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40
AD-742 200

CdS CRYSTALS

A DDC BIBLIOGRAPHY

DDC-TAS-72-36

MAY 1972

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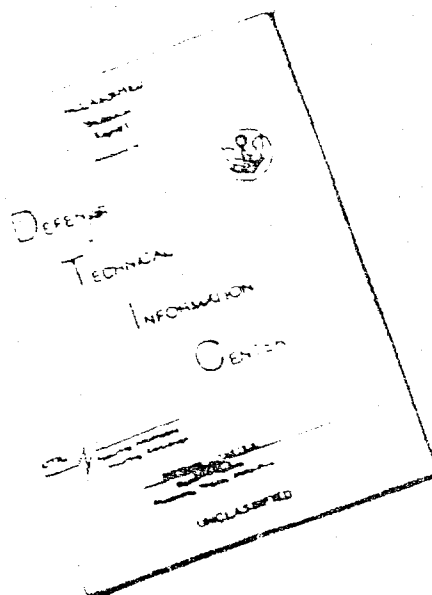
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13. ABSTRACT The references in this bibliography on Cadmium Sulfides cover the whole range of studies from the crystal growth, to the physical properties, to the uses and limitations in semiconductors, and the electronic interactions and configurations. Corporate Author-Monitoring Agency, Subject, and Title Indexes are included.			

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KEY WORDS	LINK A		LINK D		LINK C	
	HOLE	WT	HOLE	WT	HOLE	WT
*Semiconductors						
*Cadmium Sulfides						
*Crystal Growth						
*Bibliographies						
Semiconductor Devices						
Piezoelectric Transducers						
Crystals						
Single Crystals						
Solar Cells						
Excitons						
Electroluminescence						
Doping						
Raman Spectroscopy						
Acoustic Equipment						
Band Theory of Solids						
Cadmium Alloys						
Transistors						
Cadmium Selenides						
Electrical Conductance						
Photoconductivity						
Schottky Barriers						
Spin Lattice Relaxation						
Piezoelectric Crystals						
Molecular Electronics						
Transport Properties						
Zinc Compounds						
Semiconducting Films						
Triodes						
Carriers (Semiconductors)						
Delay Lines						
Phonons						
Diodes (Semiconductor)						
Field Effect Transistors						
Integrated Circuits						
Phototubes						
Lasers						
Luminescence						
Photoelectric Cells (Semiconductor)						
Photoelectric Materials						

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9 DESC. NOTE	17 TASK						
10 AUTHOR	18 M-ACRONYM						
11 DATE	19 M-SERIES						
12 PP	20 R-CLASS						

22 DISTRIBUTION/AVAILABILITY STATEMENTS

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	REKONDUKTOR SYMBOLE		MOLEKULARE SYMBOLE
	REKONDUKTOR SYMBOLE		REKONDUKTOR SYMBOLE
	SEMILEKONDUKTOR SYMBOLE		SEMILEKONDUKTOR SYMBOLE
	SINGLE CRYSTALS // SOLAR CELLS		CRYSTALS (SEMILEKONDUKTOR)
	CRYSTAL GROWTH // EXZIERUNG		CRYSTALS // PLASMAS
	ELECTROLYSE // DOPING		CRYSTALS (SEMILEKONDUKTOR)
	RAMAN SPECTROSKOPIE		CRYSTALS // PLASMAS
	ACOUSTIC SPECTROSKOPIE		CRYSTALS (SEMILEKONDUKTOR)
	BANDENLEITUNG // SOLAR		CRYSTALS SYMBOLE // PLASMAS
	SEMILEKONDUKTOR SYMBOLE // TRANSISTOR		CASES // LUMINESZENZ
	CARBON NANOETUBE		SEMILEKONDUKTOR SYMBOLE
	ELECTROLYSE // DOPING		SEMILEKONDUKTOR SYMBOLE
	PLASMA SYMBOLE	24	DESCRIPTOR CLASSIFICATION
25	IDENTIFIERS		CMHA CRD CFRD SRD SFRD
	SCOTTKEY BARRILS		OPEN-ENDED TERMS
	SPIN LATTICE RELAXATION		

9 DESC. NOTE	17 TASK
10 AUTHOR	18 M-ACRONYM
11 DATE	19 M-SERIES
12 PP	20 R-CLASS

22 DISTRIBUTION/AVAILABILITY STATEMENTS

23	DESCRIPTORS	*	DESCRIPTORS
*	CADMIUM SULFIDE SEMICONDUCTOR DEVICES PHOTOELECTRIC SEMICONDUCTOR SEMICONDUCTORS // CASSEGRAIN SINGLE CRYSTALS // SURFACE CRYSTAL GROWTH // EXCITON LASER TRANSMISSION // OPTIC RAMAN SCATTERING ACOUSTIC DEVICES DENDRIMERS THERMAL ANALYSIS // TRANSITION CRYSTALLINE ELECTRONIC TRANSPORT FILM DEPOSITION	-	* BIBLIOGRAPHIES ANALYTICAL CHEMISTRY MOLECULAR CRYSTALS PROPERTIES OF MATERIALS // ZINC SEMICONDUCTORS // TRIPODES CRYSTALS (SEMICONDUCTORS) LASER DEVICES // PHOTONICS DEVICES (SEMICONDUCTORS) LASERS OPTIC DEVICES LASERS // LUMINESCENCE PROPERTIES OF MATERIALS (SEMICONDUCTORS) PHOTOELECTRIC DEVICES

24	DESCRIPTOR CLASSIFICATION	U	C	S
	CMHA	CRD	CFRD	SRD SFRD

25	IDENTIFIERS	OPEN-ENDED TERMS
	SCHOTTKY BARRIERS SPIN LATTICE ALIGNMENT	

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4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Bibliography (March 1961 - January 1972)			
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3. REPORT DATE May 1972		7a. TOTAL NO. OF PAGES 534	7b. NO. OF REFS 413
6. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) DDC-TAS-72-36	
b. PROJECT NO.		8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD-742 200	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
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*Cadmium Sulfides						
*Crystal Growth						
*Bibliographies						
Semiconductor Devices						
Piezoelectric Transducers						
Crystals						
Single Crystals						
Solar Cells						
Excitons						
Electroluminescence						
Doping						
Raman Spectroscopy						
Acoustic Equipment						
Band Theory of Solids						
Cadmium Alloys						
Transistors						
Cadmium Selenides						
Electrical Conductance						
Photoconductivity						
Schottky Barriers						
Spin Lattice Relaxation						
Piezoelectric Crystals						
Molecular Electronics						
Transport Properties						
Zinc Compounds						
Semiconducting Films						
Triodes						
Carriers (Semiconductors)						
Delay Lines						
Phonons						
Diodes (Semiconductor)						
Field Effect Transistors						
Integrated Circuits						
Phototubes						
Lasers						
Luminescence						
Photoelectric Cells (Semiconductor)						
Photoelectric Materials						

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January 1963 - January 1972

MAY 1972

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Administrator

Defense Documentation Center

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-256 674

WESTERN RESERVE UNIV CLEVELAND OHIO

RESEARCH ON SEMICONDUCTOR SURFACES. 1. THE ANOMALOUS
FIELD EFFECT IN GERMANIUM. 2. THE FIELD EFFECT IN
CADMIUM SULFIDE (U)

MAY 61 IV NIXON, JOHN D. I

CONTRACT: DA33 019ORD3098

MONITOR: AROD 2174 1

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *ELECTRIC FIELDS,
*ELECTRON TRANSITIONS, *GERMANIUM, *SEMICONDUCTORS,
*SULFIDES, CRYSTAL LATTICES, ELECTRICAL CONDUCTANCE,
ELECTRONS, FUNCTIONS, MATERIALS, MATHEMATICAL ANALYSIS,
POLARIZATION, SINGLE CRYSTALS, SURFACES, TEMPERATURE (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-256 763

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

PROPERTIES OF CADMIUM SULFIDE, ZINC SULFIDE AND
MERCURIC SULFIDE. PARTS I-III, VOLUME I. AN ANNOTATED
BIBLIOGRAPHY (U)

MAR 61 IV ABBOTT, HELEN M. I
REPT. NO. DRD 61 2

UNCLASSIFIED REPORT

DESCRIPTORS: *BIBLIOGRAPHIES, *CADMIUM COMPOUNDS,
*LUMINESCENCE, *MERCURY COMPOUNDS, *PHOSPHORESCENT
MATERIALS, *SEMICONDUCTORS, *SULFIDES, *ZINC COMPOUNDS,
CRYSTAL STRUCTURE, CRYSTALLIZATION, CRYSTALS, ELECTRICAL
PROPERTIES, FLUORESCENCE, GROWTH, OPTICS,
PHOSPHORESCENCE, PHOTOCONDUCTIVITY, SINGLE CRYSTALS (U)

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AD-256 764

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF

PROPERTIES OF CADMIUM SULFIDE, ZINC SULFIDE AND
MERCURIC SULFIDE. PART IV. VOLUME II. AN ANNOTATED
BIBLIOGRAPHY

(U)

MAR 61 IV

REPT. NO. SRB 61 L

UNCLASSIFIED REPORT

DESCRIPTORS: •BIBLIOGRAPHIES, •LUMINESCENCE, •MERCURY
COMPOUNDS, •PHOSPHORESCENT MATERIALS, •SEMICONDUCTORS,
•SULFIDES, •ZINC COMPOUNDS, CADMIUM COMPOUNDS, CRYSTALS,
ELECTRICAL PROPERTIES, OPTICS, PHOSPHORESCENCE,
PHOTOCONDUCTIVITY, PHOTOELECTRIC CELLS (SEMICONDUCTOR),
PHOTOELECTRIC EFFECT, PHOTOTUBES, SINGLE CRYSTALS (U)

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AD-257 072

WESTERN RESERVE UNIV CLEVELAND OHIO

ENHANCED PHOTOCONDUCTANCE AND SHADOWS ON CADMIUM
SULFIDE SINGLE CRYSTALS

(U)

MAY 61 IV
CONTRACT: DA33 0190RD3098
MONITOR: AR00 2172 2

UNCLASSIFIED REPORT

DESCRIPTORS: *PHOTOCONDUCTIVITY, *SEMICONDUCTORS,
*SINGLE CRYSTALS, CADMIUM COMPOUNDS, CRYSTALS, DENSITY,
ELECTRIC FIELDS, ELECTRICAL CONDUCTANCE, ELECTRONS,
ENERGY, SULFIDES, SURFACE PROPERTIES (U)

IT IS WELL KNOWN THAT A CAPACITIVE ELECTRIC FIELD
APPLIED NORMALLY TO THE SURFACE OF MANY
SEMICONDUCTORS PRODUCES AN OBSERVABLE EFFECT ON THE
CONDUCTIVITY OF THE SEMICONDUCTOR. THE EFFECTS ON
THE RESISTANCE OF SUCH A CAPACITIVE FIELD ARE
EXPECTED TO VARY DIRECTLY WITH THE SQUARE OF THE
RESISTIVITY OF THE MATERIAL. THE DISCREPANCY
BETWEEN THE OBSERVED AND EXPECTED CHANGE IN
CONDUCTANCE ARISING FROM AN APPLIED FIELD IS USED TO
STUDY THE DENSITY AND ENERGIES OF THE SURFACE STATES
ON SEMICONDUCTORS. (AUTHOR) (U)

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AD-259 J65

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

INVESTIGATION OF CARRIER INJECTION
ELECTROLUMINESCENCE

(U)

MAY 61 IV DREBEN, A. B.; FISCHER, A. G.; MASON,

A. S.:

REPT. NO. SRI

CONTRACT: AF19 604 8018

MONITOR: AFCKL 360

UNCLASSIFIED REPORT

DESCRIPTORS: *CRYSTALS, *LUMINESCENCE, BRIGHTNESS,
CADMIUM COMPOUNDS, CRYSTAL LATTICES, ELECTRICAL
PROPERTIES, ELECTROCHEMISTRY, ELECTRON TRANSITIONS,
GROWTH, IMPURITIES, INTERMETALLIC COMPOUNDS, LASERS,
LIGHT, PHOSPHORESCENT MATERIALS, SELENIDES,
SEMICONDUCTORS, SULFIDES, SYNTHESIS, TELLURIDES, VACUUM
APPARATUS, ZINC COMPOUNDS (U)

INJECTION ELECTROLUMINESCENCE IS THE CONVERSION OF
ELECTRICAL ENERGY INTO LIGHT ENERGY BY WAY OF
RADIATIVE RECOMBINATION OF ELECTRONS AND HOLES WHICH
ARE INJECTED FROM TWO SEPARATE, OHMIC CONTACTS, INTO
THE VOLUME OF A CRYSTAL. MANY IMPORTANT
APPLICATIONS AWAIT THE PRACTICAL AVAILABILITY OF
INJECTION EL LIGHT SOURCES. SINCE THE LIGHT
SOURCE IS COMPACT, SHOCK-RESISTANT AND COOL, IT MIGHT
BE SUITABLE FOR SPECIAL APPLICATIONS SUCH AS LASER
EXCITATION. THE PREPARATION OF ZNSE CRYSTALS
SUITABLE FOR INJECTION EL IS DISCUSSED. IN ORDER
TO GROW BETTER CRYSTALS, SEVERAL METHODS WERE
DEVELOPED FOR MELTING SELENIDES AND SULFIDES ABOVE
ATMOSPHERIC PRESSURE IN SELENIUM OR SULFUR VAPORS
RESPECTIVELY. A NEW APPARATUS FOR CZOCHRALSKI
PULLING OF DECOMPOSABLE SOLIDS UNDER PRESSURE
ETROLLED ZONE-SUBLIMATION-RECRYSTALLIZATION FOR
VAPOR-PHASE GROWTH OF ZNTE AND ZNSE ARE
DESCRIBED. THE DESIGN AND OPERATION OF A NEW
VACUUM SYSTEM FOR EPITAXIAL GROWTH OF MULTIPLE LAYERS
IS OUTLINED. (AUTHOR) (U)

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AD-257 661

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

ELECTRON MOBILITY IN CADMIUM SULPHIDE SINGLE CRYSTALS
AT LOW TEMPERATURES (U)

MAR 61 IV DEL DO, LOUIS JOSEPH;
REPT. NO. GNE PHYS 61 4

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *ELECTRON TRANSITIONS,
*HALL EFFECT, *SEMICONDUCTORS, *SINGLE CRYSTALS, *SOLID
STATE PHYSICS, DETERMINATION, ELECTRIC POTENTIAL,
ELECTRICAL PROPERTIES, ELECTRONS, LOW TEMPERATURE
RESEARCH, MEASUREMENT, RESISTANCE (ELECTRICAL),
SULFIDES, TEMPERATURE, THEORY (U)

THE DEPENDENCE OF ELECTRON MOBILITY ON TEMPERATURE
FOR CHARGE CARRIERS IN SINGLE CRYSTALS OF CDS WAS
INVESTIGATED BETWEEN 4.2 AND 273 K. THE MOBILITY,
 μ , WAS OBTAINED BY DETERMINING THE VALUE OF THE
HALL CONSTANT AND THE CRYSTAL RESISTIVITY. THE
CRYSTALS WERE SHAPED INTO PARALLELEPIPEDS AND PREPARED
FOR ELECTRICAL MEASUREMENTS BY APPLYING INDIUM
CONTACTS ON THEIR SURFACES BY ULTRASONIC TECHNIQUES.
ELECTRICAL MEASUREMENTS WERE CONDUCTED IN A LIQUID
HELIUM CRYOSTAT. THE MOBILITY, THE HALL
CONSTANT, THE RESISTIVITY, AND THE CHARGE CARRIER
DENSITY WERE PLOTTED AS A FUNCTION OF $1/T$. THE
MOBILITY INCREASED RAPIDLY FROM 273 K TO A MAXIMUM
NEAR 25 K AND THEN DECREASED SHARPLY NEAR 4.2 K.
ANALYSIS OF THE DATA INDICATED THAT THE EXPERIMENTAL
BEHAVIOR OF THE MOBILITY OF CHARGE CARRIERS AT LOW
TEMPERATURES CAN BE EXPLAINED IN TERMS OF IMPURITY
BAND CONDUCTION. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZMT

AD-259 883

EAGLE-PICHER RESEARCH LABS MIAMI OKLA

RESEARCH IN PURIFICATION OF CADMIUM SULFIDE
CRYSTALS

(U)

APR 61 IV FAHRIG, R.H.; BEAN, K.E.;
CONTRACT: AF33 616 6203
MONITOR: ARL 14

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM, *CADMIUM COMPOUNDS,
*PHOTOELECTRIC CELLS (SEMICONDUCTOR), *PHOTOTUBES,
*SEMICONDUCTORS, *SINGLE CRYSTALS, *SOLAR CELLS,
*SULFIDES, *SULFUR, CRUCIBLES, CRYSTALLIZATION,
CRYSTALS, ENERGY CONVERSION, GROWTH, HEAT TREATMENT,
MATERIALS, MELTING, PREPARATION, PROCESSING,
PURIFICATION, REFRACTIVE INDEX, RESISTANCE (ELECTRICAL),
SINTERING, SYNTHESIS (U)

THE PURIFICATION OF CD AND S, AND THE
SUBSEQUENT SYNTHESIS OF SPECTROGRAPHICALLY PURE
CDS FROM THE REFINED ELEMENTS IS DESCRIBED. THE
GROWTH OF LARGE CRYSTALS OF CDS BY THE METHOD OF
VAPOR PHASE DEPOSITION IS DISCUSSED. MODIFICATIONS
OF APPARATUS AND METHOD ARE DESCRIBED AND
ILLUSTRATED. THE RESULTS OF STUDIES CONCERNING RAW
MATERIALS, SINTERING, DOPING, DIFFUSION AND HEAT
TREATING ARE GIVEN. A SECTION DEALING WITH THE
MELTING AND CRYSTALLIZATION OF CADMIUM SULFIDE AND
OTHER MATERIALS IN A PRESSURE MELTING FURNACE IS
PRESENTED. THE TESTING AND EVALUATION OF CADMIUM
SULFIDE CRYSTALS SUITABLE FOR SOLAR CELLS IS
DESCRIBED. (AUTHOR)

(U)

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AU-261 116

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO PHYSICS
LAB

PHOTOCONDUCTIVITY IN CDS CRYSTALS AS A MECHANISM FOR
GAMMA RAY DOSIMETRY (U)

IV SESSOMS, O. VAN P. I

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *PHOTOCONDUCTIVITY,
CRYSTALS, DETECTION, DOSE RATE, DOSIMETERS, ELECTRIC
CURRENTS, GAMMA RAYS, MEASUREMENT, PHOTOELECTRIC EFFECT
(GAMMA RAYS), PHOTOELECTRIC MATERIALS, RADIATION DAMAGE,
RADIATION MEASUREMENT SYSTEMS COMPONENTS,
SEMICONDUCTORS, SULFIDES (U)

GAMMA RAY INDUCE CHANGES IN THE CONDUCTIVITY OF
CDS CRYSTALS ARE STUDIED AS A POSSIBLE MECHANISM
FOR MONITORING GAMMA DOSE RATES. DATA ARE
PRESENTED ON THE CHANGE IN CONDUCTIVITY DUE TO GAMMA
EXPOSURE OVER A RANGE OF 140,000 ERGS/G HR TO
55 X 1100 TTUO TTTHHEE 77TTHH PPOOWWEERR
EERRGGSS//GG HHRN (C)). TT HH EE (U)

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AD-264 31U

GENERAL ELECTRIC CO SCHENECTADY N Y

INVESTIGATION OF SEMICONDUCTING PROPERTIES OF II-VI
COMPOUNDS (U)

AUG 61 IV AVEN. M. IPIPER, W. W. I
REPT. NO. SR1
CONTRACT: AF19 604 8512
MONITOR: AFCHL 776

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DESCRIPTORS: *COPPER, *GOLD, *SEMICONDUCTING FILMS,
*SEMICONDUCTORS, *SINGLE CRYSTALS, BROMINE, CADMIUM
COMPOUNDS, CRYSTALS, DIFFUSION, ELECTRICAL PROPERTIES,
EPITAXIAL GROWTH, GALLIUM, GROWTH, HALL EFFECT,
IMPURITIES, SELENIDES, SULFIDES, TELLURIDES, VAPOR
PLATING, ZINC COMPOUNDS (U)

THE POSSIBILITY OF USING CU OR AU AS P-TYPE
DOPANTS IN CDS HAS BEEN EXPLORED. ANALYTICAL
TECHNIQUES FOR DETERMINING THE AMOUNT OF TOTAL AND
THE APPROXIMATE PROPORTION OF UNCOMPENSATED CU IN
CDS HAVE BEEN DEVELOPED. INVESTIGATION OF
DIFFERENT METHODS OF PRODUCING UNCOMPENSATED ZNSE
HAS LED TO A NOVEL TECHNIQUE OF PRODUCING N-TYPE
ZNSE WITH FAIRLY GOOD TRANSPORT PROPERTIES.
STRUCTURES CONSISTING OF EPITAXIAL FILMS OF
HEXAGONAL N-TYPE CDS ON CUBIC P-TYPE ZNTE
SINGLE CRYSTALS HAVE BEEN STUDIED WITH RESPECT TO
THEIR CRYSTALLOGRAPHIC AND ELECTRICAL PROPERTIES.
(AUTHOR) (U)

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AD-264 433

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

INVESTIGATION OF CARRIER INJECTION
ELECTROLUMINESCENCE

(U)

AUG 61 IV FISCHER, A.G. IMASON, A.S. I
REPT. NO. SR2
CONTRACT: AF19 604 8J18
MONITOR: AFCHL 721

UNCLASSIFIED REPORT

DESCRIPTORS: LUMINESCENCE, ARSENIC, BROMINE, CADMIUM
COMPOUNDS, CIRCUITS, CONTROL SYSTEMS, CRYSTALS,
FEEDBACK, GALLIUM COMPOUNDS, GLASS, GROWTH, NITROGEN,
PHOSPHORUS, RADIOFREQUENCY POWER, SELENIDES, SOLID STATE
PHYSICS, SULFIDES, TELLURIDES, ZINC COMPOUNDS (U)

IT WAS FOUND THAT VERTICAL CRYSTAL PULLING OF
ZNSE AND CDS IS POSSIBLE ONLY IN
PRESSURIZED ATMOSPHERES OF UNSATURATED VAPORS, SINCE
SATURATED VAPORS ARE TOO OPAQUE TO PERMIT VISIBILITY.
SEVERAL NEW SYSTEMS FOR CRYSTAL GROWTH UNDER
PRESSURE ARE DESCRIBED, AND A NEW FEEDBACK CIRCUIT
FOR CONTROL OF THE RF GENERATOR HAS BEEN INVENTED.
THE PROPERTIES OF MELT-GROWN ZNSE HAVE BEEN
INVESTIGATED, AND AN EXTENSIVE SURVEY OF CONTACTS TO
ZNSE WAS INITIATED. ZNSE AND CDS FORM
SOLID SOLUTIONS, WHEREAS CDS AND ZNTE ARE
IMMISCIBLE. MATERIALS WHICH HOLD PROMISE FOR THE
PREPARATION OF ALLOYED CONTACTS HAVE BEEN FOUND.
SEVERAL SINGLE AND MULTIPLE FILMS WITH INTERESTING
PROPERTIES HAVE BEEN OBTAINED BY EVAPORATION, AND AN
ANALYSIS OF SCL HOLE CURRENTS IN ZNSE HAS BEEN
CARRIED OUT. IT HAS BEEN FOUND THAT A GLASS
CONSISTING OF AS-S-BR IS TRANSPARENT FROM .5 TO
13 MICRONS WAP CRYSTALS HAVE BEEN PREPARED BY
VAPOR PHASE REACTION STARTING FROM GAN.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-267 444

LABORATOIRE D'INFRA ROUGE TECHNIQUE ET APPLIQUE GIF-SUR-
YVETTE (FRANCE)

SEP 61 IV
CONTRACT: N62558 272U

UNCLASSIFIED REPORT

DESCRIPTORS: CADMIUM COMPOUNDS, CRYSTALS, ELECTRON
BOMBARDMENT, ELECTRON TRANSITIONS, INFRARED
SPECTRAPHOTOMETERS, PHOTOELECTRIC EFFECT,
PHOTOMULTIPLIERS, POTENTIAL METERS, RADIATION EFFECTS,
SECONDARY EMISSION, SEMICONDUCTORS, SILICON, SOLID STATE
PHYSICS, SULFIDES, TEST EQUIPMENT, THEORY, ZINC
COMPOUNDS (U)

MIXED CADMIUM AND ZINC SULFIDES WERE OBTAINED WITH
A VIEW TO TESTING WHETHER A COINCIDENCE IS STILL
OBSERVED BETWEEN THE ABSORPTION EDGE OF THE SPECTRUM
AND THE WAVELENGTH OF THE LIGHT EMITTED. THE MAIN
RESULTS ARE THOSE OBTAINED FROM STUDIES AT LIQUID AIR
TEMPERATURE. ON CERTAIN SAMPLES A COMPLEX LIGHT
IS OBTAINED, CONTAINING A YELLOW BAND, A GREEN BAND
AND A BLUE BAND AT ABOUT 4900 ANGSTROMS, THIS
WAVELENGTH CORRESPONDING TO THAT OF THE ABSORPTION
EDGE AT THE SAME TEMPERATURE. ON OTHER CRYSTALS
HOWEVER, THIS BAND IS VERY WEAK OR DISAPPEARS
COMPLETELY. IN THESE CASES ONLY THE GREEN BAND,
FAIRLY COMPLEX IN STRUCTURE, AND THE YELLOW BAND
APPEAR. ALL THE CHARACTERISTICS OF THE PHENOMENON
APPEAR TO INDICATE THAT THE LIGHT OBSERVED IS DUE TO
A DIRECT RETURN FROM THE CONDUCTION BAND TO THE
VALENCE BAND, OR TO A RETURN FROM A LEVEL VERY CLOSE
TO THE CONDUCTION BAND TO THE VALENCE BAND.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-268 932
PHILCO CORP BLUE BELL PA

ELECTROQUENCHABLE PHOSPHOR INVESTIGATION (U)

DEC 61 IV

UNCLASSIFIED REPORT

DESCRIPTORS: *CATHODE RAY TUBE SCREENS,
*PHOSPHORESCENCE, *PHOSPHORESCENT MATERIALS, BRIGHTNESS,
CADMIUM COMPOUNDS, DISPLAY SYSTEMS, FILMS, LUMINESCENCE,
MEASUREMENT, SULFIDES, ZINC COMPOUNDS (U)

RESEARCH WAS DEVOTED TO THE INVESTIGATION OF ELECTROPHOTOLUMINESCENT EFFECTS IN PHOSPHORS AND THE DEVELOPMENT OF TECHNIQUES LEADING TO THE UTILIZATION OF THESE EFFECTS IN USEFUL DISPLAY DEVICES. IT IS SHOWN THAT EFFICIENT ELECTROQUENCHABLE (EQ) CELLS CAN BE MADE, USING EVAPORATED PHOSPHOR FILMS AND SOLID CONTACTS. THE PHOSPHOR FILMS THEMSELVES HAVE A VERY HIGH PHOTOLUMINESCENT EFFICIENCY, AND MAY HAVE FUTURE USE AS HIGH RESOLUTION SCREENS IN CATHODE-RAY TUBES, ETC. VERY HIGH EFFICIENCIES, AS FAR AS QUENCHING IS CONCERNED, WERE MEASURED. THE THEORETICAL CURRENT REQUIRED FOR COMPLETE QUENCHING OF A PHOSPHOR HAVING 10 FT-LAMBERTS OF BRIGHTNESS IS 7.5 MICROAMPERE PER SQ CM IF THE PHOSPHOR IS 100% EFFICIENT. CURRENT CORRESPONDING TO APPROXIMATELY 100 MICROAMPERE SQ CM WAS MEASURED ON SOME CELLS. THE SWITCHING SPEED OF THESE CELLS CAN BE HIGH. SWITCHING SPEEDS WERE MEASURED BY CONTROLLING A CELL WITH A 60-OHM PER-SQUARE-WAVE VOLTAGE. THE CELLS MEASURED WERE COMPLETELY QUENCHED IN LESS THAN 20 MICROSECONDS, AND REACHED THEIR FULL BRIGHTNESS IN LESS THAN 20 MICROSECONDS AFTER THE QUENCHING VOLTAGE WAS REMOVED.
(AUTHOR) (U)

UNCLASSIFIED

CDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-273 974

GIANNINI CONTROLS CORP DUARTE CALIF

A NEW FORM OF SOLID STATE SOLAR GENERATOR

(U)

JAN 62 IV FABRICIUS, E.O. I
REPT. NO. TR61 564
CONTRACT: AF33 616 7637
MONITOR: ASD TR61 564

UNCLASSIFIED REPORT

DESCRIPTORS: *ELECTRIC POWER PRODUCTION, *GENERATORS,
*PHOTOCONDUCTIVITY, *PHOTOELECTRIC CELLS
(SEMICONDUCTOR), *PHOTOTUBES, *SEMICONDUCTORS, *SONAR
DOMES, CADMIUM COMPOUNDS, DESIGN, METALS, SOLID STATE
PHYSICS, SULFIDES (U)

AN INVESTIGATION WAS MADE OF VARIABLE VOLTAGE
PHOTOVOLTAIC CONVERTERS FOR A NEW FORM OF SOLID STATE
SOLAR GENERATOR. VALUABLE INFORMATION RELATED TO
THE ORIGIN OF THE PHOTOCONDUCTING ELECTRONS IN THE
PHOTOVOLTAIC EFFECT IN CDS WAS OBTAINED. THIS
INFORMATION IS PERTINENT TO THE DESIGN AND
CONSTRUCTION OF METAL-SEMICONDUCTOR SOLAR CELLS, IN
THAT BOTH THE PHOTOVOLTAGE AND THE EFFICIENCY OF
METAL-SEMICONDUCTOR CELLS IS DEPENDENT UPON WHETHER
ELECTRONS ARE INJECTED FROM THE METAL OR EXCITED
ACROSS THE FORBIDDEN GAP OF THE SEMICONDUCTOR. THE
EFFECTS OF GEOMETRY, FILM THICKNESS OF RECTIFYING
ELECTRODE, AND RESISTIVITY OF CDS UPON THE
PHOTOVOLTAGE OBTAINABLE WERE ALSO STUDIED. THE
ORIGIN OF THE ELECTRONS PRODUCING THE PHOTOCURRENT
WAS DETERMINED AND A GEOMETRY FOR OPTIMIZING THE
PHOTOCURRENT IS GIVEN. CELLS DESIGNED BY
EVAPORATING CONTACTS CONNECTED IN SERIES ARE SHOWN TO
GIVE AN ADDITIVE PHOTOVOLTAGE. SUGGESTIONS FOR
IMPROVING THE EFFICIENCY ARE GIVEN IN THE LIGHT OF
EXPERIMENTAL EVIDENCE. WHILE BATTERIES PRODUCING
9V WERE NOT SUCCESSFULLY CONSTRUCTED DUE TO
EXPERIMENTAL DIFFICULTIES, THE EVIDENCE OBTAINED
VERIFIES THE FEASIBILITY OF THE BASIC DESIGN.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-276 416

AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

RESEARCH IN PURIFICATION OF CADMIUM SULFIDE CRYSTALS
AND OTHER II-IV COMPOUNDS (U)

MAR 62 IV BEAN, K.E.; FAHRIG, R.H.;
REPT. NO. 62 319

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *PHOTOELECTRIC CELLS
(SEMICONDUCTOR), *PHOTOTUBES, *SEMICONDUCTORS, *SINGLE
CRYSTALS, *SOLAR ATMOSPHERE, *ZINC COMPOUNDS, CRUCIBLES,
ENERGY CONVERSION, GROWTH, IMPURITIES, MANUFACTURING
METHODS, METALLIC SMOKE DEPOSITS, OPTICS, OXIDES,
PRODUCTION, PURIFICATION, SELENIDES, SULFIDES,
SYNTHESIS, TELLURIDES, VAPOR PLATING (U)

SELECTED ELEMENTS FROM GROUPS II AND VI WERE
PURIFIED AND SYNTHESIZED TO FORM HIGH PURITY
COMPOUNDS AS FOLLOWS: CADMIUM SULFIDE; ZINC SULFIDE;
CADMIUM TELLURIDE; CADMIUM OXIDE; AND CADMIUM
SELENIDE. THE GROWTH OF CRYSTALS FROM THESE
COMPOUNDS BY BOTH THE MELT AND VAPOR PHASE METHODS IS
DISCUSSED. EVALUATIONS OF THE ELECTRICAL AND
OPTICAL PROPERTIES OF THESE MATERIALS ARE PRESENTED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-281 718
CLEVITE CORP CLEVELAND OHIO

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,
JUN 62 162P SHIOZAWA, L. R.; BARRETT,
J. L. I
CONTRACT: AF 33(616)6865
PROJ: 7041
MONITOR: ARL 62-365

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *SEMICONDUCTORS,
*SINGLE CRYSTALS, *ZINC COMPOUNDS, CRYSTAL LATTICES,
CRYSTALS, DIELECTRIC PROPERTIES, DIFFERENTIAL GEOMETRY,
ELECTRICAL PROPERTIES, GROUP II ELEMENTS, GROUP VI
ELEMENTS, GROWTH, HALL EFFECT, MATERIALS, PHYSICAL
PROPERTIES, PREPARATION, PURIFICATION, REFRACTIVE INDEX,
SELENIDES, SOLID STATE PHYSICS, SULFIDES, TELLURIDES,
ZONE MELTING (U)

PREPARATION, PURIFICATION, CRYSTAL GROWTH, AND
MEASUREMENT OF THE FUNDAMENTAL BULK PROPERTIES OF
CdS, CdSe, ZnTe, AND CdS-CdSe
MIXED CRYSTALS ARE SUMMARIZED. LARGE SINGLE
CRYSTALS OF CdS, CdSe, AND ZnTe WERE
PREPARED BY THE REYNOLDS-GREENE SUBLIMATION
METHOD. CdSe CRYSTALS WERE ALSO PREPARED BY
GRADIENT FREEZING. METHODS FOR PREPARING TEST
SPECIMENS FOR ELECTRICAL AND OPTICAL MEASUREMENTS ARE
PRESENTED. PROCEDURES FOR CONDUCTING HIGH-
TEMPERATURE EQUILIBRIUM STUDIES ON CdSe ARE
DISCUSSED. EXTENSIVE HALL-EFFECT AND
CONDUCTIVITY MEASUREMENTS BETWEEN 77 AND 500 K WERE
MADE ON MISCELLANEOUS CRYSTALS. OTHER MEASUREMENTS
INCLUDED MELTING POINTS, REFRACTIVE INDEXES, ELASTIC,
DIELECTRIC, PIEZOELECTRIC AND LATTICE CONSTANTS.
CORRELATIONS WERE OBTAINED BETWEEN THE SIGN OF THE
POLAR AXIS IN CdSe AND ZnTe AND THE X-RAY
DETERMINED AB LAYER ORDER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-282 527

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD
MASS

INVESTIGATION OF SEMICONDUCTING PROPERTIES OF II-VI
COMPOUNDS (U)

JUN 62 IV AVEN. M. WOODBURY, H. H. I

UNCLASSIFIED REPORT

DESCRIPTORS: •SEMICONDUCTING FILMS, •SEMICONDUCTORS,
•SINGLE CRYSTALS, ATOMIC ENERGY LEVELS, CADMIUM
COMPOUNDS, COPPER, CRYSTAL STRUCTURE, ELECTRICAL
PROPERTIES, EPITAXIAL GROWTH, GROUP II ELEMENTS, HALL
EFFECT, IMPURITIES, SELENIDES, SOLID STATE PHYSICS,
SULFIDES, TELLURIDES, TRANSPORT PROPERTIES, ZINC
COMPOUNDS (U)

USING A RADIOACTIVE TRACER TECHNIQUE, IT WAS
DEMONSTRATED THAT BY FIRING II-VI COMPOUNDS IN
SUITABLE LIQUID METALS, CU CAN BE EFFECTIVELY
EXTRACTED FROM THESE MATERIALS. ENERGY LEVELS
APPROXIMATELY 1 EV BELOW THE CONDUCTION BAND EDGE
WERE FOUND IN CDS FIRED UNDER HIGH SULFUR
PRESSURES. THE PRESENCE OF THESE LEVELS APPEAR TO
FIX THE FERMI LEVEL IN SEMI-INSULATING CDS, AND
IT HAS NOT BEEN FOUND POSSIBLE TO FURTHER LOWER THE
FERMI LEVEL EITHER BY VERY HIGH PRESSURE SULFUR
FIRING OR THE INCORPORATION OF THE ACCEPTOR
IMPURITIES CU, AG OR AU. LIQUID CD FIRING
OF SOME HIGH PURITY CDS SAMPLES HAS YIELDED A
MATERIAL SHOWING AN ELECTRON MOBILITY MAXIMUM OF 11,
000 SQ. CM/VOLT SEC. STUDY OF THE GROWTH HABITS OF
CDS ON ZNTE SHOWED THAT AN EPITAXIAL DEPOSIT
OF CDS CAN BE OBTAINED ONLY ON THE (111)
ZN FACES OF ZNTE. REASONS FOR THIS FINDING
ARE DISCUSSED IN TERMS OF THE THERMAL ETCH PATTERNS
AND THE BONDING CHARACTERISTICS OF II-VI COMPOUNDS.
DOUBLE INJECTION AND NEGATIVE RESISTANCE BEHAVIOR
HAS BEEN OBSERVED IN ZNTE-CDS HETEROJUNCTIONS
WITH WIDE COMPENSATED REGIONS BETWEEN THE P AND THE N
PARTS OF THE JUNCTION. A TENTATIVE BAND MODEL HAS
BEEN PROPOSED FOR THE ZNTE-CDS JUNCTIONS ON
THE BASIS OF THIS AND OTHER EXPERIMENTAL FINDINGS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-264 547

NATIONAL CASH REGISTER CO DAYTON OHIO

FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN
FILM PHOTOVOLTAIC CONVERTERS (U)

APR 62 IV CHAMBERLIN, R.R. I
REPT. NO. 62 637TP1058 822
CONTRACT: AF19 604 6201
MONITOR: AFCL 62 637

UNCLASSIFIED REPORT

DESCRIPTORS: *PHOTOELECTRIC CELLS (SEMICONDUCTOR),
*PHOTOTUBES, *SEMICONDUCTING FILMS, *SEMICONDUCTORS,
CADMIUM COMPOUNDS, COATINGS, CONDUCTORS, COPPER
COMPOUNDS, CRYSTALS, ELECTRODEPOSITION, ELECTRODES,
ELECTRON MICROSCOPY, FEASIBILITY STUDIES, GALLIUM, GOLD,
INDIUM, INDIUM COMPOUNDS, MANUFACTURING METHODS,
MATERIALS, OXIDES, SULFIDES, TIN COMPOUNDS, X-RAY
DIFFRACTION ANALYSIS (U)
IDENTIFIERS: THIN FILMS, THIN FILMS (M)
ELECTRONICS (M)

THE FEASIBILITY OF A CHEMICAL SPRAY PROCESS FOR ITS
APPLICATION TO THE FABRICATION OF THIN FILM
PHOTOVOLTAIC CONVERTERS USING EITHER CDS OR
CDSE AS THE SEMICONDUCTING LAYER IS BEING
INVESTIGATED. EVALUATION OF THE SEMICONDUCTING
LAYER (CDS) AND THE INITIAL WORK IN FABRICATING A
PHOTOVOLTAIC CONVERTER UTILIZING A BARRIER FORMED AT
THE INTERFACE BETWEEN A THIN (.5 MICRON) FILM OF
CDS AND A THIN FILM (.05 MICRON) OF CU9-
XSS(DIGENITE) IS REPORTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-283 953

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

ANISOTROPY IN THE ELECTRON MOBILITY OF SINGLE CADMIUM
SULFIDE CRYSTALS AT LOW TEMPERATURES (U)

MAY 62 IV GOODSON, HARRY C. I
REPT. NO. GNE PHYS 62 8

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *ELECTRONS, *SINGLE
CRYSTALS, *SULFIDES, ANISOTROPY, CRYSTAL STRUCTURE,
ELECTRICAL CONDUCTANCE, ELECTRICAL PROPERTIES, HALL
EFFECT, LABORATORY EQUIPMENT, LOW TEMPERATURE RESEARCH,
PREPARATION, RESISTANCE (ELECTRICAL), SEMICONDUCTORS,
SOLID STATE PHYSICS (U)

THE POSSIBILITY OF THE EXISTENCE OF A MEASURABLE
ANISOTROPY IN THE ELECTRON MOBILITY OF CDS WAS
INVESTIGATED BETWEEN 8 AND 293 K, USING
CROSSSHAPED, BULK SINGLE CRYSTALS. THE MOBILITY
AT EACH TEMPERATURE WAS OBTAINED FROM THE RELATION
 $\mu = E_{SUB Y} / E_{SUB X} B$ WHERE $E_{SUB Y}$ IS THE
HALL FIELD, $E_{SUB X}$ THE CRYSTAL FIELD, AND B
THE MAGNETIC FIELD. DYNAMIC MEASUREMENTS LEADING
TO THE CALCULATED MOBILITIES BETWEEN 8 AND 293 K
WERE MADE IN A LIQUID HELIUM CRYOSTAT. A
POTENTIOMETER, MULTI-CHANNEL RECORDER WAS USED TO
RECORD ALL ELECTRICAL MEASUREMENTS. THE CURRENT
WAS DIRECTED PARALLEL TO THE C-AXIS OF THE CRYSTAL IN
ONE TEST; THE CONTACTS AND LEADS WERE THEN REORIENTED
AT A 90 DEGREE ANGLE, AND THE CURRENT WAS DIRECTED
PERPENDICULAR TO THE C-AXIS. THE ELECTRON MOBILITY
WAS PLOTTED AS A FUNCTION OF $1/T$ BETWEEN 8 AND 293
K. ANALYSIS INDICATES THAT MEASURABLE ANISOTROPY
DOES EXIST, AND THAT A REVERSAL OCCURS AT ABOUT 30
K. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-284 015

AIR FORCE INST OF TECH WRIGHT-PATTENSON AFB OHIO

TEMPERATURE DEPENDENCE OF LINE STRUCTURE OF CADMIUM
SULFIDE EDGE EMISSION (U)

MAY 62 IV ANDERS, WILLIAM ALISON
REPT. NO. GNE PHYS 62 1

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *FLUORESCENCE,
*SEMICONDUCTORS, *SULFIDES, CRYSTALS, LOW TEMPERATURE
RESEARCH, PHOTOCONDUCTIVITY, PHOTOELECTRIC EFFECT,
TEMPERATURE, TEST EQUIPMENT, ULTRAVIOLET RADIATION (U)

THE TEMPERATURE DEPENDENCE OF THE LINE STRUCTURE IN
CdS EDGE EMISSION STIMULATED BY UV LIGHT WAS
INVESTIGATED FROM 4.2 K TO 367 K. THE SPECTRAL
SHIFT OF THE FINE STRUCTURE OBSERVED AT 4.2 K WAS
FOLLOWED TO 77 K WHERE THE INDIVIDUAL LINES
BROADENED AND MERGED INTO GROUPS. THE TEMPERATURE
DEPENDENCE OF THE PRIMARY LINE GROUPS IS A LINEAR
FUNCTION OF TEMPERATURE ABOVE 220 K WITH
COEFFICIENTS OF CHANGE OF 1.27 AND 1.8 ANGSTROMS
DEGREE K FOR THE LINES OBSERVED. BELOW 220 K
THE DEPENDENCE DEPARTS FROM LINEARITY AND APPROACHES
ITS LIMITING VALUE MORE RAPIDLY WITH DECREASING
TEMPERATURE. STRIATIONS, DUE TO VARIATIONS OF THE
LUMINESCENT PROPERTIES OVER THE SURFACE OF THE
CRYSTAL, WERE OBSERVED IN EMISSION SPECTRA. THESE
STRIATIONS WERE USED TO ADVANTAGE IN THE RESOLUTION
OF THE VARIOUS BROAD OVERLAPPING BANDS FOUND IN THE
EMISSION SPECTRUM AT HIGHER TEMPERATURE. TWO
INDIVIDUAL BANDS WERE RESOLVED IN THE ROOM
TEMPERATURE SPECTRUM WITH PEAKS AT 5090 AND 5275
ANGSTROMS. (AUTHOR) (U)

UNCLASSIFIED

JDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-284 J2U

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

AN EVALUATION OF CADMIUM SULFIDE AS A NUCLEAR
RADIATION DETECTOR

(U)

AUG 62 IV MILLS, DARREL LEROY;
REPT. NO. GNE PHYS 62 10

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *CRYSTALS, *DETECTORS,
*SULFIDES, RADIATION MEASUREMENT SYSTEMS COMPONENTS,
SOLID STATE PHYSICS (U)

SOLID STATE RADIATION DETECTORS WERE CONSTRUCTED USING CRYSTAL PLATELETS OF CDS. BOTH INTRINSIC AND P-N JUNCTION DETECTORS WERE MADE AND EVALUATED. ALTHOUGH ALPHA PARTICLES WERE DETECTED BY BOTH TYPES OF DETECTORS, THE MOBILITY-LIFETIME PRODUCT OF THE CHARGE CARRIERS RESULTED IN THE PULSE RESPONSE NOT BEING PROPORTIONAL TO THE ENERGY OF THE INCIDENT PARTICLE. THE BEST EXPERIMENTAL VALUE FOR THE MOBILITY-LIFETIME PRODUCT IN CDS WAS 2.6×10^{10} TO THE SIXTH POWER SQ CM/VOLT FOR THE ELECTRONS AND 2.1×10^{10} TO THE SIXTH POWER SQ CM/VOLT FOR THE HOLES. ALSO AN EXPERIMENTAL VALUE OF 5.2 ELECTRON VOLTS DISSIPATED PER HOLE-ELECTRON PAIR FORMED WAS DETERMINED. A RESOLUTION OF 6.8% WAS OBTAINED WITH ONE DETECTOR. OTHER PHENOMENA SUCH AS THE TRAPPING OF THE CHARGE CARRIERS AND THE IONIZATION OF NEUTRAL IMPURITY ATOMS ALSO WERE EVIDENT IN THE CRYSTAL. (AUTHOR)

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-284 032

HARSHAW CHEMICAL CO CLEVELAND OHIO

RESEARCH ON SOLAR-ENERGY CONVERSION EMPLOYING CADMIUM
SULFIDE (U)

APR 62 IV SHIRLAND, FRED A.; WOLFF, G. A.; NIXON,
JOHN D.;

REPT. NO. 4

CONTRACT: DAJ6 039SC67289

MONITOR: ASD TDR-62-69

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *SOLAR CELLS, *SOLAR
RADIATION, FILMS, MANUFACTURING METHODS, SEMICONDUCTORS,
SINGLE CRYSTALS, SULFIDES (U)

RESEARCH ON SOLAR ENERGY CONVERSION EMPLOYING CDS
GROWTH, ANNEALING, ETCHING AND ORIENTATION OF CDS
SINGLE CRYSTALS AND FILMS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-286 829

WESTINGHOUSE ELECTRIC CORP PITTSBURGH PA

ELECTROLUMINESCENT-PHOTOCONDUCTOR ELEMENTS (U)

AUG 62 IV WOLFE, P.N.; JOHNSON, J.E.; HARPER, W.J.
REPT. NO. TDR62 533
CONTRACT: AF33 616 8020
MONITOR: ASD TDR62 533

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *LUMINESCENCE,
*PHOTOCONDUCTIVITY, *SULFIDES, ABSORPTION, EVAPORATION,
GROWTH, INFRARED PHOTOCONDUCTORS, PHOTOELASTICITY,
PHOTOELECTRIC CELLS (SEMICONDUCTOR), PHOTOELECTRIC
EFFECT, PHOTOTUBES, PULSE MODULATION, SINGLE CRYSTALS,
THIN FILMS (STORAGE DEVICES) (U)

A MATERIALS IMPROVEMENT PROGRAM WAS UNDERTAKEN.
ELECTROLUMINESCENCE STUDIES WERE CONCENTRATED ON
DC-PULSE-EXCITED THIN FILM ELECTROLUMINORS, WHOSE
RELEVANT PROPERTIES SUCH AS RESPONSE SPEED, QUANTUM
EFFICIENCY, SPECTRAL OUTPUT, TEMPERATURE DEPENDENCE,
AND MAINTENANCE ARE SUMMARIZED. RESEARCH ON
PHOTOCONDUCTORS WAS CONCERNED WITH PREPARATION
TECHNIQUES FOR HIGH-PURITY SINGLE CRYSTALS AND
EVAPORATED FILMS OF CADMIUM SULFIDE, AND WITH
PERFORMANCE IMPROVEMENTS ATTAINABLE IN SINGLE
CRYSTALS BY OPTIMIZING TRAP DISTRIBUTIONS. IT WAS
CONCLUDED THAT THE DESIRED LOGIC ELEMENT SPEED IS NOT
LIKELY TO BE ATTAINED WITH SIMPLE, TWO-TERMINAL
ELECTROLUMINORS AND PHOTOCONDUCTORS, BUT RATHER WILL
REQUIRE THE USE OF DEVICES INCORPORATING ADDITIONAL
GAIN, POSSIBLY THREETERMINAL ELECTROLUMINORS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-288 U6U
HARSHAW CHEMICAL CO CLEVELAND OHIO

AUG 62 IV HEYENDAHL, NOHMAN E. I
REPT. NO. 62 395
CONTRACT: AF33 616 6548
MONITOR: ARL 62 395

UNCLASSIFIED REPORT

DESCRIPTORS: *PHOTOELECTRIC CELLS (SEMICONDUCTOR),
*PHOTOTUBES, *POWER SUPPLIES, *SOLAR CELLS, *STORAGE
BATTERIES, CADMIUM COMPOUNDS, CRYSTALS, ELECTRIC
CONNECTORS, EVAPORATION, GROWTH, OPTICS, PROCESSING,
SELENIDES, SEMICONDUCTING FILMS, SEMICONDUCTORS, SINGLE
CRYSTALS, SOLID STATE PHYSICS, SOLVENT ACTION,
SPECTROGRAPHIC ANALYSIS, SULFIDES, TELLURIDES, THIN
FILMS (STORAGE DEVICES), VACUUM APPARATUS, ZINC
COMPOUNDS (U)
IDENTIFIERS: THIN FILMS, THIN FILMS (M)
ELECTRONICS (M)

INVESTIGATION ON THE FEASIBILITY OF STACKING
PHOTOVOLTAIC LAYERS OF DIFFERENT II-VI
SEMICONDUCTING COMPOUNDS IN INTIMATE ELECTRICAL
CONTACT IN ORDER TO CONVERT A LARGER FRACTION OF THE
SUN'S RADIATION INTO ELECTRICAL POWER THAN IS
POSSIBLE IN A SINGLE LAYER. FIVE PROBLEMS ARE
DESCRIBED AND THE RESULTS ARE TABULATED. THESE
PROBLEMS ARE: THE PRODUCTION OF ZNS, ZNSE,
ZnTe, CuSe, CDS, AND CdTe CRYSTALS
AND/OR THIN FILMS; CDS SOLAR CELL MECHANISM;
THE PREPARATION OF VARIOUS CONFIGURATIONS FOR A
STUDY OF HETEROJUNCTIONS INCLUDING ZNS-CDS,
ZnTe-CDS, CuSe-CDS, CdTe-CDS,
ZnSe-CdSe; AND THEORETICAL EXAMINATIONS OF
THE ABRUPT P-N JUNCTION AND THE EFFECT OF SURFACE
STATES UPON THE ELECTRICAL PROPERTIES OF SEMI-
CONDUCTING CRYSTALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-288 571
MELPAR INC FALLS CHURCH VA

MOLECULAR CIRCUIT DEVELOPMENT (U)

NOV 62 77P LAYTON, WILBUR T. I
CONTRACT: NON-60-0362

UNCLASSIFIED REPORT

DESCRIPTORS: *CIRCUITS, *DIELECTRIC FILMS, *MICROMETERS,
*MOLECULAR ELECTRONICS, *SEMICONDUCTING FILMS, AIRFRAME
BEARINGS, ANTIMONY ALLOYS, CADMIUM COMPOUNDS, CRYSTALS,
DIELECTRIC PROPERTIES, ELECTRICAL PROPERTIES, GERMANIUM,
GROWTH, INDIUM COMPOUNDS, INTERMETALLIC COMPOUNDS,
NITRIDES, OXIDES, PYROGENS, REFRACTORY MATERIALS,
SELENIDES, SILICON COMPOUNDS, SULFIDES, TELLURIDES,
TEMPERATURE, THICKNESS, THIN FILMS (STORAGE DEVICES),
VACUUM APPARATUS, VAPOR PLATING (U)
IDENTIFIERS: THIN FILMS, THIN FILMS (M)
ELECTRONICS

THE USE OF A NEW APPARATUS HAS RESULTED IN OBTAINING BOTH UNIFORM FILMS AND CRYSTALLITES. IT WAS DETERMINED THAT INTERMEDIATE SUBSTRATE TEMPERATURES (1050 - 1100 C) WILL LEAD TO UNIFORM SILICON FILMS IF CERTAIN CONDITIONS ARE MET. THE STUDY OF THE EFFECTS OF POST-DEPOSITION HEAT TREATMENT ON SPUTTERED III-V COMPOUNDS WAS CONTINUED. NUMEROUS ARSENIDE FILMS WERE SPUTTERED AND THEIR ELECTRICAL PROPERTIES EXAMINED. WORK WAS BEGUN ON THE SPUTTERING OF SILICON CARBIDE. THE FILMS OBTAINED VARIED GREATLY IN THEIR PROPERTIES. THE THICKNESS DEPENDENCE OF THE DIELECTRIC CONSTANTS OF FILMS OF GeO_2 , SiO_2 , AND Si_3N_4 , WAS INVESTIGATED. FILMS OF GeO_2 AND SiO_2 SHOWED THE DIELECTRIC ANOMALY. FILMS OF NUMEROUS MATERIALS WERE VACUUM DEPOSITED. FILMS OF LEAD AND CADMIUM SULFIDE, SELENIDE AND TELLURIDE, ZINC OXIDE AND SULFIDE, AND TIN OXIDE WERE FORMED. MANY ALL-DEPOSITED, LAYERED FIELD EFFECT DEVICES WERE FORMED AND, THEIR CHARACTERISTICS DETERMINED. SIGNIFICANT IMPROVEMENT IN DEVICE PARAMETERS WAS ACHIEVED. VOLTAGE-AMPLIFICATION FACTORS AS HIGH AS 600 WERE OBTAINED. TUNNEL DIODES WERE FORMED IN SILICON CRYSTALLITES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-289 278

NATIONAL CASH REGISTER CO DAYTON OHIO

FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN
FILM PHOTOVOLTAIC CONVERTERS (U)

UCT 62 IV CHAMBERLIN, R.R. I
CONTRACT: AF33 657 7919

UNCLASSIFIED REPORT

DESCRIPTORS: *PHOTOELECTRIC CELLS (SEMICONDUCTOR),
*PHOTOTUBES, *SEMICONDUCTING FILMS, *SEMICONDUCTORS,
CADMIUM COMPOUNDS, COATINGS, COPPER COMPOUNDS, CRYSTALS,
DEPOSITS, DIODES, FOILS, GLASS, HEAT-RESISTANT GLASS,
HEAT TREATMENT, IMPURITIES, MANUFACTURING METHODS,
OXIDES, SELENIDES, SULFIDES, THIN FILMS (STORAGE
DEVICES), TIN COMPOUNDS (U)
IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (M)

STUDIES INCLUDED: POSSIBLE VARIATIONS IN THE
PHYSICAL STRUCTURE (CRYSTALLINITY AND CRYSTALLITE
ORIENTATION) OF THE SEMICONDUCTING LAYER (CDS
AND CDSE) DUE TO CHANGES IN THE DEPOSITION
PARAMETERS; THE EFFECT ON DIFFERENT ORIENTATIONS DUE
TO HEAT TREATMENT; CHANGES IN RESISTIVITY DUE TO HEAT
TREAT AND DOPING; IMPROVEMENT OF THE DEPOSITION OF
THE BARRIER LAYER; INVESTIGATION OF A BARRIER LAYER
USING COPPER SELENIDE; SEARCH FOR A FLEXIBLE (METAL
FOIL) SUBSTRATE COMPATIBLE WITH THE FILM DEPOSITION
CONDITIONS; INVESTIGATION OF THE POSSIBLE CORRELATION
BETWEEN CRYSTALLITE ORIENTATION AND CRYSTALLINITY TO
PHOTOVOLTAIC RESPONSE; AND THE SPECTRAL
CHARACTERISTICS OF THE CDSE, CDS, AND
CDSE-CDS PHOTOVOLTAIC CELLS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-292 324

WHEELER AND WHEELER ASSOCIATES BRANFORD CONN

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS

(U)

SEP 62 1V WHEELER, R.G. | WHEELER, G.W. |
REPT. NO. 62 433
CONTRACT: AF33 616 8314
MONITOR: ARL 62 433

UNCLASSIFIED REPORT

DESCRIPTORS: *CRYOGENICS, *MAGNETIC PROPERTIES,
*PARAMAGNETIC MATERIALS, *QUANTUM MECHANICS, *SINGLE
CRYSTALS, *SOLID STATE PHYSICS, ATOMIC ENERGY LEVELS,
CADMIUM COMPOUNDS, IMPURITIES, LABORATORY EQUIPMENT,
MATERIALS, MOLECULAR SPECTROSCOPY, OPTICS, PARAMAGNETIC
RESONANCE, SELENIDES, SULFIDES, THERMOMETERS, ZINC
COMPOUNDS (U)

RESEARCH IN CRYOGENICS AND MAGNETO-OPTICS.
MAGNETO-OPTICAL AND MAGNETIC SUSCEPTIBILITY RESEARCH
SYSTEM AT THE AERONAUTICAL RESEARCH LABORATORIES.
DOPED CDS AND ZNS SINGLE CRYSTALS AS ULTRA-LOW TEMPERATURE
PARAMAGNETIC SALTS. POSSIBILITY OF OBSERVING THE
MOLECULAR SPECTRA ASSOCIATED WITH IMPURITY-EXCITON
COMPLEXES IN CUS AND CDSE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-294 U16
MARSHAW CHEMICAL CO CLEVELAND OHIO

LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL ARRAY
INVESTIGATION (U)

JAN 63 IV SHIRLAND, F.A. ISCHAEFER, J.C. I
CONTRACT: AF33 657 9975

UNCLASSIFIED REPORT

DESCRIPTORS: *AUXILIARY POWER PLANTS, *POWER SUPPLIES;
*SOLAR CELLS, ACCELERATION, CADMIUM COMPOUNDS, DESIGN,
LAMINATES, PHOTOELECTRIC CELLS (SEMICONDUCTOR),
PHOTOTUBES, PLASTICS, SHEETS, SHOCK RESISTANCE, SINGLE
CRYSTALS, SULFIDES, TEMPERATURE, TESTS, THIN FILMS
(STORAGE DEVICES) (U)

THE MAJOR FACTOR WHICH PREVENTS THE ACCEPTANCE OF
CDS FILM SOLAR CELL AS PRACTICALLY CONVERSION
FOR POWER SYSTEMS IS THAT IT IS UN
PROVEN IN THE SPACE ENVIRONMENT.
THE CDS FILM CELL UNDER THE CONDITIONS OF
SPACE AND THE CONDITIONS THAT WOULD BE ENCOUNTERED IN
GETTING ARRAYS INTO SPACE IS THE PRINCIPAL OBJECTIVE
OF THIS PROJECT IS TO IMPROVE THE PERFORMANCE
OF THE CDS FILM CELL AND TO OBTAIN
UNDERSTANDING OF THE FUNDAMENTAL GOVERNING THE
OPERATION OF THIS CELL. FULL SCALE EFFORTS WERE
EXERCISED ON THE DESIGN OF CDS FILM CELL ARRAYS ON
STABILITY, USE AND ENVIRONMENTAL AND PERFORMANCE TEST
ING AND ON THE CONSTRUCTION OF CELL ARRAYS
FOR THE ORBITAL EVALUATION PANELS. A FINAL DESIGN
OF CDS FILM CELL ARRAYS FOR THE ORBITAL TEST WAS
EVOLVED, AND ARRAYS OF THIS DESIGN SUCCESSFULLY MET
REQUIREMENTS FOR SHOCK, ACCELERATION AND T
EMPERATURE CYCLING WITH NO DISCRETE FAILURE.
A STOCKPILE OF LARGE AREA CDS FILM CELLS OF GR
ATER THAN 100 CM² EFFICIENCY WAS BUILT UP.
AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-294 301

GENERAL ELECTRIC CO SYRACUSE N Y

RESEARCH AND DEVELOPMENT FOR FIELD EFFECT TRIODES AND
SPACE CHARGE LIMITED TRIODES (U)

AUG 62 IV BLANK, J.M.; TANTRAPORN, W.T.;
CONTRACT: DAJ6 0395C90756

UNCLASSIFIED REPORT

DESCRIPTORS: •TRANSISTORS, •TRIODES, CADMIUM COMPOUNDS,
COATINGS, DIELECTRICS, ELECTRIC FIELDS, ELECTRODES,
HALIDES, MATERIALS, MEASUREMENT, PHOTOCONDUCTIVITY,
RESISTANCE (ELECTRICAL), SEMICONDUCTORS, SOLID STATE
PHYSICS, SPACE CHARGES, SULFIDES, THEORY, THIN FILMS
(STORAGE DEVICES) (U)

IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (M)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-294 655
MOTOROLA INC PHOENIX ARIZ

COMPATIBLE TECHNIQUES FOR INTEGRATED CIRCUITRY (U)

DESCRIPTIVE NOTE: QUARTERLY REPORT NO. 5

JUL 62 IV

CONTRACT: AF 33(616)-8276

UNCLASSIFIED REPORT

DESCRIPTORS: (MICROMINIATURIZATION(ELECTRONICS)),
CADMIUM COMPOUNDS, CRYSTALS, DIELECTRICS,
ELECTRIC CURRENT, ELECTRODES, FEASIBILITY STUDIES,
MEASUREMENT, SEMICONDUCTORS, SPACE CHARGES,
SULFIDES, THEORY, TRIDUES (U)
IDENTIFIERS: THIN FILMS, THIN FILMS (U)
ELECTRONICS

PROCESS TECHNIQUES IN INTEGRATED CIRCUIT FABRICATION.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-295 358

RADIO CORP OF AMERICA PRINCETON N J DEFENSE ELECTRONIC
PRODUCTS

SOLAR CELL ARRAY OPTIMIZATION

(U)

DEC 62 IV

UNCLASSIFIED REPORT

DESCRIPTORS: •CRYSTALS, •POWER SUPPLIES, CADMIUM
COMPOUNDS, DESIGN, ELECTRICAL PROPERTIES, ELECTRONS,
FILMS, MANUFACTURING METHODS, PHOTOELECTRIC CELLS
(SEMICONDUCTOR), PHOTOELECTRIC MATERIALS, PHOTOTUBES,
PLASTICS, PROTONS, RADIATION DAMAGE, RESISTANCE
(ELECTRICAL), SEMICONDUCTORS, SOLAR CELLS, SULFIDES,
THIN FILMS (STORAGE DEVICES) (U)
IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (M)

SOLAR CELL ARRAY OPTIMIZATION. RESEARCH AND FABRICATION
PHASES OF THIS WORK WERE DIRECTED TOWARDS DEMONSTRATING
THE POTENTIAL OF LARGE AREA, THIN-FILM CADMIUM SULFIDE
PHOTOVOLTAIC MATERIALS. POWER-TO-WEIGHT RATIO FOR FOUR-INCH
SQUARE CELLS APPROACHES 20 WATTS/LB.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-295 654

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD
MASS

MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS (U)

NOV 62 IV ANDERSON, W.M. IBUBE, R.H.:

UNCLASSIFIED REPORT

DESCRIPTORS: *CRYSTALS, *PHOTOCONDUCTIVITY,
*PHOTOELECTRIC MATERIALS, *SINGLE CRYSTALS, CADMIUM
COMPOUNDS, ELECTRIC CURRENTS, ELECTRIC INSULATION,
ELECTRODES, HALL EFFECT, INSULATING MATERIALS,
LABORATORY EQUIPMENT, MANUFACTURING METHODS,
MATHEMATICAL ANALYSIS, MEASUREMENT, ORGANIC COMPOUNDS,
PROBABILITY, RESISTANCE (ELECTRICAL), SELENIUM,
SEMICONDUCTORS, SOLID STATE PHYSICS, SPACE CHARGES,
SULFIDES, TRANSIENTS (U)

HALL EFFECT MEASUREMENTS IN INSULATORS, A 'TIME-OF-FLIGHT'
METHOD OF STUDYING CARRIER TRANSPORT IN INSULATORS, A
GENERAL ANALYSIS OF UNIPOLAR STEADY STATE SPACE CHARGE
LIMITED CURRENTS IN INSULATORS, ORGANIC SEMICONDUCTORS, AND
CDS ARE TOPICS INVESTIGATED IN PHOTOCONDUCTOR
RESEARCH.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-296 305
HONEYWELL INC HOPKINS MINN

LOW INPUT VOLTAGE CONVERSION (U)

SEP 62 IV LINGLE, JOHN T.; LONG, DONALD;
REPT. NO. 565031
CONTRACT: DA36 D395C90808

UNCLASSIFIED REPORT

DESCRIPTORS: *POWER TRANSFORMERS, CADMIUM COMPOUNDS, CIRCUITS, CRYOGENICS, DIODES, ELECTRICAL PROPERTIES, ELECTROMECHANICAL CONVERTERS, FEASIBILITY STUDIES, FEEDBACK, HALL EFFECT, HELIUM, LIQUEFIED GASES, LIQUID METALS, MAGNETIC PROPERTIES, MAGNETOHYDRODYNAMICS, OSCILLATORS, PHOTOELECTRIC CELLS (SEMICONDUCTOR), PHOTOELECTRIC MATERIALS, POWER SUPPLIES, PUSH-PULL AMPLIFIERS, SEMICONDUCTORS, SHORT TAKE-OFF PLANES, SULFIDES, SUPERCONDUCTIVITY, SUPERCONDUCTORS, THEORY (U)

IDENTIFIERS: CRYOTRONS, VOLTAGE CONVERTERS, TUNNEL DIODES, MAGNETORESISTIVE POWER CONVERTERS, PHOTORESISTIVE POWER CONVERTERS. A LITERATURE SEARCH WAS MADE TO DETERMINE ALL KNOWN METHODS OF POWER CONVERSION AND TO OBTAIN PERFORMANCE DATA ON THESE METHODS AND DATA ON TRANSDUCER DEVICES. THE FOLLOWING APPROACHES WERE INVESTIGATED IN DETAIL: TRANSISTOR APPROACH; TUNNEL DIODE APPROACH; ELECTROMECHANICAL APPROACH; HALL EFFECT APPROACH; MAGNETORESISTIVE APPROACH; SUPERCONDUCTIVE APPROACH; PHOTORESISTIVE APPROACH. CALCULATIONS HAVE BEEN MADE TO DETERMINE TRANSDUCER REQUIREMENTS FOR EACH APPROACH. FORMULAS HAVE BEEN DERIVED AND CALCULATIONS MADE WHICH DETERMINE THE RESISTANCE RATIOS NECESSARY BETWEEN THE 'OFF' AND 'ON' TRANSDUCERS IN A PUSH-PULL CIRCUIT TO ACHIEVE ANY GIVEN EFFICIENCY. THIS INFORMATION HAS BEEN USED TO DETERMINE REQUIREMENTS AND FEASIBILITY OF VARIOUS APPROACHES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-296 440

GENERAL ELECTRIC CO SYRACUSE N Y

PHONON-PHONON INTERACTION IN CRYSTALS

(U)

NOV 62 IV

CONTRACT: DAJ6 0395C07209

UNCLASSIFIED REPORT

DESCRIPTORS: *PHONONS, *SINGLE CRYSTALS, *SOLID STATE PHYSICS, CADMIUM COMPOUNDS, CRYSTAL LATTICES, CRYSTALS, ELECTROMAGNETS, EXCITATION, GERMANIUM, MAGNETOSTRICTIVE ELEMENTS, MICROWAVES, PIEZOELECTRIC CRYSTALS, PROPAGATION, QUARTZ, SILICON, SULFIDES, TELLURIDES (U)

THE GENERATION, PROPAGATION AND INTERACTION OF PHONONS ARE STUDIED WITH EMPHASIS ON THE PHONON INTERACTIONS IN CRYSTALS. THEORETICAL CURVES BASED ON THE SELECTION RULES HAVE BEEN DRAWN FOR THE VARIOUS MODES OF OPERATION FOR PHONONPHONON INTERACTION IN SOLIDS. THEY ARE ANALYZED WITH REGARD TO THE VARIOUS TYPES OF PARAMETRIC INTERACTIONS THAT ARE POSSIBLE. EXPERIMENTAL RESULTS AND OBSERVATIONS ARE DISCUSSED PERTAINING TO PHONON GENERATION AND ATTENUATION IN VARIOUS TYPES OF SINGLE CRYSTALS. EXPERIMENTAL STUDIES INVOLVING THE SEARCH FOR PHONON INTERACTIONS ARE REPORTED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-296 929

RCA LABS PRINCETON N J

EVAPORATED THIN FILM DEVICES

(U)

NOV 62 IV WEIMER, P.K.; BORKAN, H.I
CONTRACT: AF19 628 1017
MONITOR: AFCL 62 965

UNCLASSIFIED REPORT

DESCRIPTORS: CADMIUM COMPOUNDS, CAPACITANCE, CRYSTAL
STRUCTURE, ELECTRIC INSULATION, ELECTRICAL CONDUCTANCE,
ELECTRICAL IMPEDANCE, ELECTRODES, ELECTRONIC SWITCHES,
EVAPORATION, GATES (CIRCUITS), HALL EFFECT, MATHEMATICAL
ANALYSIS, PREPARATION, PROCESSING, SEMICONDUCTING FILMS,
SEMICONDUCTOR DEVICES, SULFIDES (U)
IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (M)

EVIDENCE IS PRESENTED TO SHOW THAT THE DOMINANT
CURRENT CONTROL MECHANISM IN THE INSULATED-GATE
CADMIUM SULFIDE THIN FILM TRANSISTOR (TFT) IS
CONDUCTIVITY MODULATION IN THE SEMICONDUCTOR BY FIELD
EFFECT ACTION OF THE GATE. THE CHARACTERISTICS OF
THE COPLANAR-ELECTRODE TFT HAVING OVERLYING
"OHMIC" CONTACTS WERE DEMONSTRATED TO BE
EQUIVALENT TO THE EARLIER STAGGERED-ELECTRODE
STRUCTURE HAVING UNDERLYING GOLD CONTACTS. THE
MEASURED DRIFT MOBILITY AS CALCULATED FROM THE RATIO
OF TRANSCONDUCTANCE TO INPUT CAPACITANCE MAY BE
EITHER HIGHER OR LOWER THAN THE MEASURED HALL
MOBILITY DEPENDING UPON THE METHOD OF PREPARATION OF
THE SEMICONDUCTOR FILM. AN INCREASE IN THE HALL
MOBILITY AS A FUNCTION OF POSITIVE GATE BIAS WAS
FOUND, CONTRARY TO PREDICTIONS BASED UPON THE EFFECT
OF SCATTERING AT THE SURFACE OF A HOMOGENEOUS
SEMICONDUCTOR. TESTS ON VARIOUS PROCESSING
PROCEDURES AND ELECTRODE CONTACTS WERE CARRIED OUT
FOR CADMIUM SULFIDE AND OTHER MATERIALS POTENTIALLY
USEFUL FOR TFT FABRICATION. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-297 20J

IIT RESEARCH INST CHICAGO ILL

UNCOOLED IR DETECTOR FOR THE TEN MICRON REGION (U)

FEB 63 31P BRENNAN, WILLIAM D. I
REPT. NO. 1208 12 A
CONTRACT: N0W-62-0751

UNCLASSIFIED REPORT

DESCRIPTORS: *CRYSTAL DETECTORS, *INFRARED DETECTORS,
*INFRARED RADIATION, *PHOTOCONDUCTIVITY, ABSORPTION,
CADMIUM COMPOUNDS, CRYSTAL LATTICE DEFECTS, CRYSTAL
LATTICES, CRYSTAL STRUCTURE, CRYSTALS, ELECTRONS,
ELECTROSTATICS, ENERGY, IONIZATION, OPTICAL EQUIPMENT,
PHOTOELECTRIC MATERIALS, SEMICONDUCTORS, SENSITIVITY,
SULFIDES (U)

UNCOOLED IR DETECTOR FOR THE TEN MICRON REGION; EXCITONS IN
CADMIUM SULFIDE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-297 135

LOUVAIN UNIV (BELGIUM)

PHOTO-MAGNETO-ELECTRIC STUDY OF CDS SINGLE CRYSTALS
AND ROLLED BISMUTH FOILS (U)

FEB 63 IV LUYCKX, ANDRE;
REPT. NO. SR15R2
CONTRACT: AF01 052 166

UNCLASSIFIED REPORT

DESCRIPTORS: *BISMUTH, *CADMIUM COMPOUNDS,
*SEMICONDUCTORS, CRYSTAL LATTICE DEFECTS,
ELECTROMAGNETIC FIELDS, FOILS, MAGNETIC FIELDS,
PHOTOELECTRIC MATERIALS, PHOTOGRAPHIC ANALYSIS,
POLARIZATION, SINGLE CRYSTALS, SULFIDES (U)

PHOTO-MAGNETO-ELECTRIC STUDY OF CDS SINGLE CRYSTALS AND
ROLLED BI FOILS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-400 290
TEXAS INSTRUMENTS INC DALLAS

MATERIAL PROCESSING AND PHENOMENA INVESTIGATION OF
FUNCTIONAL ELECTRONIC BLOCKS (U)

FEB 63 IV JOHNSON, ROWLAND E.; SANGSTER, R.C.;
PHIPPS, CHARLES H.;
REPT. NO. UB 63 27
CONTRACT: AF33 657 9196

UNCLASSIFIED REPORT

DESCRIPTORS: *INTEGRATED CIRCUITS, *MOLECULAR
ELECTRONICS, ARSENIDES, CADMIUM COMPOUNDS,
CAPACITORS, CRYSTAL GROWTH, DIFFUSION,
DIODES (SEMICONDUCTOR), DIOXIDES, EPITAXIAL
GROWTH, FILMS, GALLIUM COMPOUNDS, LIGHT,
MANUFACTURING METHODS, RESISTANCE (ELECTRICAL),
SILICON COMPOUNDS, SULFIDES, VOLTAGE (U)
IDENTIFIERS: *THIN FILMS, ELECTRIC POTENTIAL,
THREE DIMENSIONAL ARRAYS, THIN FILMS ELECTRONICS (U)

GAAS EPITAXIAL DEPOSITION, SiO₂ MASKING, DIFFUSION
FROM SiO₂ FILMS INTO GAAS; STUDY OF HIGH RESISTIVITY
MECHANISMS, VOLTAGE BREAKDOWN ACROSS THIN LAYERS, MAXIMUM
COMPONENT PACKING DENSITY, PREPARATION OF SINGLE CRYSTAL
GDS AND LIGHT PRODUCING DIODES.

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-400 759

LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY
DIV

ELECTRIC CONDUCTIVITY AND HALL EFFECT IN
SEMICONDUCTORS WITH LOOPS OF EXTREMA (U)

DEC 61 IV PREPELITSA, B.V. IPOKATILOV, YE. P. I

UNCLASSIFIED REPORT

DESCRIPTORS: •SEMICONDUCTORS, CADMIUM COMPOUNDS,
CRYSTALS, ELECTRICAL CONDUCTANCE, HALL EFFECT,
RELAXATION TIME, SULFIDES (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-401 699

HARSHAW CHEMICAL CO CLEVELAND OHIO

LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL ARRAY
INVESTIGATION (U)

MAN 63 IV SCHAEFER, J. C. ; WOLFF, G. A. ; HILL, E. R. ;
CONTRACT: AF33 657 9975

UNCLASSIFIED REPORT

DESCRIPTORS: *CADMIUM COMPOUNDS, *SOLAR CELLS, *THIN
FILMS (STORAGE DEVICES), ACCELERATION, ACRYLIC RESINS,
COATINGS, COPPER, CRYSTAL GROWTH, CRYSTALS,
ELECTRODEPOSITION, EXPERIMENTAL DATA, FILMS, GLASS,
GOLD, LOADING (MECHANICS), MANUFACTURING METHODS,
MOLYBDENUM, NICKEL, PLASTICS, SHOCK RESISTANCE, SILVER,
SOLAR PANELS, SONAR SOUND ANALYZERS, SULFIDES,

TESTS (U)
IDENTIFIERS: THIN FILMS (M)

LARGE-AREA, THIN-FILM, CADMIUM SULFIDE SOLAR CELL ARRAY
INVESTIGATION.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-403 053

NATIONAL CASH REGISTER CO DAYTON OHIO

FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN
FILM PHOTOVOLTAIC CONVERTERS. (U)

DESCRIPTIVE NOTE: REPT. FOR 1 FEB 62-JAN 63,
MAR 63 111P CHAMBERLIN, R.R., ISKAMMAN,
J.S.; KOUPMAN, D.E.; BLAKELY, L.E.;

CONTRACT: AF 33 657 7919

PROJ: 8173

TASK: 817301

MONITOR: ASD TOR63 223, VOL. 1

UNCLASSIFIED REPORT

DESCRIPTORS: *PHOTOELECTRIC CELLS (SEMICON
DUCTOR), *SEMICONDUCTOR FILMS, *SOLAR CELLS,
CADMIUM COMPOUNDS, SULFIDES, SELENIDES, COPPER
COMPOUNDS, SOLAR RADIATION, SPRAYS, THIN FILMS
(STORAGE DEVICES), VAPOR PLATING, FEASIBILITY
STUDIES. (U)

IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (M)

THE OBJECTIVES WERE (1) TO DEMONSTRATE THE
FEASIBILITY OF FABRICATING A THIN FILM PHOTO VOLTAIC
CONVERTER USING A CHEMICAL SPRAY PROCESS FOR THE
DEPOSITION OF THE ACTIVE ELEMENTS AND (2) TO
FABRICATE FOR DELIVERY SIX EXPERIMENTAL CELLS, FOUR
USING CDS AND TWO USING CU2S AS THE N-TYPE
SEMICONDUCTING LAYER. RESEARCH HAS SHOWN THE
FEASIBILITY OF FABRICATING PHOTOVOLTAIC CONVERTERS
USING THIN FILMS OF CADMIUM AND COPPER SULFIDE (.6
MICRON AND .05 MICRON RESPECTIVELY) AND HAS SHOWN
THAT THE DEPOSITION PROCESS USED IS APPLICABLE TO
LARGE AREA, MULTIPLE LAYER (CDS CU2S-
CU2S) CONFIGURATIONS, SOLID SOLUTION (CD(S,
SE)-CU2S) CELLS, AND CONTINUOUS LINE
PRODUCTION. THIS RESEARCH HAS ALSO SHOWN THAT A
HETEROGENEOUS JUNCTION PHOTOVOLTAIC CONVERTER CAN BE
FORMED USING CDS AND CU2S. SIX (4
CDS AND 2 CU2S) CELLS OF 16 SQ IN AREA WERE
FABRICATED FOR DELIVERY. THE FOUR CDS CELLS
HAD AN AVERAGE EFFICIENCY OF .2% AND THE TWO
CU2S CELLS HAD AN AVERAGE EFFICIENCY OF LESS THAN
.01%. THE EFFICIENCIES OF THE FOUR INCH SQUARE
CELLS DO NOT INDICATE THE POTENTIAL OF THE CHEMICAL
SPRAY PROCESS SINCE CDS CELLS OF ONE SQUARE INCH
WERE MADE WITH 1.2% EFFICIENCY AND CDS CELLS OF
ONE SQUARE CENTIMETER WERE MADE WITH 3.58 (U)

40

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-403 786

LABORATOIRE D'INFRA ROUGE TECHNIQUE ET APPLIQUE GIF-SUR-
YVETTE (FRANCE)

STUDY OF THE RADIATIVE RECOMBINATION OF FREE
CARRIERS PRODUCED BY ELECTRON BOMBARDMENT OF CADMIUM
SULFIDE. (U)

62 29P DE GAALON, GILLES I
CONTRACT: N62558 2720

UNCLASSIFIED REPORT

DESCRIPTORS: *ELECTRON BOMBARDMENT, *LUMINES
CENCE, SULFIDES, SEMICONDUCTORS, SOLID STATE
PHYSICS, EXCITATION, IMPURITIES, IONIZATION,
CRYOGENICS, CALCIUM COMPOUNDS. (U)
IDENTIFIERS: RECOMBINATION CARRIERS. (U)

STUDY OF THE RADIATIVE RECOMBINATION OF FREE CARRIERS
PRODUCED BY ELECTRONIC BOMBARDMENT OF CADMIUM SULPHIDE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-407 525

HARSHMAN CHEMICAL CO CLEVELAND OHIO

LARGE AREA THIN FILM CADMIUM SULFIDE SOLAR CELL
ARRAY INVESTIGATION. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO.

3, 15 MAR-15 JUNE 63,

JUN 63

25P

SCHAEFER, J.C.; HUMRICK, R.J.;

HILL, E.R. I

CONTRACT: AF33 657 9975

PROJ: 8173

TASK: 817301

UNCLASSIFIED REPORT

DESCRIPTORS: *SOLAR CELLS, *X-RAY DIFFRACTION
ANALYSIS, CRYSTALS, CADMIUM, SULFIDES, PHOTO
GRAPHIC ANALYSIS, X-RAY PHOTOGRAPHY, PURIFI
CATION, DISTILLATION, SEMICONDUCTING FILMS,
SULFUR, DIODES (SEMICONDUCTOR), LUMINESCENCE,
CADMIUM COMPOUNDS, MICROSCOPY. (U)

IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (U)

A 5.1X THIN-FILM CELL WAS PRODUCED ON A 1 IN. X
1 IN. SUBSTRATE. THIS RESULT COMPARES FAVORABLY
WITH THE MAXIMUM EFFICIENCY OF 5.4% REPORTED FOR A
SINGLE CRYSTAL CDS CELL. A PROCEDURE FOR UP
GRADING LOW EFFICIENCY CELLS TO THE AVERAGE
EFFICIENCY LEVEL WAS ALSO DEVELOPED. A NON
DESTRUCTIVE X-RAY TECHNIQUE WAS USED SUCCESSFULLY TO
PHOTOGRAPH DISLOCATIONS IN SINGLE CRYSTAL CDS.
THIS PROCEDURE PROMISES TO YIELD A FUND OF
INFORMATION. EFFORTS TO PRODUCE AN ULTRAPURE
CDS BY DISTILLATION OF THE ELEMENTS AND
SUBSEQUENT REACTION IS UNDERWAY. WORK WAS CARRIED
ON IN THE ANALYSIS OF THE I-V DATA AND SPECTRAL
RESPONSE IN AN EFFORT TO CATALOG THIS DATA IN THE
FORM OF A. THE PRESENT DATA CAN BE IN AN EFFORT TO
CATALOG THIS DATA IN THE FORM OF A MODEL. THE
PRESENT DATA CAN BE MADE TO FIT A P-N JUNCTION WITH
PHOTOCONDUCTIVE SERIES AND SHUNT RESISTANCES. SOME
REJECT 'SHORTED' CELLS WERE STUDIED AT LOW
TEMPERATURES WHERE THE I-V CURVE BEGINS TO
RESEMBLE A BACKWARD DIODE. INJECTION LUMINESCENCE
WITH VERY LOW CONVERSION EFFICIENCY WAS OBSERVED WITH
THE RADIATION LYING IN THE BAND BETWEEN 1 AND 1.5 EV.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-408 472
PHILCO CORP BLUE BELL PA

THIN FILM ACTIVE DEVICES. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2, 22 SEP-22 DEC
62,

DEC 62 IV SPRATT, JAMES P. I
CONTRACT: DA49 136URD1056

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTING FILMS, SANDWICH
CONSTRUCTION), (*DIODES (SEMICONDUCTOR), METAL
FILMS), (*TRANSISTORS, METAL FILMS), PHONONS,
ALUMINUM COMPOUNDS, OXIDES, INDIUM, CADMIUM
COMPOUNDS, SULFIDES, CAPACITANCE, VAPOR PLATING,
GERMANIUM, DIELECTRIC PROPERTIES, TEST EQUIP
MENT (ELECTRONICS), UNS, PHOTSENSITIVITY. (U)
IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (U)

THE USE OF EVAPORATED, RATHER THAN THERMALLY GROWN,
LAYERS OF AL₂O₃ HAS ALLEVIATED THE SHORTING
PROBLEM IN THE MEA TUNNEL EMISSION DEVICE. HIGH
INPUT IMPEDANCE DEVICES SHOWING TRANSCONDUCTANCE
VALUES AS HIGH AS 25,000 MICRO MHOS HAVE BEEN
OBTAINED IN THIS WAY. A TENTATIVE EQUIVALENT
CIRCUIT FOR THE DEVICE IS PRESENTED. STUDIES OF
THE CONDUCTION PROCESSES IN CDS-AL₂O₃-AL
DIODES CONTINUE. THIN FILMS OF CDS SHOW
RESISTIVITIES OF APPROXIMATELY 0.1 OHM-CM, MOBILITIES
OF 10 CM SQUARED/V-SEC, AND CARRIER CONCENTRATIONS
OF 7 X 10 TO THE 18TH POWER/CM CUBED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-408 664

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS,

(U)

FEB 63 62P HALL, R.N. I
REPT. NO. SRJA
CONTRACT: AF19 628 329
PROJ: 4608
TASK: 460804
MONITOR: AFCML 63 120 A

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, SCIENTIFIC RE
SEARCH), CADMIUM, CADMIUM COMPOUNDS, SULFIDES,
TELURIDES, ALUMINUM ALLOYS, ZINC ALLOYS,
CRYSTALS, LUMINESCENCE, LASERS, GALLIUM ALLOYS,
ANTHONY ALLOYS, ARSENIDES, HIGH TEMPERATURE
RESEARCH, ELECTRICAL PROPERTIES, SELENIDES.
IDENTIFIERS: HALL MEASUREMENTS.

(U)

(U)

THE CD-CDS LIQUIDUS WAS MEASURED BETWEEN 700
DEGREES AND 1250 DEGREES C. IN THE LOW-
TEMPERATURE REGION, THE LIQUIDUS RISES EXPONENTIALLY
WITH TEMPERATURE, SIMILAR TO THAT OBSERVED IN III-V
SEMICONDUCTING COMPOUND SYSTEMS. A NEW ELECTRI-
CALLY ACTIVE DEFECT CENTER, BELIEVED TO BE A NATIVE
DOUBLE ACCEPTOR, WAS OBSERVED IN CDS. IT SHOWS
IDENTICAL BEHAVIOR TO A CENTER CONCURRENTLY OBSERVED
IN CDTE IN THIS LABORATORY. THESE CENTERS ARE
FORMED DURING HEAT TREATMENT IN A CD ATMOSPHERE.
THE CENTERS ARE SIMILAR TO THE DOUBLE ACCEPTOR
CENTERS OBSERVED IN GE IN THAT THEY BECOME VERY
EFFECTIVE HOLE TRAPS AT LOW TEMPERATURES.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-409 102

GENERAL ELECTRIC CO SYRACUSE N Y

FIELD EFFECT TRIODES AND SPACE CHARGE LIMITED TRIODES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 DEC 62-28 FEB 63,

FEB 63 67P BLANK, J. M. STRANTRAPORN, W. REINHARTZ, K. K. WILLIS, W. L. CAHILL, A. E. I

CONTRACT: DA36 D395C9D756
PROJ: 3A99 21 00J

UNCLASSIFIED REPORT

DESCRIPTORS: *TRANSISTORS, *SEMICONDUCTING FILMS, MANUFACTURING METHODS, ZINC ALLOYS, OXIDES, CADMIUM ALLOYS, SULFIDES, VACUUM APPARATUS, VAPOR PLATING, SANDWICH CONSTRUCTION, METAL FILMS, AGING (MATERIALS), SOLID STATE PHYSICS, RESISTANCE (ELECTRICAL), HALL EFFECT, PHOTOCONDUCTIVITY, SPACE CHARGES, MOLECULAR BEAMS

(U)

IDENTIFIERS: *THIN FILMS, FIELD EFFECT TRANSISTORS, SPACE CHARGE LIMITED DEVICES, THIN FILMS ELECTRONICS

(U)

FIELD EFFECT TRIODES. A DETAILED CONDUCTION MECHANISM FOR THIN-FILM FIELD EFFECT TRIODES IS PRESENTED. NEW EXPERIMENTAL FINDINGS SEEM TO SUBSTANTIATE THE TRAP-EMPTYING MECHANISM. THE RESULTS OF VARYING SiO AND CDS THICKNESS IN FIELD-EFFECT TRIODES AND THEIR EFFECT ON DEVICE PERFORMANCE ARE SHOWN. EFFECTS OF DEVICE AGING AND ELECTRODE CONFIGURATIONS ON DEVICE PERFORMANCE ARE ALSO DISCUSSED. SPACE CHARGE LIMITED TRIODES. THE REQUIREMENTS FOR PRODUCING SPACE CHARGE LIMITED CURRENT IN DEVICES ARE DISCUSSED, AND POSSIBLE METHODS OF FULFILLING THEM ARE PRESENTED. CADMIUM SULFIDE IMPROVEMENT. A POST DEPOSITION TREATMENT OF CADMIUM SULFIDE FILMS IS OUTLINED AND RESULTS ARE PRESENTED. ZINC OXIDE MATERIAL IMPROVEMENT. THE DIFFICULTIES EVAPORATION OF ZINC OXIDE ARE DISCUSSED AND THE RESULTS OF THESE EXPERIMENTS ARE PRESENTED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-409 475

TEXAS INSTRUMENTS INC DALLAS

MATERIAL PROCESSING AND PHENOMENA INVESTIGATION OF
FUNCTIONAL ELECTRONIC BLOCKS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 3, 1 MAR-
31 MAY 63,

MAY 63 IV JOHNSON, ROWLAND E.; SANGSTER,

R.C.; PHIPPS, CHARLES H.;

REPT. NO. 08 63 80

CONTRACT: AF33 657 9195

UNCLASSIFIED REPORT

DESCRIPTORS: (*MOLECULAR ELECTRONICS, MANU
FACTURING METHODS), (*SEMICONDUCTING FILMS,
EPITAXIAL GROWTH), (*EPITAXIAL GROWTH, MOLECU
LAR ELECTRONICS), SEMICONDUCTORS, SILICON
COMPOUNDS, DIOXIDES, GALLIUM ALLOYS, ARSENIC
ALLOYS, DIFFUSION, VAPOR PLATING, VACUUM AP
PARATUS, PHOTOELECTRIC MATERIALS, PHOTSENSI
TIVITY, PHOSPHORUS ALLOYS, IMPURITIES, ZINC,
IRON, CHROMIUM, ELECTRICAL PROPERTIES, CAPACI
TORS, TELLURIUM, CADMIUM COMPOUNDS, SULFIDES,
INDIUM, TRANSISTORS, DIODES (SEMICONDUCTOR).

(U)

IDENTIFIERS: DOPING, 1963.

(U)

GAAS EPITAXIAL DEPOSITION TECHNOLOGY WAS OPTI
MIZED TO INCLUDE EFFECTS OF SEED ORIENTATION, VA POR
STREAM COMPOSITION, TEMPERATURE, AND THERMAL
GRADIENT. DIFFUSION OF ZINC FROM DOPED SiO₂ IS
WELL CHARACTERIZED AND IS USED ROUTINELY. WORK ON
DIFFUSION OF TE AND A DOUBLE DIFFUSED TRANSIS TOR
STRUCTURE WAS STARTED. VOLTAGE BREAKDOWN
MECHANISMS AND PARAMETERS HAVE BEEN STUDIED FOR
VARIOUS HIGH RESISTIVITY SAMPLES. DOPED CdS
PREPARATION AND INDIUM DIFFUSION FOR SURFACE
TREATMENT OF HIGH RESISTIVITY CdS ARE ROUTINE.
A COMPREHENSIVE ANALYSIS OF THE PHOTOCAPACITOR IS
PRESENTED. GaAs(x)P(1-x) WAS PREPARED
FOR ALL VALUES OF X. ADHERENT LAYERS OF GAP
HAVE BEEN PRODUCED ON A GAAS SEED BY USE OF AN
INTERMEDIATE LAYER OF GaAs(x)P(1-x).
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 7ZZZHT

AD-411 383

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT., 15 SEP 62-15 MAR 63,
APR 63 65P ANDERSON, W.M.; DREEBEN, A.B.;

DREBNER, J.; MARK, P.;

CONTRACT: AF19 604 8353

PROJ: PROJ 4608

TASK: 460804

MONITOR: AFCHL 63 145

UNCLASSIFIED REPORT

DESCRIPTORS: (*HALL EFFECT, MEASUREMENT),
(*SELENIUM, HALL EFFECT), PHOTOCONDUCTIVITY, X-
RAY DIFFRACTION ANALYSIS, SCATTERING, ELECTRONS,
DRIFT, ELECTRON BEAMS, ELECTRONIC EQUIPMENT,
ELECTROMETER, VACUUM APPARATUS, EVAPORATION,
COPPER COMPOUNDS, CADMIUM COMPOUNDS, SULFIDES,
CRYSTALS, IMPURITIES, PHOTOMICROGRAPHY,
CHEMICAL ANALYSIS, VALENCE, PHOTOELECTRIC
EFFECT.

(U)

IDENTIFIERS: 1963.

(U)

HALL EFFECT MEASUREMENTS FOR PHOTOGENERATED CAR-
RIERS IN VITREOUS SE SHOWED THAT N-TYPE PHOTO
CONDUCTIVITY PREDOMINATES IN ILLUMINATED LAYERS,
WHILE CURRENT IS CARRIED MAINLY BY HOLES IN
UNEXCITED SE. THE ELECTRON MOBILITY IS 0.32 PLUS
OR MINUS 0.1 CM SQUARED/V S. THE FORMATION OF
PRECIPITATED ACCEPTOR IMPURITIES IN LARGE CDS
CRYSTALS HAS BEEN DEMONSTRATED FOR CONCENTRATIONS AS
LOW AS $2 \times 10^{-2}\%$ TO THE -2% , THE UPPER LIMIT FOR THE
SOLUBILITY OF CU IN CDS. CU AND AG
SULFIDES EXIST AS RODS AT LOW CONCENTRATIONS. AT
CONCENTRATIONS NEAR 1% , CU FORMS LARGE DISCS.
AU SEGREGATES AS HEXAGONAL PLATELETS OF ELEMENTAL
AU. INCLUSIONS HAVE A PARTICULAR ORIENTATION
WITH RESPECT TO THE C-AXIS OF CDS.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-413 667

HUGHES TOOL CO CULVER CITY CALIF

CADMIUM SULFIDE SUMMARY REVIEW AND DATA SHEETS.

(U)

APR 63 196P NEUBERGER, M. I
REPT. NO. DS-124
CONTRACT: AF 33(616)-8438
PROJ: AF-7381
TASK: 736103

UNCLASSIFIED REPORT

DESCRIPTORS: (*CADMIUM COMPOUNDS, SULFIDES),
SEMICONDUCTORS, ABSORPTION, OPTICAL PROPER
TIES, DIFFUSION, DIELECTRIC PROPERTIES, ELEC
TRICAL CONDUCTANCE, RESISTANCE (ELECTRICAL),
HALL EFFECT, RADIATION DAMAGE, LIFE EXPECTANCY,
THERMOELECTRICITY, PHOTOCONDUCTIVITY,
REFRACTIVE INDEX, REFLECTION, DATA, EXPERI
MENTAL DATA.

(U)

REVIEW AND DATA SHEETS ON CADMIUM SULFIDE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-414 853

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INSULATION
RESEARCH

PIEZOELECTRIC COUPLING BETWEEN ULTRASONIC WAVES AND
FREE ELECTRONS IN CADMIUM SULFIDE, (U)

JUL 63 20P MILL, KENNETH W. I
REPT. NO. 181
CONTRACT: NONR184110

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PIEZOELECTRIC EFFECT,
SEMICONDUCTORS), (*ULTRASONIC PROPERTIES,
PHONONS), SCATTERING, ELECTRONS, ELECTRIC
CURRENTS, CRYSTAL LATTICES, ATTENUATION, ELECTRIC
FIELDS, SPACE CHANGES, CADMIUM COMPOUNDS,
SULFIDES, ENERGY CONVERSION, PROPAGATION,
EQUATIONS (U)

IDENTIFIERS: 1963 (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-415 755

HP ASSOCIATES PALO ALTO CALIF

INVESTIGATION OF HOT ELECTRON EMITTER. (U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 4, 1 MAR-31 MAY 63.

MAY 63 16P
MONITOR: AFCKL 63 336

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TRANSISTORS, TRIODES), (*METAL FILMS, GOLD), QUANTUM MECHANICS, RESISTANCE (ELECTRICAL), GALLIUM COMPOUNDS, ARSENIDES, SILICON, CADMIUM COMPOUNDS, SULFIDES, SEMICONDUCTOR DEVICES, MANUFACTURING METHODS (U)

IDENTIFIERS: HOT ELECTRONS, THIN FILMS, THIN FILMS ELECTRONICS (U)

THE RESISTIVITY OF THIN GOLD FILMS ON SILICON SUBSTRATES HAS BEEN STUDIED. THE BEST FILMS WERE EVAPORATED AT PRESSURES LESS THAN 10^{-8} TORR AND ON A 200 C SUBSTRATE. EVIDENCE IS PRESENTED FOR SOME SPECTRAL REFLECTION OF CONDUCTION ELECTRONS BY THE FILM BOUNDARIES. GOLD FILMS ABOUT 100 ANGSTROMS THICK HAVE BEEN PREPARED WITH SHEET RESISTANCE AS LOW AS 6 OHMS. A HOT ELECTRON TRIODE WITH A SINGLE CRYSTAL GAAS POINT EMITTER, A GOLD BASE, AND A SINGLE CRYSTAL SI COLLECTOR IS DESCRIBED. THIS TRIODE EXHIBITS A CURRENT TRANSFER RATIO ALPHA OF 0.05 OVER SEVERAL DECADES OF COLLECTOR CURRENT, AND THE EMITTER AND COLLECTOR CURRENTS ARE PROPORTIONAL TO $\exp(-qV_{EB}/1.04 kT)$. A DISCUSSION IS GIVEN OF THE FABRICATION OF HOT ELECTRON TRIODES UTILIZING AN EVAPORATED CDS COLLECTOR. THE TECHNIQUES OF CDS DOPING AND EVAPORATION ARE DESCRIBED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-416 264

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS.

(U)

JUN 63 1V

REPT. NO. SCIENTIFIC REPT. NO. 4A

CONTRACT: AF19 628 329

MONITOR: AFCKL

UNCLASSIFIED REPORT

DESCRIPTORS: 63 J23 4A , (SEMICONDUCTOR DEVICES, MATERIALS), (SEMICONDUCTORS, ELECTROLUMINESCENCE), GROUP II ELEMENTS, GROUP VI ELEMENTS, INTERMETALLIC COMPOUNDS, CADMIUM COMPOUNDS, SULFIDES, COPPER COMPOUNDS, ZINC COMPOUNDS, COPPER ALLOYS, ZINC ALLOYS, SELENIUM ALLOYS, MANUFACTURING METHODS, SINGLE CRYSTALS.

(U)

IDENTIFIERS: 1963.

(U)

INJECTION ELECTROLUMINESCENCE HAS BEEN OBSERVED IN CU₂S-ZNS AND CU₂SE-ZNSE HETEROJUNCTIONS. THE LIGHT EMISSION OCCURS THROUGH HOLE INJECTION FROM THE P-TYPE CU CHALCOGENIDE INTO N-TYPE ZNS OR ZNSE. AT ROOM TEMPERATURE THE LIGHT EMISSION FROM THE CU₂S-ZNS AND THE CU₂SE-ZNSE JUNCTIONS ORIGINATES AT THE CU OR SELF-ACTIVATED LUMINESCENCE CENTERS. AT 77K EDGE EMISSION PEAKING AT 2.68 EV HAS BEEN OBSERVED FROM THE CU₂SE-ZNSE DIODES WITH 2V DC APPLIED ACROSS THE JUNCTION. A TENTATIVE MODEL FOR THE BAND STRUCTURE OF THE CU CHALCOGENIDE-II-VI COMPOUND HETEROJUNCTIONS IS PRESENTED. STUDIES ON THE DOUBLE ACCEPTOR CENTER IN CDS HAVE CONTINUED WITH THE DISCOVERY THAT THESE CENTERS CAN BE PRODUCED BY ELECTRON IR RADIATION AS WELL AS BY CD FIRING. SOME PRELIMINARY CONCLUSIONS FROM STUDIES OF THE OIF FUSION OF CD IN CDS ARE ALSO PRESENTED. THE JUNCTION LASER THRESHOLD ANALYSIS HAS BEEN EXTENDED. MOST OF THE ASSUMPTIONS AND APPROXIMATIONS PREVIOUSLY PRESENT HAVE BEEN ELIMINATED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-417 747

HARSHAW CHEMICAL CO CLEVELAND OHIO

RESEARCH ON PHOTOCONDUCTIVITY IN THIN FILMS.

(U)

DESCRIPTIVE NOTE: FINAL REPT., JUNE 62-JULY 63,
JUL 63 SIP LIND, E.L.; LANCIA, F.N.I
HILL, E.R.;

CONTRACT: AF33 657 9194

PROJ: PROJ. 4156

TASK: 4156J5

MONITOR: ASD TOR63 654

UNCLASSIFIED REPORT

DESCRIPTORS: (*PHOTOCONDUCTIVITY, FILMS),
(*PHOTOSENSITIVITY, MATERIALS), PREPARATIONS,
PHOTONS, GRAIN BOUNDARIES, EQUATIONS,
SULFIDES, ANTIMONY COMPOUNDS, CADMIUM COMPOUNDS,
SELENIUM COMPOUNDS, TEMPERATURE, SINGLE
CRYSTALS, ELECTRIC POTENTIAL, MEASUREMENT, HIGH
TEMPERATURE RESEARCH, EVAPORATION, TEST ENT,
VACUUM APPARATUS, TABLES, DATA, RESISTANCE
(ELECTRICAL).

(U)

IDENTIFIERS: 196J, TRAPPING, FERMI LEVEL, BLOCK
DIAGRAM.

(U)

RESEARCH ON PHOTOCONDUCTIVITY IN THIN FILMS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-418 516

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

FEASIBILITY OF CADMIUM SULFIDE FOR SOLID STATE
DETECTOR APPLICATION.

(U)

AUG 63 69P GALE, KENNETH ALLEN I
MONITOR: AFII GNE PHYS 63 9.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: MASTER'S THESIS.

DESCRIPTORS: (*CADMIUM COMPOUNDS, SULFIDES),
(*NUCLEAR PARTICLES, DETECTORS), (*DETECTORS,
NUCLEAR PARTICLES), (*SOLID STATE PHYSICS,
DETECTORS), ALPHA PARTICLES, ELECTRONS, PLASMA
OSCILLATION, THEORY, MEASUREMENT, ATOMIC ENERGY
LEVELS, PHOTONS, CRYSTAL HOLDERS, PHOTOCONDUCTIVITY,
FEASIBILITY STUDIES.

(U)

IDENTIFIERS: 1963.

(U)

SOLID STATE RADIATION DETECTORS WERE CONSTRUCTED
USING CDS CRYSTAL PLATELETS. THE DETECTORS
WERE TESTED USING BOTH ALPHA AND PHOTON IRRADIATION.
ATTEMPTS TO MEASURE THE LIFETIMES OF THE HOLES AND
ELECTRONS WITH ALPHA AND PHOTON IRRADIATION AND TO
MEASURE THE ENERGY OF THE TRAP LEVELS FOR THE
ELECTRONS FAILED FOR VARIOUS REASONS. THE ONLY
QUANTITATIVE RESULT SECURED WERE A VALUE OF 2.48×10
TO THE -6TH POWER SQ CM/V FOR THE MOBILITY-LIFETIME
PRODUCT OF ELECTRONS AND A VALUE OF 5.06 EV/ION PAIR
FOR THE AVERAGE ENERGY REQUIRED TO PRODUCE AN ION
PAIR. OTHER QUALITATIVE FEATURES SUCH AS THE
TRAPPING OF CARRIERS AND THE FORMATION OF A PLASMA IN
THE DETECTOR WERE OBSERVED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-419 017

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

THE SYNTHESIS OF A VOLATILE CADMIUM CHELATE AND THE STUDY OF ITS VAPOR PHASE REACTION WITH HYDROGEN SULFIDE.

(U)

MAY 63 IV CUPKA, ALBERT GEORGE

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNCLASSIFIED REPORT MASTERS THESIS

DESCRIPTORS: (•COMPLEX COMPOUNDS, SYNTHESIS (CHEMISTRY), (•CADMIUM COMPOUNDS, ORGANIC COMPOUNDS), (•ORGANIC COMPOUNDS, COMPLEX COMPOUNDS), (•METALORGANIC COMPOUNDS, CADMIUM COMPOUNDS), FILMS, CRYSTALS, CADMIUM, SEMI CONDUCTORS, PHYSICAL PROPERTIES, VAPORS, CHEMICAL REACTIONS, FLUORINE COMPOUNDS, HYDROGEN COMPOUNDS, SULFIDES, VAPOR PLATING, CHEMICAL ANALYSIS, SPECTROSCOPY, CHROMATOGRAPHIC ANALYSIS, CARBONYL GROUP.

(U)

IDENTIFIERS: 1963, CHELATE, ACETYLACETONATES.

(U)

A CHEMICAL APPROACH TO DEPOSITION OF THIN FILMS OR CRYSTALS OF METAL COMPOUNDS WAS INVESTIGATED. IT WAS OF INTEREST TO DETERMINE WHETHER METAL CHELATES WOULD UNDERGO A VAPOR PHASE REACTION TO FORM THE DESIRED PRODUCTS. REACTIONS TO PRODUCE MATERIALS OF IMPORTANCE AS SEMICONDUCTORS WERE OF SPECIAL INTEREST. TWO METAL DERIVATIVES OF FLUORINATED ACETYLACETONE CONTAINING CADMIUM WERE PD, ONE IONIC IN NATURE AND THE OTHER COVALENT. COMPOSITION AND STRUCTURE OF THE TWO COMPOUNDS IS PRESENTED, TOGETHER WITH A FEW OF THEIR PHYSICAL PROPERTIES. THE COVALENT CADMIUM CHELATE WAS REACTED IN THE VAPOR PHASE WITH HYDROGEN SULFIDE. THE EXPERIMENTS WERE CONDUCTED AT ATMOSPHERIC PRESSURE AND REACTION TEMPERATURES OF 140 TO 240 C. (AUTHOR)

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-421 739
TEXAS INSTRUMENTS INC DALLAS

ADVANCED FUNCTIONAL ELECTRONIC BLOCK
DEVELOPMENT.

(U)

DESCRIPTIVE NOTE: INTERIM ENGINEERING REPT. NO. 1, 15
AUG 15 NOV 62,

MAY 63 57P BIARD, J. R. ;
REPT. NO. U363 12
CONTRACT: AF33 657 9624
PROJ: 4159
TASK: 415906

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, SCIENTIFIC
RESEARCH), (*OPTICAL PHENOMENA, SEMICONDUCTORS),
(*SEMICONDUCTORS, PIEZOELECTRIC EFFECT), (*OSCILLATORS,
THERMAL CONDUCTIVITY), (*MOLECULAR ELECTRONICS,
SCIENTIFIC RESEARCH), GALLIUM ALLOYS, ARSENIC ALLOYS,
LASERS, RECOMBINATION REACTIONS, MULTIPLEX, INFRARED
PULSES, TRANSISTORS, PHOTOELECTRIC CELLS
(SEMICONDUCTOR), SILICON, PACKAGED CIRCUITS, PHOTONS,
CADMIUM ALLOYS, SULFIDES, TEST FACILITIES, INFRARED
RADIATION, BONDING, INDIUM, TEST EQUIPMENT
(ELECTRONICS)

(U)

IDENTIFIERS: 1963, ACOUSTIC AMPLIFIER, LIGHT
MULTIPLEXING, THERMAL OSCILLATOR

(U)

EFFORTS CONTINUED ON INVESTIGATIONS OF NEW
SEMICONDUCTOR PHENOMENA FOR APPLICATION IN ADVANCED
FUNCTIONAL ELECTRONIC BLOCKS. THE WORK IS
DIVIDED INTO FOUR SPECIFIC TASKS: THE FIRST TWO
RELATE TO OPTICAL PHENOMENA, THE THIRD TO
PIEZOELECTRICITY, AND THE FOURTH TO THERMAL EFFECTS.
THE RADIATIVE RECOMBINATION MECHANISMS IN GAAS
P-N JUNCTIONS AND THE OVERALL EFFICIENCY OF THESE
DEVICES AS LIGHT EMITTERS WERE INVESTIGATED. THIS
REPORT DESCRIBES THE OPTICAL AND ELECTRICAL
CHARACTERISTICS OF BOTH SPONTANEOUS EMISSION SOURCES
AND LASERS. A DISCUSSION OF THE POSSIBLE RADIATIVE
RECOMBINATION MECHANISMS IS ALSO INCLUDED. A
MULTIPLEX NETWORK OR LOWLEVEL PHOTOCHOPPER HAS BEEN
SELECTED AS THE FIRST APPLICATION OF THE GAAS
INFRARED SOURCE TO FEB'S. THIS REPORT DESCRIBES
GEOMETRICAL AND OPTICAL TECHNIQUES WHICH MAY BE
EMPLOYED TO OPTIMIZE THE OPTICAL COUPLING BETWEEN THE
GAAS LIGHT SOURCE AND SILICON PHOTODETECTOR.
(AUTHOR)

(U)

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UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-423 387

GENERAL DYNAMICS/FORT WORTH TEX

STRESS CORROSION CRACKING IN HIGH STRENGTH FERROUS
ALLOYS, (U)

NOV 63 42P HILDEBRAND, J. F. TURNER, E.
W. INORQUIST, F. C. I
REPT. NO. FZM269D
CONTRACT: AF33 657 11214

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*STEEL, CORROSION), (*STRESSES,
CORROSION), (*CORROSION, FRACTURE (MECHANICS)),
(*PROTECTIVE TREATMENTS, STEEL), SALT SPRAY TESTS,
COATINGS, METAL COATINGS, VAPOR PLATING, FLAME SPRAYING,
ELECTRODEPOSITION, PLATING, LUBRICANTS, PAINTS,
DIFFUSION, COLD WORKING, CORROSIVE LIQUIDS, ALUMINUM
COATINGS, NICKEL, CADMIUM, COPPER, SILVER, SURFACES,
MOLYBDENUM COMPOUNDS, SULFIDES, FILMS, SILICONE
PLASTICS, CORROSION INHIBITION, TESTS, TEST METHODS (U)

IDENTIFIERS: 1963, 4340 STEEL, SHOT PEENING,
ELECTROLESS PLATING (U)

THIS PAPER DESCRIBES TESTS PERFORMED TO INVESTIGATE
THE STRESS CORROSION CRACKING OF AISI TYPE 4340
STEEL IN THE 260,000 TO 292,000 PSI STRENGTH RANGE.
VARIOUS PROTECTIVE COATINGS WERE EVALUATED
COMPARATIVELY ON THE BASIS OF A SUSTAINED AXIAL
TENSILE LOAD EQUIVALENT TO 70% OF THE ULTIMATE
STRENGTH. ROUND, TENSILE TYPE SPECIMENS TESTED THE
COATINGS AS APPLIED TO A MACHINED OR SHOT-PEENED
SURFACE BY ALTERNATE IMMERSION IN 5% SALT WATER.
THE RESULTS INDICATED THAT THE PEENED SURFACE HAD
MORE RESISTANCE TO CRACKING THAN THE MACHINED
SURFACE. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-423 684

HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF THIN FILM CADMIUM SULFIDE SOLAR
CELLS. (U)

DESCRIPTIVE NOTE: REPT. FOR SEP 62-NOV 63,
NOV 63 60P SCHAEFER, J. C. THUMRICK, R. J.
HILL, E. R. IBELT, R. F. ;
CONTRACT: AF33 657 9975
PROJ: 8173
TASK: 817301 32
MONITOR: ASD TOR63 743

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SOLAR CELLS, CADMIUM COMPOUNDS),
(*SEMICONDUCTING FILMS, CADMIUM COMPOUNDS), (*CADMIUM
COMPOUNDS, SULFIDES), PHOTOELECTRIC CELLS
(SEMICONDUCTOR), DESIGN, MATERIALS, ELECTRODES, LIFE
EXPECTANCY, RADIATION DAMAGE, ELECTRONS, CRYSTAL LATTICE
DEFECTS, STABILITY, MANUFACTURING METHODS, CRYSTAL
GROWTH, ENCAPSULATION, SANDWICH CONSTRUCTION, PLASTICS,
PHOTONS, ENERGY, ELECTRICAL PROPERTIES, SPACECRAFT (U)
IDENTIFIERS: THIN FILMS, QUANTUM YIELD (U)

RESEARCH AND DEVELOPMENT OF A LARGE AREA CDS,
VACUUM EVAPORATED, THIN FILM, FLEXIBLE, LIGHTWEIGHT,
FRONT WALL SOLAR CELL WAS CONTINUED IN AN EFFORT TO
IMPROVE THE PERFORMANCE CHARACTERISTICS.
EFFICIENCIES WERE INCREASED TO A MAXIMUM OF 5.18.
POWER TO WEIGHT RATIOS OF 15 WATTS PER POUND ARE
NORMAL WITH 30 AS A MAXIMUM. AN UPGRADING PROCEDURE
FOR LOW EFFICIENCY CELLS WAS DEVELOPED. TEST PANELS
WERE SUBMITTED FOR A 30 DAY ORBITAL SPACE FLIGHT
EVALUATION. ELECTRON DAMAGE EXPERIMENTS INDICATE
LITTLE EFFECT ON THE CDS SOLAR CELLS. X-RAY
TECHNIQUES HAVE BEEN USED TO PHOTOGRAPH DISLOCATIONS
IN SINGLE CRYSTAL CDS. CURRENT-VOLTAGE CURVES
AND SPECTRAL RESPONSE DATA ANALYSES RESULTED IN A
ONE-TRAP MODEL OF THE CDS PHOTOVOLTAIC CELL.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-424 852

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

INVESTIGATION OF CARRIER INJECTION
ELECTROLUMINESCENCE.

(U)

DESCRIPTIVE NOTE: SEMI-ANNUAL SCIENTIFIC REPT. NO. 4, 16
JANUARY JUL 63,

AUG 63 5/P FISCHER, A. G. ; FONGER, W. H.

MOSS, H. L. ; PETERSON, R. L. ; DONAHUE, P. ;

CONTRACT: AF19 604 8U18

PROJ: 4608

TASK: 460804

MONITOR: AFCKL 63 389

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTING FILMS,
ELECTROLUMINESCENCE), (*ELECTROLUMINESCENCE,
SEMICONDUCTORS), (*SEMICONDUCTORS,
ELECTROLUMINESCENCE), (*LUMINESCENCE,
SEMICONDUCTORS), SOLID STATE PHYSICS, ZINC
ALLOYS, TELLURIUM ALLOYS, IMPURITIES, GALLIUM
ALLOYS, ARSENIC ALLOYS, SELENIUM ALLOYS, SINGLE
CRYSTALS, MATERIALS, ELECTRIC CURRENTS, ELECTRONS,
INJECTION, CRYSTAL GROWTH, ZINC COMPOUNDS,
SULFIDES, CADMIUM COMPOUNDS, EPITAXIAL GROWTH,
OPTICAL PHENOMENA, REFRACTIVE INDEX, LIGHT
TRANSMISSION, OPTICAL PROPERTIES, BROADBAND,
PHOSPHIDES, ARSENIDES, GALLIUM COMPOUNDS

(U)

IDENTIFIERS: 1963, INJECTION
ELECTROLUMINESCENCE

(U)

CARRIER INJECTION ELECTROLUMINESCENCE: LUMINESCENT
JUNCTIONS IN WIDE-GAP SEMICONDUCTORS; TUNNEL INJECTION
ELECTROLUMINESCENCE; A GALLIUM ARSENIDE-GALLIUM PHOSPHIDE
LIGHT SOURCE; EVAPORATED ZNSE AND ZNTE FILMS AND
CELLS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-425 523
HP ASSOCIATES PALO ALTO CALIF

INVESTIGATION OF HOT ELECTRON EMITTER. (U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 5, 1 JUNE-31
AUG 63.

AUG 63 29P
CONTRACT: AF19 628 1637
PROJ: 4608
TASK: 460804
MONITOR: AFCEL 63 553

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTOR FILMS, CADMIUM ALLOYS),
(*CADMIUM ALLOYS, SEMICONDUCTOR FILMS), DIODES
(SEMICONDUCTOR), VAPOR PLATING, SULFIDES, IMPURITIES,
SELENIUM ALLOYS, VACUUM APPARATUS, GOLD, SILICON,
PLATINUM (U)
IDENTIFIERS: 1963, SCHOTTKY BARRIERS, HOT
ELECTRONS (U)

A NEWTYPE OF CADMIUM SULFIDE EVAPORATION SOURCE IN WHICH THE RATE IS DIFFUSION LIMITED IS DISCUSSED. TYPICAL THICKNESS VERSUS TIME AND RATE VERSUS TEMPERATURE DEPENDENCES ARE PRESENTED AND THE RATE IS FOUND TO BE DEPENDENT ONLY ON SOURCE TEMPERATURE. SPECTROCHEMICAL ANALYSIS OF THE FILMS INDICATE THAT THE FILM DOPANT CONCENTRATION IS APPROXIMATELY 20% OF THE SOURCE CONCENTRATION. THIS MEASUREMENT IS VERIFIED BY ELECTRICAL MEASUREMENTS ON THE FILMS. A DISCUSSION OF POSSIBLE ADVANTAGES OF EVAPORATING $CdSe$ INSTEAD OF CdS FOR A TRIODE COLLECTOR IS PRESENTED. THE CAPACITY-VOLTAGE AND CURRENT-VOLTAGE OF A GOLD TO CADMIUM SELENIDE BARRIER ARE PRESENTED AND THE INTERNAL BARRIER HEIGHT IS FOUND TO BE 0.82 EV, WHICH IS COMPATIBLE WITH A GALLIUM ARSENIDE EMITTER. FURTHER DATA IS PRESENTED FOR THE REVERSE LEAKAGE MECHANISM OF IMAGE FORCE LOWERING OF THE BARRIER. THE DATA SUPPORTS THE CONTENTION THAT THE INFRARED FREQUENCY VALUE OF SEMICONDUCTOR PERMITTIVITY, VIZ. 12 FOR Si , SHOULD BE USED FOR BARRIER LOWERING CALCULATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-426 170
RCA LABS PRINCETON N J

EVAPORATED THIN-FILM TECHNIQUES. (U)

DESCRIPTIVE NOTE: FINAL REPT., 15 MAY 62-31 JULY 63,
JUL 63 30P QUINN, R. E. ;
CONTRACT: NONR385400

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INTEGRATED CIRCUITS, SEMICONDUCTING
FILMS), (*TRANSISTORS, INTEGRATED CIRCUITS),
(*SEMICONDUCTING FILMS, INTEGRATED CIRCUITS),
MANUFACTURING METHODS, PROCESSING, ELECTRIC FIELDS,
ELECTRODES, CADMIUM COMPOUNDS, CADMIUM ALLOYS, SULFIDES,
ELECTRIC CURRENTS, FIXED CONTACTS, THICKNESS, ELECTRIC
INSULATION, LIFE EXPECTANCY, AMPLIFIERS (U)

IDENTIFIERS: 1963, SHIFT REGISTERS, THIN
FILMS (U)

THE REQUIREMENTS PECULIAR TO ACTIVE INTEGRATED
CIRCUIT ELEMENTS ARE SET FORTH IN DETAIL AND THE
PRESENT CHARACTERISTICS OF THE THIN-FILM TRANSISTOR
(TFT) ARE MEASURED AGAINST THESE REQUIREMENTS.
SOME OF THE PROBLEMS IMPEDING SUCCESSFUL
UTILIZATION OF THE TFT IN INTEGRATED CIRCUITS WERE
SOLVED, BUT OTHERS PERSIST. NONE OF THESE
DIFFICULTIES ARE BELIEVED TO BE FUNDAMENTAL TO THE
OPERATION OF THE DEVICE. THE DESIGN AND
FABRICATION OF AN INTEGRATED AMPLIFIER AND AN
INTEGRATED SHIFT REGISTER EMPLOYING TFT IS IS
DESCRIBED. THE TECHNIQUES REQUIRED FOR TFT
FABRICATION WERE FOUND COMPATIBLE WITH THOSE USED FOR
THIN-FILM PASSIVE COMPONENT FABRICATION. A SUMMARY
OF TFT FABRICATION TECHNIQUES IS GIVEN.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-426 250

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS.

(U)

UCT 63 IV

REPT. NO. SR5A

CONTRACT: AF19 628 329

PROJ: 4608

TASK: 460004

MONITOR: AFCL

63 552A

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, LUMINESCENCE),
(*DIODES (SEMICONDUCTOR), LUMINESCENCE),
(*SEMICONDUCTORS, LUMINESCENCE), (*LUMINESCENCE,
SEMICONDUCTORS), (*ELECTROLUMINESCENCE, SEMICONDUCTORS),
CADMIUM COMPOUNDS, SULFIDES, COPPER ALLOYS, ZINC
ALLOYS, SELENIUM ALLOYS, SILICON COMPOUNDS, CARBIDES,
GALLIUM ALLOYS, ANTIMONY ALLOYS, INDIUM ALLOYS,
GALLIUM COMPOUNDS, ARSENIDES, PHOSPHIDES, CADMIUM,
DIFFUSION, IMPURITIES, CRYSTAL GROWTH, INTENSITY, LOW-
TEMPERATURE RESEARCH, LASERS (U)
IDENTIFIERS: 1963, CADMIUM SULFIDE, COPPER SELENIDE,
ZINC SELENIDE, SILICON CARBIDE, GALLIUM ARSENIDE,
GALLIUM PHOSPHIDE, GALLIUM ANTIMONIDE (U)

THE SELF-DIFFUSION OF CD IN CDS HAS BEEN
MEASURED UNDER A VARIETY OF DOPING AND FIRING
CONDITIONS. UNDER SATURATED CD PRESSURE THE
DIFFUSION COEFFICIENT IS GIVEN BY $D = 3 \text{ EXP}(-2.0$
 $\text{EV/KT})$. UNDER S PRESSURE AT 800 C THE
DIFFUSION COEFFICIENT IS FOUND TO BE LINEARLY
DEPENDENT ON THE DONOR IMPURITY CONCENTRATION. BY
MEASURING THE POSITION OF THE PEAK OF THE EDGE
EMISSION EXCITON BAND IT HAS BEEN POSSIBLE TO MONITOR
ACCURATELY THE TEMPERATURE OF OPERATING
CARRIER INJECTION ELECTROLUMINESCENT
HETEROJUNCTIONS. LUMINESCENCE FROM TRAVELING
SOLVENT SiC DIODES IS DISCUSSED. MIXED CRYSTALS
OF GaAs-GAP WERE GROWN FROM EXCESS Ga.
COHERENT LIGHT EMISSION WAS OBTAINED FROM DIODES
MADE FROM THESE CRYSTALS. LUMINESCENCE FROM
GaSb DIODES SHOWS LINE NARROWING, BUT COHERENT
LIGHT EMISSION WAS NOT ACHIEVED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-426 463

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

INVESTIGATION OF CARRIER INJECTION
ELECTROLUMINESCENCE.

(U)

DESCRIPTIVE NOTE: FINAL REPT., 15 JAN 61-14 SEP 63,

UCT 63 27P FISCHER, A. G. ;

CONTRACT: AF19 604 9018

PROJ: 4608

TASK: 460804

MONITOR: AFCKL 63 526

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ELECTROLUMINESCENCE, SEMICONDUCTOR
DEVICES), (*SEMICONDUCTING FILMS, ELECTROLUMINESCENCE),
(*SEMICONDUCTOR DEVICES, ELECTROLUMINESCENCE), POWDERS,
ZINC COMPOUNDS, SULFIDES, SELENIUM COMPOUNDS, TELLURIUM
COMPOUNDS, CADMIUM COMPOUNDS, GALLIUM COMPOUNDS,
PHOSPHIDES, CRYSTAL GROWTH, MANUFACTURING METHODS,
LUMINESCENCE, LIGHT, SOURCES, SELENIDES (U)

IDENTIFIERS: 1963, ELECTROLUMINESCENT JUNCTIONS,
TUNNEL INJECTION, CARRIER INJECTION, WIDE BAND-
GAP SEMICONDUCTORS, ZINC SULFIDE, THIN FILMS (U)

TO DEVELOP A SOLID-STATE LIGHT SOURCE, FIRST
STUDIED WAS THE MECHANISM OF THE EXISTING
ELECTROLUMINESCENCE OF ZINC SULFIDE POWDER, WHICH WAS
FOUND TO BE BASED ON BIPOLAR ALTERNATING INJECTION OF
ELECTRONS AND HOLES FROM CONDUCTING, COPPER-DECORATED
IMPERFECTION LINES, AND RECOMBINATION AT FIELD
REVERSAL. TO EXTEND THIS PRINCIPLE TO EFFICIENT DC
OPERATION, THE TECHNOLOGY WAS DEVELOPED OF CRYSTAL
GROWTH LUMINESCENT, CONDUCTING II-VI COMPOUNDS
FROM THE MELT UNDER PRESSURE, AND INJECTION
MECHANISMS WERE FOUND ACTIVE IN RESULTING BROAD P-I-N
HETEROJUNCTIONS. A NEW TYPE OF INJECTING
HETEROJUNCTION, BASED ON TUNNELING THROUGH THIN
INSULATING FILMS, WAS INVENTED, PERMITTING MINORITY
CARRIER INJECTION INTO LUMINESCENT SEMICONDUCTORS
REGARDLESS OF COMPENSATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-427 362
RCA LABS PRINCETON N J

EVAPORATED THIN-FILM DEVICES. (U)

DESCRIPTIVE NOTE: FINAL REPT., 1 JUNE 62-30 SEP 63,
OCT 63 58P BORKAN, H. ; HENRICH, V. E. ;
SHALLCROSS, F. V. ; WAXMAN, A. ; WEIMER, P. K. ;
CONTRACT: AF19 628 1617
PROJ: AF-4608
TASK: 460804
MONITOR: AFCKL 63-529

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TRANSISTORS, SEMICONDUCTING FILMS),
(*SEMICONDUCTING FILMS, TRANSISTORS), ELECTRIC
INSULATION, ELECTRODES, VAPOR PLATING, TELLURIUM, SPACE
CHARGES, CADMIUM COMPOUNDS, SULFIDES, SURFACE
PROPERTIES, FIXED CONTACTS, DIODES (SEMICONDUCTORS),
HALL EFFECT, RESISTANCE (ELECTRICAL), ELECTRIC FIELDS (U)
IDENTIFIERS: THIN FILMS, 1963, FIELD EFFECT
TRANSISTORS, CARRIER MOBILITY (U)

RESEARCH CONCERNED THIN-FILM DEVICES WHICH HAD
EVAPORATED. THE OPERATING CHARACTERISTICS OF THE
INSULATED-GATE THIN-FILM TRANSISTOR (TFT) ARE SHOWN
IN GOOD AGREEMENT WITH A SIMPLE FIELD-EFFECT
ANALYSIS. A COPLANAR-ELECTRODE TFT STRUCTURE HAS
YIELDED IMPROVED PERFORMANCE AND IS SIMPLER TO
FABRICATE THAN THE EARLIER STAGGEREDELECTRODE
STRUCTURE. A P-TYPE TFT, HAVING EXCELLENT
ENHANCEMENT-TYPE CHARACTERISTICS, WAS MADE USING
EVAPORATED TELLURIUM AS THE SEMICONDUCTOR. STUDIES
OF MOBILITY IN THE SPACE-CHARGE LAYER USING THE TFT
AS A RESEARCH TOOL HAVE SHOWN THE EXISTENCE OF
BARRIERS BETWEEN CRYSTALLITES IN A POLYCRYSTALLINE
CADMIUM SULFIDE FILM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZH1

AD-429 412

BARUS RESEARCH LAB OF PHYSICS BROWN UNIV PROVIDENCE R
I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY-CLEAN
METALS AND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 4, 1 JUNE-31 DEC
63:

DEC 63 14P FARNSWORTH, R. E. ; CAMPBELL, B.
D. :

CONTRACT: DA36 D395CH9069

PROJ: 3A99 25 001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CADMIUM COMPOUNDS, SURFACE PROPERTIES);
(*SEMICONDUCTORS, ELECTRON DIFFRACTION ANALYSIS),
CLEANING, SULFIDES, SINGLE CRYSTAL, ETCHED CRYSTALS,
ADSORPTION, OXYGEN, HEAT TREATMENT (U)
IDENTIFIERS: 1963 (U)

THE (0001) SURFACES OF CDS WERE EXAMINED
BY MEANS OF LOW-ENERGY ELECTRON DIFFRACTION.
HEATING THE CDS CRYSTAL IN OXYGEN AT 200C
INDUCES ADSORPTION ON THE (0001) SPECULAR
SURFACE. THE (0001) MATTE SURFACE OF A HIGH
PURITY CDS CRYSTAL WAS EX AMINED. THE RESULTS
FOR THIS CRYSTAL SHOWED THE PRESENCE OF SURFACE
PLANES IN AGREEMENT WITH THE RESULTS FOR THE SAME
FACE OF ANOTHER CDS CRYSTAL WHOSE PURITY WAS
UNKNOWN. THE (0001) MATTE SURFACE OF A HIGH
PURITY CDS CRYSTAL WAS PREPARED FOR EXAMINATION
WITHOUT CHEMICAL ETCH AND WITHOUT EXPOSURE TO
TEMPERATURES HIGHER THAN 400C. A WEAK DIFFRACTION
PATTERN CHARACTERISTIC OF DIFFRACTION FROM A
(0001) PLANE AND CONTAINING HALF INTEGRAL AS WELL
AS INTEGRAL ORDER BEAMS IN TWO MAJOR AZIMUTHS WAS
OBTAINED IN AGREEMENT WITH THE RESULTS FOR THE
(0001) SPECULAR SURFACE. THESE RESULTS SHOW
THAT THE CHEMICAL ETCH EXPOSES THE PLANES ON THE
MATTE SURFACE. HEATING THE CRYSTAL NEAR 500C IN
A VACUUM CAUSED THE APPEARANCE OF PLANES AS IN THE
CASE OF THE CHEMICAL ETCH. THUS THE PLANE ON THE
MATTE SURFACE IS UNSTABLE UNDER THE CONDITIONS OF
CHEMICAL ETCH OR HEAT TREATMENT NEAR 500C IN A
VACUUM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-431 975
RCA LABS PRINCETON N J

INTERACTIONS OF COHERENT OPTICAL RADIATION WITH SOLIDS. (U)

DESCRIPTIVE NOTE: SEMIANNUAL TECHNICAL SUMMARY REPT., 1
MAY 6331 DEC 63,
DEC 63 37P BRAUNSTEIN, R. ;OCKMAN, N. I
CONTRACT: NONR412800
PROJ: 306 62

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LASERS, INJECTION), (*SOLIDS, OPTICAL PHENOMENA), SEMICONDUCTORS, PHOTONS, EXCITATION, ABSORPTION, CADMIUM COMPOUNDS, SULFIDES, MEASUREMENT, TUNED AMPLIFIERS, LINE SPECTRUM, EMISSIVITY, STRESSES, COMPRESSIVE PROPERTIES, RUBY, DIFFUSION, SELECTION RULES (U)
IDENTIFIERS: 1963, Q-SWITCHING, FREQUENCY TUNING (U)

THE STUDY OF DOUBLE-PHOTON ABSORPTION, HARMONIC GENERATION IN SEMICONDUCTORS, AND THE FREQUENCY TUNING OF INJECTION LASERS BY UNIAXIAL STRESS ARE REPORTED. OBSERVATIONS HAVE BEEN MADE OF THE TWO-PHOTON EXCITATION OF AN ELECTRON FROM THE VALENCE TO THE CONDUCTION BAND IN CDS. THE RADIATIVE RECOMBINATION EMISSION FROM EXCITON AND IMPURITY LEVELS SUBSEQUENT TO THE SIMULTANEOUS ABSORPTION OF TWO QUANTA WAS OBSERVED AS A FUNCTION OF LASER INTENSITY AND COMPARED TO THE EMISSION EXCITED BY SINGLE-QUANTA ABSORPTION FOR PHOTONS. THE FREQUENCY OF A GAAS LASER CAN BE READILY TUNED BY THE APPLICATION OF UNIAXIAL STRESS. ANALYSIS OF THE FREQUENCY CHANGES WITH STRESS OF DIODES PREPARED IN DIFFERENT FASHIONS INDICATES THAT DIFFERENT EMISSION PROCESSES MAY BE TAKING PLACE.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-432 272

DAVID SARNOFF RESEARCH CENTER PRINCETON N J

SYNTHESIS AND CHARACTERIZATION OF ELECTRONICALLY
ACTIVE MATERIALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 1, 15 MAY 63-15
FEB 64.

MAR 64 159P WEISBERG, L. R. ; LEVERENZ, H.

W. :

CONTRACT: SD182

PROJ: 446

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
(*CRYSTAL GROWTH, SEMICONDUCTORS), (*SOLID STATE
PHYSICS, SEMICONDUCTORS), PHTHALOCYANINES, VAPOR
PLATING, SINGLE CRYSTALS, ALUMINUM COMPOUNDS, GALLIUM
COMPOUNDS, PHOSPHIDES, ARSENIDES, DIFFUSION, IMPURITIES,
ELECTRON BOMBARDMENT, OPTICAL PROPERTIES, BISMUTH
ALLOYS, ANTIMONY ALLOYS, TIN ALLOYS, ORGANIC COMPOUNDS,
GALLIUM ALLOYS, ARSENIC ALLOYS, INDIUM ALLOYS, PHONONS,
CADMIUM COMPOUNDS, SULFIDES, ACOUSTICS, MOLYBDENUM,
REFRACTORY MATERIALS, REFRACTORY METALS + ALLOYS,
THERMIONIC EMISSION, TUNGSTEN ALLOYS, RHENIUM
ALLOYS (U)

IDENTIFIERS: 1964, MICROWAVE ULTRASONICS, GALLIUM
ARSENIDE, GALLIUM PHOSPHIDE, CADMIUM SULFIDE, BISMUTH
ALLOY-SB-SN, BISMUTH ALLOY-SB, INDIUM ALLOY-SB,
TUNGSTEN ALLOY-RE (U)

CONTENTS: RESEARCH ON III-V COMPOUND
SEMICONDUCTORS--ALP, GAAS, GAP, AND
GAAS-GAP ALLOYS, GROWTH OF GAP FROM THE
MELT, REVIEW OF DIFFUSION IN GAAS, ON THE
ROLE OF THERMAL SPIKES IN ELECTRON BOMBARDED
SEMICONDUCTORS; SEMIMETALS AND LOW BAND-GAP
SEMICONDUCTORS; PHONON INTERACTIONS IN
SEMICONDUCTORS--III-A MICROWAVE ULTRASONICS,
III-B ACOUSTOELECTRIC EFFECTS IN CDS; OPTICAL
PROPERTIES OF SEMICONDUCTORS; RESEARCH ON
REFRACTORY MATERIALS--V-A ARC-IMAGE FURNACE
GROWTH OF REFRACTORY MATERIALS, V-B THERMIONIC
EMISSION FROM REFRACTORY METALS. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-433 671
GENERAL ELECTRIC CO SYRACUSE N Y

IMPROVED PHOTOCONDUCTORS FOR DISPLAY SWITCHING. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
FEB 64 76P ING, S. I
CONTRACT: AF30 602 2918
PROJ: 5578
TASK: 557803
MONITOR: RADC TUR63 554

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PHOTOELECTRIC CELLS (SEMICONDUCTOR),
DISPLAY SYSTEMS), (*SEMICONDUCTORS, PHOTOCONDUCTIVITY),
ELECTROLUMINESCENCE, SEMICONDUCTOR DEVICES, SINGLE
CRYSTALS, CADMIUM COMPOUNDS, SULFIDES, SELENIDES (U)
IDENTIFIERS: 1964 (U)

RESEARCH AND DEVELOPMENT WORK ON POLYCRYSTALLINE
CdSe PHOTOCONDUCTORS FOR (EVENTUAL) SWITCHING
OF LARGE ELECTROLUMINESCENT DISPLAYS IS DESCRIBED.
A POWDER SINTERING PROCEDURE, FOLLOWED BY EITHER A
SPRAY OR A SETTLING TECHNIQUE FOR DEPOSITING THE
POWDER UNTO THE SUBSTRATE, WAS USED TO FABRICATE THE
PHOTOCONDUCTOR CELLS. THE SETTLING TECHNIQUE WAS
FOUND TO BE MORE REPRODUCIBLE, EASIER TO CONTROL AND
LESS COSTLY THAN THE SPRAY METHOD. VARIOUS
PERTINENT PROCESSING VARIABLES WERE STUDIED INCLUDING
THE AMOUNT OF DUPANT AND FLUXING AGENT ADDED, THE
SINTERING TEMPERATURE AND TIME, THE CONCENTRATION OF
OXYGEN IN THE SINTERING AMBIENT AND THE PARTICLE
SIZE. A NUMBER OF MEASUREMENTS WERE MADE IN ORDER
TO FULLY CHARACTERIZE THE PHOTOCONDUCTORS, CLARIFY
THE ROLE OF VARIOUS PROCESSING VARIABLES AND
UNDERSTAND THE MANY ASPECTS OF THE PHOTOCONDUCTIVE
PROCESSES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-433 894

HP ASSOCIATES PALO ALTO CALIF

INVESTIGATION OF HOT ELECTRON EMITTER.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 6, 1 SEP-31 DEC
63.

DEC 63 43P

CONTRACT: AF19 628 1637

PROJ: 4608

TASK: 460805

MONITOR: AFCKL 64 134

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ELECTRONS, HEAT), (*EMISSIVITY,
ELECTRONS), CADMIUM COMPOUNDS, SULFIDES, RESISTANCE
(ELECTRICAL), EVAPORATION, GOLD, PLATINUM, VACUUM
APPARATUS, SELENIDES, METAL FILMS, SILICON,
MEASUREMENTS, HEAT TREATMENT, PHOTOELECTRIC EFFECT (U)
IDENTIFIERS: THIN FILMS, SUBSTRATES (U)

A SUMMARY OF THE WORK ON CDS IS PRESENTED, AND
IT IS CONCLUDED THAT RESISTIVITY OF THE EVAPORATED
FILMS DOES NOT DEPEND ON THE CONTROLLED EVAPORATION
PARAMETERS. IT IS OBSERVED THAT GOLD SUBSTRATES
ARE DESTROYED BY THE EVAPORATION OF CDS ONTO A
300 C SUBSTRATE WHEREAS PLATINUM SUBSTRATES ARE
NOT. THE EVAPORATION OF CDS HAS BEEN DROPPED
IN FAVOR OF COSE WHICH APPEARS TO BE A MORE
REPRODUCIBLE SYSTEM. THE RANGE OF 0.95 EV HOT
ELECTRONS IN GOLD FILMS HAS BEEN PHOTOELECTRICALLY
DETERMINED TO BE 330 - 30 ANGSTROM UNITS. THIS
VALUE IS OBTAINED WITH GOLD FILMS ON CHEMICALLY
PREPARED SILICON AS WELL AS SAMPLES CLEAVED IN AN
EVAPORATING GOLD STREAM. A DISCUSSION OF THE RANGE
MEASUREMENTS IS PRESENTED, AND THIS VALUE OF RANGE IS
COMPARED TO THAT MEASURED BY OTHER INVESTIGATORS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-435 548

LION (KURT S) BELMONT MASS

INVESTIGATION IN THE FIELD OF IMAGE INTENSIFICATION. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

JAN 64 69P LION, KURT S. (VANDERSCHMIDT,

G. F. I

CONTRACT: AF19 604 5704

PROJ: 7661

TASK: 76612

MONITOR: AFCHL 64 133

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (IMAGE INTENSIFIERS (ELECTRONICS), SANDWICH CONSTRUCTION), DESIGN, THEORY, PHOTOGRAPHIC RECORDING SYSTEMS, PHOTOCONDUCTIVITY, CADMIUM COMPOUNDS, SULFIDES, ELECTRICAL PROPERTIES, OPTICAL PROPERTIES, PHOTOGRAPHIC EMULSIONS, ELECTROLUMINESCENCE, PHOSPHORESCENT MATERIALS, PHOTOGRAPHIC IMAGES, SOLID STATE PHYSICS, ELECTRIC FIELDS, GAS DISCHARGES (U)
IDENTIFIERS: 1964 (U)

THE OBJECT OF THIS STUDY IS AN INVESTIGATION OF A SOLID STATE IMAGE INTENSIFIER CONSISTING OF A PHOTOCONDUCTIVE LAYER AND A PHOTOGRAPHIC EMULSION IN AN ELECTRIC FIELD. AN INCIDENT RADIATION PATTERN PRODUCES A LOCAL CONDUCTIVITY OF THE PHOTOCONDUCTIVE LAYER AND CAUSES A CURRENT PATTERN AND A CORRESPONDING BLACKENING IN THE PHOTOGRAPHIC EMULSION. INTENSIFICATION IN EXCESS OF 1000 WERE OBTAINED AT WAVELENGTHS BETWEEN 800 AND 850 MILLIMICRONS. THE RESOLUTION IS OF THE ORDER OF 100 TO 300 MICRONS. THE INTENSIFICATION CAN BE FURTHER IMPROVED BY THE USE OF THIN LAYERS OF DC EXCITED ELECTROLUMINESCENT LAYERS. THE INVESTIGATION SHOWS THAT SEVERAL PHYSICAL EFFECTS CONTRIBUTE TO THE BLACKENING OF THE EMULSION. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-442 635

RAYTHEON CO WALTHAM MASS

FIELD EFFECT AND SPACE-CHARGE-LIMITED THIN FILM
TRIODES. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 JAN-31 MAR
64.

APR 64 33P BOWE, J. J. LAZNOVSKY, W. H.
SHALLCROSS, F. V. WALLMARK, J. T. WEIMER, D. K.

CONTRACT: DA36 039AMCO2374

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (SEMICONDUCTOR DEVICES, SEMICONDUCTING
FILMS), DIELECTRIC FILMS, STABILITY, ELECTRICAL
CONDUCTANCE, TRANSISTORS, LIFE EXPECTANCY,
ENCAPSULATION, TESTS, TEMPERATURE, SELENIUM, COATINGS,
ELECTRODES, CADMIUM COMPOUNDS, SULFIDES, TELLURIUM,
MANUFACTURING METHODS, X-RAY DIFFRACTION ANALYSIS, VAPOR
PLATING, SURFACE PROPERTIES (U)

IDENTIFIERS: THIN FILMS, THIN FILMS ELECTRONICS,
THIN FILM TRIODES (U)

SHELF AND OPERATIONAL LIFE TESTS CONTINUED.
VACUUM AND SELENIUM ENCAPSULATED TFT UNITS NOW
SHOW A STABILITY EQUIVALENT TO THAT OF GERMANIUM
TRANSISTORS. A STUDY HAS BEEN MADE OF VARIOUS
PHASES OF INSTABILITY WHICH OCCUR IN ENCAPSULATED
THIN-FILM TRANSISTORS WHEN BIAS IS APPLIED. IT HAS
BEEN FOUND THAT THE CHANNEL CONDUCTIVITY DECREASES
FOR POSITIVE GATE BIAS AND INCREASES FOR NEGATIVE
GATE BIAS. A STEADY-STATE CONDUCTIVITY IS REACHED
AFTER ABOUT FOUR HOURS AND REMAINS STEADY FOR AS LONG
AS 1000 HOURS WHILE BIAS IS APPLIED. AFTER REMOVAL
OF THE BIAS, THE CONDUCTIVITY RETURNS TO ITS INITIAL
VALUE IN ABOUT 24 HOURS. AT 70 C THE TIME
CONSTANTS ARE ABOUT HALF OF THE VALUES AT ROOM
TEMPERATURE. THE AMOUNT OF CHANGE VARIES FROM UNIT
TO UNIT, BEING LARGER (25 PER CENT AVERAGE) FOR
LOW-CONDUCTIVITY UNITS AND NEGLIGIBLE FOR HIGH-
CONDUCTIVITY UNITS. RELATED TO THESE INSTABILITIES
ARE CHANGES IN CHANNEL CONDUCTIVITY WHICH OCCUR WHEN
UNITS ARE HANDLED. THESE ARE ATTRIBUTED TO STATIC
DISCHARGES THROUGH THE INSULATOR. A PRELIMINARY
COMPARISON (ONE UNIT OPERATED FOR 1000 HOURS) OF
EVAPORATED SELENIUM COATING OF THE FINISHED TFT AND
VACUUM ENCAPSULATION INDICATES THAT THE FORMER
PROCESS MAY BE AS GOOD AS THE LATTER. (AUTHOR) (U)

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UNCLASSIFIED

/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-442 774

GENERAL ELECTRIC CO SYRACUSE N Y

RESEARCH AND DEVELOPMENT FOR FIELD EFFECT TRIODES AND
SPACE CHARGE LIMITED TRIODES. (U)

DESCRIPTIVE NOTE: FINAL REPT., 1 JUN 62-31 MAY 63,
MAY 63 7UP BLANK, J. M. ICAHILL, R. E.
REINHARTZ, K. K. RUSSELL, V. A. TANTRAPORN, W.

REPT. NO. 4

CONTRACT: DA36 0395C90756

PROJ: 3A99 21 003

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TRANSISTORS, ELECTRIC FIELDS), (*ELECTRIC
FIELDS, TRANSISTORS), (*SPACE CHARGES, TRANSISTORS),
SEMICONDUCTING FILMS, ELECTRICAL CONDUCTANCE, METAL
FILMS, DIELECTRIC FILMS, GAIN, POWER, TEMPERATURE,
SILICON COMPOUNDS, OXIDES, CADMIUM COMPOUNDS, SULFIDES,
ZINC COMPOUNDS, THICKNESS, AGING (MATERIALS),
ELECTRODES, CONFIGURATION, ELECTRIC CURRENTS, SANDWICH
CONSTRUCTION, MANUFACTURING METHODS, VACUUM, VAPOR
PLATING, ELECTRICAL PROPERTIES, FIXED CONTACTS,
MOLECULAR BEAMS (U)

IDENTIFIERS: THIN FILMS, FIELDISTORS, SILICON
OXIDE, CADMIUM SULFIDE, ZINC OXIDE, SPACE CHARGE
LIMITED TRANSISTOR, SUBSTRATES(ELECTRONICS) (U)

RESEARCH CONCERNED THE THEORETICAL INVESTIGATION,
DESIGN, AND DEVELOPMENT OF THIN FILM METALDIELECTRIC
ACTIVE SOLID STATE ELECTRONIC DEVICE WITH USABLE
POWER GAINS THAT ARE RELATIVELY INSENSITIVE TO
TEMPERATURE CHANGES. A DETAILED CONDUCTION
MECHANISM FOR THIN-FILM FIELD EFFECT TRIODES IS
PRESENTED. NEW EXPERIMENTAL FINDINGS WHICH SEEM TO
SUBSTANTIATE THE TRAP EMPTYING MECHANISM ARE
OUTLINED. THE RESULTS OF EXPERIMENTS IN VARYING
SIO AND CDS THICKNESS IN FIELD EFFECT TRIODES
AND THEIR EFFECT ON DEVICE PERFORMANCE ARE SHOWN.
EFFECTS OF DEVICE AGING AND ELECTRODE
CONFIGURATIONS ON DEVICE PERFORMANCE ARE ALSO
DISCUSSED. SOME THEORETICAL CONSIDERATIONS FOR
OBSERVATION OF SPACE CHARGE LIMITED CURRENT IN
CDS FILMS ARE DISCUSSED, THE METHODS OF
FABRICATION OF SCL DEVICES ARE PRESENTED.
(AUTHOR) (U)

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UNCLASSIFIED

/ZZZHY

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-450 756
RCA LABS PRINCETON N J

INTERACTIONS OF COHERENT OPTICAL RADIATION WITH
SOLIDS.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,
AUG 64 67P BRUNSTEIN, R. ;OCKMAN, N. I
CONTRACT: NONR412800
PROJ: 306 62

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LIGHT TRANSMISSION, SOLIDS),
(*SEMICONDUCTORS, LIGHT), (*SOLID STATE PHYSICS,
LASERS), RECOMBINATION REACTIONS, POLARIZATION, DIODES
(SEMICONDUCTOR), LASERS, RUBY, PHOTONS, ABSORPTION,
SEMICONDUCTOR DEVICES, GALLIUM COMPOUNDS, ARSENIDES,
CADMIUM COMPOUNDS, SULFIDES, ALUMINUM COMPOUNDS,
NEODYMIUM, CRYSTAL MIXERS, EXCITATION, ANTIMONY ALLOYS,
GERMANIUM, PHOSPHIDES, INDIUM COMPOUNDS, ARSENIDES,
ABSORPTION, IMPURITIES, QUANTUM MECHANIS, SILICON,
CRYSTALS

(U)

IDENTIFIERS: 1964

(U)

THE STUDY OF DOUBLE-PHOTON ABSORPTION, HARMONIC
GENERATION, AND FREQUENCY-MIXING IN SEMICONDUCTORS,
AND THE FREQUENCY TUNING OF INJECTION LASERS BY
UNIAXIAL STRESS ARE REPORTED. CALCULATIONS WERE
ALSO MADE OF THE CROSS SECTIONS FOR DOUBLE-PHOTON
ABSORPTION IN VARIOUS SUBSTANCE. THESE RESULTS
INDICATE THAT DOUBLE-PHOTON ABSORPTION CAN READILY SET
AN INTRINSIC UPPER LIMIT TO THE POWER DENSITY THAT
CAN BE TRANSMITTED THROUGH A MEDIUM. MIXING OF THE
AXIAL MODES OF BOTH A RUBY AND A ND(3+) GLASS
LASER OBSERVED IN SAMPLES OF GE, GAAS, AND SI
WHICH WERE SUBJECTED TO AN EXTERNAL DC BIAS FIELD.
THE OBSERVED DEPENDENCE OF THE INTENSITY OF THE
DIFFERENCE FREQUENCIES ON THE BIAS, EXCITATION
INTENSITY. THE EFFECT OF UNIAXIAL STRESS ON THE
EMISSION OF GAAS DIODES OPERATING BOTH IN THE
LASING AND NONLASING MODES HAVE BEEN STUDIED.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-451 775
RAYTHEON CO WALTHAM MASS

FIELD-EFFECT AND SPACE-CHARGE-LIMITED INFILM TRIODES. (U)

DESCRIPTIVE NOTE: REPT. NO. 4 (FINAL), 1 JUL 63-30
JKUN >5,
JUL 64 86P LAZNOVSKY, W. H. ;SHALLCROSS,
F. V. ;WEIMER, P. K. ;WENNIK, L. P. ;
CONTRACT: DAJ6 D39AMCO23/4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•SEMICONDUCTOR DEVICES, SEMICONDUCTING FILMS), VAPOR PLATING, MANUFACTURING METHODS, STABILITY, ELECTRICAL CONDUCTANCE, TRANSISTORS, LIFE EXPECTANCY, ENCAPSULATION, TESTS, TEMPERATURE, ELECTRODES, COATINGS, CADMIUM COMPOUNDS, SULFIDES, TELLURIUM, SURFACE PROPERTIES, SPACE CHARGES (U)
IDENTIFIERS: 1964 (U)

DURING THIS PROGRAM, MATERIALS AND TECHNIQUES WERE STUDIED TO IMPROVE THE REPRODUCIBILITY AND STABILITY OF CDS TFTS, AND TO OBTAIN AN UNDERSTANDING OF THE FAILURE MECHANISMS. EARLY IN THE PROGRAM THE AVERAGE LIFE OF TFTS (AS MEASURED, FOR EXAMPLE, BY THE HALF-LIFE OF THE VALUE OF $G \text{ SUB } M$) WAS ON THE ORDER OF DAYS. AT THE CONCLUSION OF THE PROGRAM LIFE HAS BEEN EXTENDED TO OVER A YEAR. THE FALL-OFF IN $G \text{ SUB } M$ FOR CDS TFTS IS NOW COMPARABLE TO THE DEGRADATION RATE OF GERMANIUM TRANSISTORS WHICH HAVE NOT BEEN AGED. SUCCESS WITH VACUUM-ENCAPSULATED HERMETICALLY SEALED UNITS SHOWS THE SIGNIFICANCE OF ADVERSE AMBIENTS, PARTICULARLY OXYGEN. VITREOUS SELENIUM ENCAPSULATION IS EQUALLY EFFECTIVE, JUDGING FROM EARLY RESULTS OF TESTING. CROWDING OF CHARACTERISTICS IS ASSOCIATED WITH OXIDATION OF CONTACT INTERFACES. A SECOND TYPE OF INSTABILITY-A SHORT TIME VARIATION-WAS STUDIED; THIS IS ASSOCIATED WITH TRAPPED CHARGE AND CHARGE MIGRATION UNDER FIELD. CONTROL OF THIS CALLS FOR CONTROL OF CHARGE INCLUDED IN THE EVAPORATED FILM. RESULTS OF THE PROGRAM SHOW THAT A STABLE TFT MAY BE ACHIEVED BY PROPER FABRICATION AND SEALING. INDICATIONS ARE THAT A POSTFABRICATION AGING PROCESS WOULD YIELD EXTREMELY STABLE DEVICES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-455 519

OFFICE OF AEROSPACE RESEARCH ARLINGTON VA

CADMIUM SULFIDE. A HISTORY OF SEMICONDUCTOR RESEARCH
AT THE AEROSPACE RESEARCH LABORATORIES. (U)

SEP 64 77P KOMONS, NICK A. I
REPT. NO. 64 11

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, AIR FORCE RESEARCH),
(*AIR FORCE RESEARCH, SEMICONDUCTORS), (*CADMIUM
COMPOUNDS, SULFIDES), SEMICONDUCTING FILMS, REVIEWS,
SOLAR CELLS, CRYSTALS, CRYSTAL GROWTH, TRANSISTORS,
SEMICONDUCTOR DEVICES, RESEARCH PROGRAM ADMINISTRATION,
FLUORESCENCE, HISTORY, ATOMIC ENERGY LEVELS, SINGLE
CRYSTALS, BIBLIOGRAPHIES, SOLID STATE PHYSICS (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

AN HISTORICAL ACCOUNT IS GIVEN OF AHL'S PROGRAM
IN GROUP II-VI COMPOUND SEMICONDUCTORS FROM THE
BEGINNING OF THE PROGRAM IN 1951 TO THE PRESENT.
STUDIES RELATING TO THE ELECTRICAL AND OPTICAL
PROPERTIES OF CADMIUM SULFIDE ARE EMPHASIZED. THE
STORY IS TOLD IN THE CHANGING CONTEXT OF AIR
FORCE RESEARCH. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-455 972

RCA LABS PRINCETON N J

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1, JUL-JU SEP
64,

JAN 65 3/P WEIMER, P. K. HOWE, J. J. ;
FRANTZ, V. L. LAZNOVSKY, W. H. ISCHELHORN, R. L.

CONTRACT: DA48 0431MCU231E

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TRIODES, ARMY RESEARCH), SEMICONDUCTING
FILMS, CADMIUM COMPOUNDS, SULFIDES, ELECTRICAL
PROPERTIES, IMPURITIES, INDIUM COMPOUNDS, ANTIMONY
ALLOYS, TRANSISTORS, MANUFACTURING METHODS, CRYSTAL
STRUCTURE, CRYSTAL SUBSTRUCTURE, CRYSTAL LATTICE
DEFECTS, ELECTRON DIFFRACTION ANALYSIS, HALL EFFECT (U)
IDENTIFIERS: THIN FILMS (M)

THE MICROSTRUCTURE AND ELECTRICAL CHARACTERISTICS
OF CADMIUM SULFIDE FILMS WERE STUDIED AS A FUNCTION
OF SUBSTRATE TEMPERATURE, FILM THICKNESS, AND
DEPOSITION RATE. PHYSICAL FACTORS WHICH WERE
EXAMINED INCLUDED FILM STRESS, FILM ROUGHNESS,
CRYSTALLITE SIZE, AND DEGREE OF PREFERRED
ORIENTATION. ELECTRICAL PROPERTIES STUDIED
INCLUDED HALL MOBILITY, RESISTIVITY, AND
PERFORMANCE IN TFT STRUCTURES. A SIMPLE
ELECTRICAL METHOD OF MEASURING THE SEMICONDUCTOR
DOPING DENSITY IN THIN-FILM STRUCTURES WAS DEVISED.
TFT'S USING INDIUM ANTIMONIDE FILMS AS THE
SEMICONDUCTOR WERE SHOWN TO OPERATE BY FIELD-EFFECT
CONTROL OF EITHER ELECTRONS OR HOLES. CADMIUM
SELENIDE TFT'S HAVING GOOD PERFORMANCE WERE
PREPARED BY EVAPORATION OF ALL CONSTITUENTS IN A
SINGLE VACUUM UPON A SUBSTRATE HELD AT ROOM
TEMPERATURE. FABRICATION FACILITIES WERE
CONSTRUCTED FOR PRODUCING TWELVE TFT'S ON ONE
SUBSTRATE WITH AN EVAPORATED OVERCOAT AND UNDERCOAT
TO IMPROVE UNIFORMITY AND LIFE. A 0.2-MIL WIRE
MASK IN CONTACT WITH THE GLASS IS EXPECTED TO PRODUCE
SMALLER SOURCE-DRAIN SPACING AND HIGHER PERFORMANCE
THAN HAS BEEN OBTAINED PREVIOUSLY. A TEST FACILITY
WAS CONSTRUCTED FOR LIFE-TESTING A GROUP OF 14
TFT'S UNDER VARIOUS CONDITIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-459 964

LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY
DIV

RADIATION DAMAGE IN SOLIDS. COMPILATION OF
ABSTRACTS.

(U)

DESCRIPTIVE NOTE: SURVEYS OF SOVIET-BLOC SCIENTIFIC
AND TECHNICAL LITERATURE.

MAY 64 90P

REPT. NO. AID-U-64-43

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, RADIATION DAMAGE),
(*SOLID STATE PHYSICS, BIBLIOGRAPHIES), USSR, THEORY,
GERMANIUM, SILICON, CADMIUM COMPOUNDS, INDIUM COMPOUNDS,
CRYSTALS, HALIDES, TITANATES, ABSTRACTING, POLYMERS,
GLASS, MAGNESIUM, ZINC, SELENIDES, SULFIDES, ANTIMONY
ALLOYS, DIELECTRIC PROPERTIES (U)

THIS IS A COMPILATION OF SCIENTIFIC PAPERS ON THE
SUBJECT OF RADIATION DAMAGE IN SOLIDS PUBLISHED IN
THE PERIODICAL FIZIKA TVERDUGO TELA (SOLID
STATE PHYSICS), DURING THE PERIOD FROM
JANUARY 1961 TO NOVEMBER 1963. THE REPORT IS
DIVIDED INTO FOUR SECTIONS: SEMICONDUCTORS, SILICON,
GERMANIUM, CADMIUM SULFIDE, AND CADMIUM SELENIDE AND
INDIUM ANTIMONIDE, IONIC CRYSTALS (EXCLUDING
SEMICONDUCTORS) ALKALI HALIDES, AND MAGNESIUM AND
ZINC TITANATES; OTHER MATERIALS (COVALENT
SUBSTANCES INCLUDING POLYMERS, GLASSES, ROCHELLE
SALT, . . .); AND PURELY THEORETICAL SUBJECTS.
WITHIN EACH SECTION OR SUBSECTION THE PAPERS ARE
ARRANGED CHRONOLOGICALLY STARTING WITH THE EARLIEST
PUBLISHED ARTICLES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-467 489

STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

SURFACE STATES AND BARRIER HEIGHT IN METAL-
SEMICONDUCTOR SURFACE BARRIER DIODES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 65 187P COWLEY, A. M. I
REPT. NO. TR-0414-1, SU-SEL-65-051
CONTRACT: NONR22583
PROJ: NR373 360

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTOR: (*DIODES (SEMICONDUCTOR), SURFACE
PROPERTIES), METALS, ELECTRONS, ENERGY,
EXCITATION, ATOMIC ENERGY LEVELS, GALLIUM ALLOYS,
PHOSPHORUS ALLOYS, THEORY, STATIC ELECTRICITY,
MATHEMATICAL ANALYSES, DIFFUSION, EMISSIVITY,
JOINTS, CRYSTALS, DISTRIBUTION, ELECTRON
DENSITY, ELECTRICAL PROPERTIES, EXPERIMENTAL DATA,
SILICON, CADMIUM COMPOUNDS, SULFIDE, ARSENIC
ALLOYS

(U)

IDENTIFIERS: FERMI LEVEL, JUNCTION
(SEMICONDUCTORS), BARRIER LAYERS, MOS
JUNCTION, CONDUCTION BAND, SUBSTRATE,
PHOTOTHRESHOLD

(U)

METAL-SEMICONDUCTOR SURFACE BARRIER DIODES WERE
INVESTIGATED FROM THE STANDPOINT OF THE MECHANISM FOR
THE FORMATION OF THE POTENTIAL BARRIER AT THE METAL-
SEMICONDUCTOR INTERFACE AND THE MEASUREMENT OF THE
BARRIER HEIGHT. THE DEPENDENCE OF THE BARRIER
HEIGHT OF METAL-SEMICONDUCTOR SYSTEMS UPON THE METAL
WORK FUNCTION WAS DERIVED WITH THE FOLLOWING
ASSUMPTIONS: (1) THE CONTACT BETWEEN THE METAL
AND THE SEMICONDUCTOR HAS AN INTERFACIAL LAYER OF THE
ORDER OF ATOMIC DIMENSIONS; IT WAS FURTHER ASSUMED
THAT THIS LAYER IS TRANSPARENT TO ELECTRONS WITH
ENERGY GREATER THAN THE POTENTIAL BARRIER, BUT CAN
WITHSTAND POTENTIAL ACROSS IT. (2) THE SURFACE
STATE DENSITY (PER UNIT AREA PER ELECTRON VOLT)
AT THE INTERFACE IS A PROPERTY ONLY OF THE
SEMICONDUCTOR SURFACE AND IS INDEPENDENT OF THE
METAL. SEVERAL MODELS FOR DESCRIBING THE BIAS
BEHAVIOR OF THE MOS STRUCTURE WITH SURFACE STATES
ARE ALSO DISCUSSED.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-475 206 9/1
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

FERROMAGNETIC, FERROELECTRIC AND ACOUSTIC
DEVICES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1, 1 JUN-31 AUG
65.

SEP 65 37P SLIKER, T. R. 1

CONTRACT: DA-28-U43-AMC-01359(E)

PROJ: DA-1P622001A055

TASK: 1P622001A05504

MONITOR: ECOM 01359-1-TR

UNCLASSIFIED REPORT

DESCRIPTORS: (*DELAY LINES, ARMY RESEARCH),
PIEZOELECTRIC CRYSTALS, SEMICONDUCTORS, CADMIUM
COMPOUNDS, SULFIDES, SEMICONDUCTING FILMS,
FERROMAGNETISM, FERROELECTRICITY, PIEZOELECTRIC
TRANSDUCERS, CADMIUM ALLOYS, SELENIUM ALLOYS,
ELECTRICAL IMPEDANCE, ULTRASONIC RADIATION
IDENTIFIERS: EQUIVALENT CIRCUITS

(U)

(U)

THIS WORK BEING CARRIED OUT UNDER THIS CONTRACT IS
AIMED AT THE DEVELOPMENT OF ULTRASONIC DELAY LINES
WHICH UTILIZE PIEZOELECTRIC SEMICONDUCTORS. TO
THIS END THE UNDERSTANDING OF CDS FILM-FUSED
SILICA DELAY LINES WAS SIGNIFICANTLY INCREASED DURING
THE FIRST QUARTER. CALCULATION SHOWED THAT CROSS
COUPLING EFFECTS BETWEEN LONGITUDINAL AND SHEAR MODES
WILL BE RELATIVELY SMALL. IT WAS FOUND THAT FOR
CERTAIN ANGLES OF THE C-AXIS WITH RESPECT TO THE
ELECTRODES THE GENERATION OF SHEAR WAVES IS MAXIMIZED
RELATIVE TO THE GENERATION OF LONGITUDINAL WAVES.
AN EQUIVALENT CIRCUIT WAS DERIVED FROM THE BASIC
PIEZOELECTRIC EQUATIONS. WITH THIS IT WAS SHOWN
THAT THE MIDBAND LOSS CAN IN THEORY BE ZERO. ALSO
IT WAS FOUND THAT THE INPUT IMPEDANCE CAN BE MADE TO
MATCH COMMONLY AVAILABLE COAXIAL LINES.
PRELIMINARY EXPERIMENTAL WORK PRODUCED CDS
FILMS OF HIGH RESISTIVITY AND GOOD ADHERENCE. IT
WAS FOUND THAT THE DEGREE OF ORIENTATION OF THE
CDS FILMS WAS DEPENDENT ON THE KIND OF METAL USED
FOR THE BASE ELECTRODE. GOOD PROGRESS WAS MADE ON
A SUBSTRATE HOLDER AND THREE POSITION MASK CHANGER
WHICH WILL INCORPORATE A QUARTZ CRYSTAL MICROBALANCE.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-601 459

HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF THIN FILM CADMIUM SULFIDE SOLAR CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO. 2, 25 FEB-25 MAY 64

MAY 64 46P SCHAEFER, J. C. HUMRICK, R. J.

BELT, R. F. I

CONTRACT: AF33 615 1248

PROJ: 8173

TASK: 81301, 81732

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SOLAR CELLS, FILMS), (*CADMIUM COMPOUNDS, SULFIDES), VAPOR PLATING, VACUUM APPARATUS, SINGLE CRYSTALS, TITANIUM, COPPER COMPOUNDS, CHLORIDES, INDIUM, MOLYBDENUM, SILICON COMPOUNDS, MONOXIDES, SURFACE PROPERTIES, ENERGY CONVERSION, EFFECTIVENESS (U)
IDENTIFIERS: THIN FILMS (M)

CONSIDERABLE EMPHASIS HAS BEEN PLACED ON THE DEVELOPMENT OF THE CHEMPLATED OR IMMERSION TECHNIQUE FOR THE BARRIER FORMATION. GAINS OF ABOUT 40% IN CONVERSION EFFICIENCY HAVE BEEN REALIZED OVER THE STANDARD EFFICIENCY OF 2.5%. LIGHTER WEIGHT SOLAR CELLS HAVE BEEN FABRICATED ON TITANIUM SUBSTRATES WITH HIGH POWER TO WEIGHT RATIOS. SOLAR CELLS USING H-FILM AS THE SUBSTRATE MATERIAL HAVE BEEN MADE WITH EFFICIENCIES OF OVER 4% AND POWER TO WEIGHT RATIOS GREATER THAN 40. THE VACUUM DEPOSITION OF CDS ON SINGLE CRYSTAL CDS HAS BEEN PERFORMED TO STUDY EFFECTS OF SUBSTRATE PERFECTION ON THE QUALITY OF THE FILM. SOLID STATE REACTIONS OF CUCL AND CDS WERE INVESTIGATED IN ORDER TO PREPARE MORE EFFECTIVE BARRIERS. INDIUM PLATED MU SUBSTRATES WERE UTILIZED TO PROVIDE OHMIC CONTACTS AT THE CDS SUBSTRATE INTERFACE. SPECTRAL RESPONSE OF ELECTROPLATED AND CHEMPLATED CELLS AS A FUNCTION OF TIME SHOWS THAT THE LATTER APPEAR TO BE MORE STABLE IN ORDINARY AMBIENTS. THE USE OF SiO THIN FILMS ON THE TOP SURFACE OF THE CELLS HAS LED TO A MORE STABLE CELL IN THE PRESENCE OF WATER VAPOR. OPTICAL STUDIES ON THE CHEMPLATED BARRIER LAYER HAVE CONFIRMED A CU₂-XS COMPOUND OF A THICKNESS OF ABOUT 1800A AND EXHIBITING FREE CARRIER ABSORPTION.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-601 566

MOTOROLA INC PHOENIX ARIZ

MICROWAVE ACOUSTIC DELAY LINE AND RELATED ACTIVE DEVICES.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 17

AUG-17 NOV 63,

MAR 64 79P

HICKERNELL, F.; BRENDENCKE, W.

MEDINA, M.;

CONTRACT: AF30 602 3076

PROJ: 5578

TASK: 557802

MONITOR: RADL

TDR64 22

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MICROWAVE EQUIPMENT, DELAY LINES),
(*DELAY LINES, ACOUSTIC EQUIPMENT, SEMICONDUCTORS, SOLID
STATE PHYSICS, ACOUSTICS, SINGLE CRYSTALS, CADMIUM
COMPOUNDS, SULFIDES, VERY HIGH FREQUENCY, HIGH
FREQUENCY, QUARTZ, ELECTROACOUSTIC TRANSDUCERS, PHONONS,
ULTRASONIC PROPERTIES, HALL EFFECT, PIEZOELECTRIC
EFFECT, GAIN, MANUFACTURING METHODS, AMPLIFIERS,
RESISTANCE (ELECTRICAL)

(U)

PRIMARILY EXPERIMENTAL EFFORTS DURING THIS PERIOD
HAVE PRODUCED 60 MC CDS AMPLIFIERS WITH 40 DB
NET ELECTRICAL GAIN AND 120 DB/CM GAIN VALUES, WITH
POWER OUTPUT LEVELS OF 20 MW. BROADBAND, 60 MC,
DIFFUSED SURFACE-TRANSDUCERS IN CDS HAVE BEEN
MADE WITH LESS THAN 12 DB LOSSES, AND QUARTZ
TRANSDUCER LOSSES AT 60 MC HAVE BEEN REDUCED BELOW
3 DB. ELECTRICALLY TUNABLE MILLIHENRY INDUCTANCES
WITH Q GREATER THAN 10 AND HALL EFFECT, NON-
RECIPROCAL NEGATIVE RESISTANCE CIRCUITS OPERATING
OVER A 30:1 FREQUENCY RANGE ARE DESCRIBED ALONG
WITH METHODS FOR ACHIEVING LOW TEMPERATURE OHMIC
CONTACTS TO CDS CRYSTALS. THESE RESULTS
REPRESENT MAJOR PROGRESS TOWARD THE OBJECTIVE OF
COMPLEX FUNCTIONAL ELECTRONIC CIRCUITS IN SINGLE
CRYSTAL STRUCTURES WITHOUT DISCRETE ELEMENTS OR
INTERCONNECTIONS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-602 212

STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

OPTICAL SECOND-HARMONIC GENERATION IN SEMICONDUCTOR ALLOYS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. FOR JAN 62-DEC 63,
DEC 63 102P SOREF, R. A. ;
REPT. NO. SEL-TR0556-8, 63-145
CONTRACT: AF 33(657)-11144, NSG-331
PROJ: 4036
TASK: 403602
MONITOR: AFAL TDR64 78

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, OPTICAL PROPERTIES),
ABSORPTION SPECTRUM, CRYSTAL LATTICES, ZINC COMPOUNDS,
SULFIDES, CADMIUM COMPOUNDS, SELENIDES, SINGLE CRYSTALS,
GALLIUM COMPOUNDS, LIGHT, ELECTROMAGNETIC WAVES, QUANTUM
MECHANICS, PHOTONS, CADMIUM ALLOYS, LASERS,
POLARIZATION, ARSENIDES, PROPAGATION, WAVE FUNCTIONS,
GALLIUM ALLOYS, CRYSTAL STRUCTURE, MATHEMATICAL MODELS,
TELLURIDES, PHOSPHIDES (U)
IDENTIFIERS: WURTZITE (U)

OPTICAL SECOND-HARMONIC GENERATION IN SEMICONDUCTORS HAS BEEN STUDIED EXPERIMENTALLY AND THEORETICALLY TO LEARN HOW ENERGY-BAND STRUCTURE AND LATTICE SYMMETRY INFLUENCE THE EFFICIENCY OF HARMONIC CONVERSION. USING A PULSED ND3+ GLASS LASER, HARMONIC GENERATION WAS MEASURED AS A FUNCTION OF ALLOY COMPOSITION IN WURTZITE ZNS-CUS AND CDS-COSE MONOCRYSTALS TO DETERMINE THE EFFECT OF SETTING THE ENERGY GAP AT VALUES EITHER GREATER OR LESS THAN THE HARMONIC PHOTON ENERGY. IN THE CDS-COSE SERIES, THE HARMONIC RADIATION WAS READILY OBSERVABLE DESPITE THE STRONG ABSORPTION OF HARMONIC LIGHT. THE INFLUENCE OF LATTICE SYMMETRY WAS STUDIED BY COMPARING HARMONIC GENERATION IN ZINC-BLENDE AND WURTZITE SEMICONDUCTORS HAVING SIMILAR ENERGY GAPS, NAMELY ZNSE, ZNTE, GAP, GAAS, CUS, COSE, CUBIC ZNS, AND HEXAGONAL ZNS. IT WAS FOUND THAT THE LATTICE STRUCTURE HAD LESS EFFECT UPON THE MAGNITUDE OF THESE SUSCEPTIBILITY-TENSOR COMPONENTS THAN THE BAND STRUCTURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-602 482

TEXAS INSTRUMENTS INC DALLAS

MATERIAL PROCESSING AND PHENOMENA INVESTIGATION OF
FUNCTIONAL ELECTRONIC BLOCKS. (U)

DESCRIPTIVE NOTE: FINAL REPT. SEP 62-AUG 63,
JUL 64 217P JOHNSON, ROWLAND E. I

REPT. NO. TI-08-64-62

CONTRACT: AF 33(657)-9196

PROJ: AF-4159

TASK: 415906

MONITOR: AFAL TDR-64-135

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*EPITAXIAL GROWTH, SEMICONDUCTING FILMS),
(*SEMICONDUCTORS, MOLECULAR ELECTRONICS), (*MOLECULAR
ELECTRONICS, SEMICONDUCTORS), GALLIUM ALLOYS, ARSENIC
ALLOYS, PHOSPHORUS ALLOYS, CADMIUM COMPOUNDS, SULFIDES,
CHEMICAL ELEMENTS, INTERMETALLIC COMPOUNDS, VAPOR
PLATING, DIFFUSION, TRANSPORT PROPERTIES, ELECTRIC
DISCHARGES, CRYSTAL GROWTH, SURFACE PROPERTIES,
PHOTOELECTRIC MATERIALS, PHOTSENSITIVITY,
PHOTOELECTRONS, DIODES (SEMICONDUCTOR), SEMICONDUCTOR
DEVICES, MANUFACTURING METHODS, IMPURITIES, SILICON (U)
IDENTIFIERS: FUNCTIONAL ELECTRONIC BLOCKS, THREE
DIMENSIONAL ARRAYS, EPITAXIAL DIFFUSION (U)

CONTENTS: HIGH RESISTIVITY GAAS AND
DEPOSITION ON GAAS TECHNOLOGY OF THREE-
DIMENSIONAL ARRAYS, INVESTIGATION OF PHENOMENA IN
II-VI COMPOUNDS, GAP AND GAASXP (I-X)
IN EPITAXIAL DEVICES. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 075
DELAWARE UNIV NEWARK

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-
LIKE FIELD DISTRIBUTIONS IN PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 1, 15 NOV 63-30
JUN 64:

JUN 64 6P BOER, K. W. ;
CONTRACT: NONR G00046 63

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, SINGLE CRYSTALS),
(*PHOTOELECTRIC MATERIALS, SINGLE CRYSTALS), (*SINGLE
CRYSTALS, CRYSTAL GROWTH), CADMIUM COMPOUNDS, SULFIDES,
ELECTROLUMINESCENCE, CRYSTAL HOLDERS, EXCITATION,
DISTRIBUTION, TEST FACILITIES (U)

IDENTIFIERS: ELECTRO-OPTIC EFFECT, CADMIUM
SULFIDE (U)

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-LIKE FIELD
DISTRIBUTIONS IN PHOTOCONDUCTORS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 374

DAYTON UNIV OHIO RESEARCH INST

OPTICAL PROPERTIES OF SEMICONDUCTING CRYSTALS, (U)

DESCRIPTIVE NOTE: FINAL REPT., 15 NOV 60-30 APR 64,
JUN 64 54P KAMBAUSKE, WERNER R. ;

CONTRACT: AF33 616 7500

PROJ: 7885

TASK: 786503

MONITOR: ARL , 64 98

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, OPTICAL PROPERTIES),
(*CRYSTALS, OPTICAL PROPERTIES), CADMIUM COMPOUNDS, ZINC
COMPOUNDS, SELENIDES, SULFIDES, EMISSIVITY, ABSORPTION,
IMPURITIES, TEMPERATURE, PRESSURE, MAGNETIC FIELDS,
ELECTRICAL FIELDS (U)

IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE, ZINC
SELENIDE, ZINC SULFIDE (U)

AN EXTENDED PROGRAM ABOUT OPTICAL PROPERTIES OF
SOME SELECTED SEMICONDUCTING CRYSTALS UNDER VARIED
CONDITIONS OF TEMPERATURE, PRESSURE, MAGNETIC AND
ELECTRIC FIELDS, MEANS OF EXCITATION, AND INFLUENCE
OF IMPURITIES IS BRIEFLY SUMMARIZED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 391

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

METHOD OF CONTACTLESS INVESTIGATING ELECTRICAL
CONDUCTION OF CADMIUM SULFIDE TYPE SEMI-CONDUCTORS.

(U)

JUL 64 14P KYNEV, S. ISHEINKMAN, M. I
FURSENKO, V. I
REPT. NO. FTD-TT-64-155

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF
BULGARSKA AKADEMIYA NA NAUKITE, FIZICHESKI
INSTITUT. IZVESTIYA, 1962, V. 10, NO. 2, P. 29-36.

DESCRIPTORS: (*PHOTOSENSITIVITY, SINGLE CRYSTALS),
(*SEMICONDUCTORS, PHOTOCONDUCTIVITY), (*SINGLE CRYSTALS,
PHOTOELECTRIC EFFECT), ELECTRICAL CONDUCTANCE,
DIELECTRIC PROPERTIES, ELECTRODES, GENERATORS,
MEASUREMENT, HIGH FREQUENCY, CADMIUM COMPOUNDS,
SULFIDES, BULGARIA (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

INVESTIGATIONS OF LOCAL PHOTSENSITIVITY ON
COS-MONOCRYSTALS WERE CARRIED OUT BY THREE
METHODS: A) WITH THE AID OF A GENERATOR THE
RELATIVE PHOTSENSITIVITY ALONG THE LENGTH OF THE
CRYSTAL WAS MEASURED; B) BY AN ORDINARY METHOD
WITH CONSTANT VOLTAGE; C) SIMILARLY WITH THE
CONSTANT VOLTAGE, THE ELECTRODES WERE APPLIED OVER
THE ENTIRE LENGTH OF THE CRYSTAL. LOCAL
MEASUREMENTS WITH THE HIGH FREQUENCY GENERATOR
OFFERED PRACTICALLY TRUE RESULTS, JUST AS BY DIRECTLY
MEASURING THE CURRENT AND LARGE NUMBER OF ELECTRODES.
THE LOCALLY MEASURED PROPERTIES, BY MEANS OF THE
THIRD METHOD, DID NOT LEAD TO SATISFACTORY RESULTS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 490
LOUVAIN UNIV (BELGIUM)

PHOTO-MAGNETIC-ELECTRIC STUDY OF CDS CRYSTALS.
TRANSPORT PROPERTIES OF BISMUTH ROLLED THIN
FOILS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 15 NOV 58-31 DEC 63

APR 64 93P LUYCKX, ANDRE ;VANDEWAUWER,
JEAN ;ISSI, JEAN-PAUL ;LONTIE, GUY ;STOUWART,
JACQUES ;
CONTRACT: AF61 052 166
MONITOR: RADC , TOR64 349

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, SINGLE CRYSTALS),
(*SINGLE CRYSTALS, SEMICONDUCTORS), (*BISMUTH, TRANSPORT
PROPERTIES), (*FOILS, BISMUTH), CADMIUM COMPOUNDS,
SULFIDES, PHOTOCONDUCTIVITY, CRYSTAL GROWTH,
ELECTROLYSIS, ABSORPTION, GASES, POLARIZATION,
RESISTANCE (ELECTRICAL), THERMOELECTRICITY, MAGNETIC
PROPERTIES, COLD WORKING, INFRARED RADIATION, ROLLING
(METALLURGY), HEAT TREATMENT, HALL EFFECT, PHOTOELECTRIC
EFFECT, ELECTROLUMINESCENCE, ELECTROMAGNETIC PROPERTIES (U)

PHOTO-MAGNETO-ELECTRIC PHENOMENA IN CDS SINGLE
CRYSTALS ARE INTERPRETED BY PHOTOPOLARIZATION.
HIGH FREQUENCY FORMING OF CDS IS INTERPRETED BY
SOLID REVERSIBLE ELECTROLYSIS. PHOTOVOLTAGES AND
ADSORBED GASES. STUDY OF PHOTOCURRENTS INDUCED BY
POST-IRRADIATION INFRARED QUENCHING WAVELENGTHS.
TRANSPORT PROPERTIES OF BISMUTH ROLLED THIN FOILS
AT 80 AND 295 K, RESISTIVITY, THERMOELECTRIC POWER,
MAGNETORESISTANCE, HALL CONSTANT, MAGNETO-SEEBECK
COEFFICIENT, ARE COMPARED WITH THE SIMILAR PROPERTIES
OF UNDEFORMED SAMPLES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 521

GENERAL ELECTRIC CO SYRACUSE N Y

RESEARCH ON MICROWAVE INTERACTIONS IN
SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4:

DEC 63 6UP ALDRICH, R. W. ; BOYD, C. R. ;

DIETZ, J. P. ; WANUGA, S. ;

CONTRACT: AF33 657 10088

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*AUDIO AMPLIFIERS, SEMICONDUCTOR DEVICES),
(*PHASE SHIFTERS, WAVEGUIDES), (*SEMICONDUCTORS,
PIEZOELECTRIC CRYSTALS), MICROWAVE AMPLIFIERS, PULSE
AMPLIFIERS, DIODES (SEMICONDUCTOR), SINGLE CRYSTALS,
SILICON, CADMIUM COMPOUNDS, SULFIDES, TRANSDUCERS,
ULTRASONIC RADIATION (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

THE FIRST TASK WAS TO DEVELOP THREE INCH LONG P-N
JUNCTIONS IN SINGLE CRYSTAL SILICON WHICH COULD BE
INCORPORATED IN WAVEGUIDES AS ACTIVE PHASE-SHIFTING
ELEMENTS FOR MEASUREMENT PURPOSES. RECENT ADVANCES
IN THE FIELD OF ULTRASONICS HAVE PRODUCED DIRECT
OBSERVATION OF ELECTRON-PHONON INTERACTION IN
PIEZOELECTRIC SEMICONDUCTORS. THE MOST IMPORTANT
DEVICE TO EMERGE FROM THIS WORK IS THE ULTRASONIC
PIEZOELECTRIC SEMICONDUCTOR AMPLIFIER. IN THIS
DEVICE, WHEN THE DRIFT VELOCITY OF CONDUCTION
ELECTRONS IN A PIEZOELECTRIC SEMICONDUCTING CRYSTAL
EXCEEDS THE VELOCITY OF AN ACOUSTIC WAVE TRAVELING IN
THE SAME DIRECTION, ENERGY IS TRANSFERRED FROM THE
ELECTRONS TO THE ACOUSTIC WAVE SUCH THAT ACOUSTIC
AMPLIFICATION TAKES PLACE. A SHEAR WAVE CDS
AMPLIFIER CENTERED AT 48.5 MEGACYCLES SHOWED 23 DB
INSERTION GAIN OPERATING IN PULSED CONDITION.
RELATED EXPERIMENTAL DATA OBSERVED IN THIS
AMPLIFIER SUCH AS GAIN SATURATION AND LIMITER ACTION
ARE GIVEN. PARTS OF THE AMPLIFIER STRUCTURES SUCH
AS TRANSDUCERS, BONDS, AND CONTACTS ARE DISCUSSED AS
WELL AS EXPERIMENTAL MEASUREMENTS ON OTHER AMPLIFIER
STRUCTURES. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 604
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

HOMOGENEITY OF CADMIUM SELENIDE-CADMIUM SULFIDE SOLID
SOLUTIONS BY X-RAY FLUORESCENCE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
AUG 64 135P BROOKS, DONALD ARTHUR ;
MONITOR: AFIT , NE/PHYS/64 4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CADMIUM COMPOUNDS, FLUORESCENCE), (*SOLID
SOLUTIONS, CADMIUM COMPOUNDS), SELENIDES, SULFIDES,
SINGLE CRYSTALS, X-RAY SPECTROSCOPY, CRYSTAL GROWTH,
SEMICONDUCTORS (U)
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE (U)

THE HOMOGENEITY OF CADMIUM SELENIDE-CADMIUM SULFIDE
SOLID SOLUTIONS WAS INVESTIGATED BY THE X-RAY
FLUORESCENCE METHOD. BOTH 'AS GROWN' OR ASSUMED
HOMOGENEOUS CRYSTALS AND PURPOSELY MANUFACTURED NON-
HOMOGENEOUS CRYSTALS WERE USED. IT WAS CONCLUDED
FROM THE X-RAY FLUORESCENCE ANALYSIS OF STANDARDS
THAT ANY RESULTS WITHIN 3% OF EACH OTHER WERE DUE
TO STATISTICAL VARIATIONS, BUT RESULTS WITH
DEVIATIONS GREATER THAN 3% WERE DUE TO THE
COMPOSITION CHANGE WITHIN THE CRYSTAL. THE
HOMOGENEITY OF FOUR ASSUMED HOMOGENEOUS AND FOUR NON-
HOMOGENEOUS CRYSTALS WAS EXAMINED BY SCANNING THE
CRYSTALS WITH STATIONARY COLLIMATORS OF SMALL
APERTURE. THE ASSUMED HOMOGENEOUS CRYSTALS SHOWED
RESULTS WITHIN 3% THEREFORE THEY WERE CONSIDERED
HOMOGENEOUS, BUT THE PURPOSELY MANUFACTURED NON-
HOMOGENEOUS CRYSTALS WERE FOUND TO BE TRULY
NONHOMOGENEOUS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 611

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

ACOUSTIC AMPLIFICATION AND ELECTRON MOBILITY IN
LITHIUM AND SODIUM DOPED CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 64 82P HUBBARD, JOHN ALLEN I
MONITOR: AFIT, GNE/PHYS/64 11

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*IMPURITIES, SEMICONDUCTORS),
(*SEMICONDUCTORS, ACOUSTIC PROPERTIES), (*PIEZOELECTRIC
CRYSTALS, ELECTRICAL PROPERTIES), (*CADMIUM COMPOUNDS,
SULFIDES), CRYSTALS, LITHIUM, SODIUM, CRYSTAL GROWTH,
ELECTRONS, DRIFT, HALL EFFECT, GAIN, ATTENUATION,
MEASUREMENT, CONDUCTIVITY, DELAY LINES, PULSE
AMPLIFIERS, AMPLIFIERS (U)

THE ACOUSTIC AMPLIFICATION, DRIFT MOBILITY AND
HALL MOBILITY WERE MEASURED IN THIRTEEN CADMIUM
SULFIDE CRYSTALS TO DETERMINE THE EFFECT OF
IMPURITIES ON THESE PROPERTIES. TEN OF THE MEASURED
CRYSTALS WERE GROWN DOPED WITH LITHIUM, SODIUM OR A
COMBINATION OF BOTH SODIUM AND LITHIUM AND THREE
CRYSTALS WERE GROWN UNDOPED. THE UNDOPED CRYSTALS
HAVE A MAXIMUM ACOUSTIC GAIN OF ABOUT 70 DB/CM, A
HALL MOBILITY OF 170 SQ CM/VOLT-SEC AND A DRIFT
MOBILITY OF 160 SQ CM/VOLT-SEC. THE LITHIUM DOPED
CRYSTALS HAVE A MAXIMUM GAIN OF ABOUT 100 DB/CM, A
HALL MOBILITY OF 300 SQ CM/VOLT-SEC AND A DRIFT
MOBILITY OF 100 SQ CM/VOLT-SEC. THE SODIUM DOPED
CRYSTALS HAVE A MAXIMUM GAIN OF 3 DB/CM, A HALL
MOBILITY 100 SQ CM/VOLT-SEC AND A DRIFT MOBILITY OF
50 SQ CM/VOLT-SEC. THE SODIUM-PLUS-LITHIUM DOPED
CRYSTALS HAVE A MAXIMUM GAIN OF ABOUT 25 DB/CM, A
HALL MOBILITY OF 200 SQ CM/VOLT-SEC AND A DRIFT
MOBILITY OF 150 SQ CM/VOLT-SEC. THE MEASUREMENTS
INDICATE THAT IMPURITIES IN THE CRYSTAL CAN EITHER
INCREASE OR REDUCE THE ACOUSTIC AMPLIFICATION AND
IMPURITIES INCREASE ELECTRON TRAPPING WITHIN THE
CRYSTAL, THUS REDUCING THE DRIFT MOBILITY.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-603 783

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 7,
MAY 64 67P WOODBURY, H. H. AVEN, M. ;
HEUMANN, F. K. HALL, R. N. ;
CONTRACT: AF19 628 329
PROJ: 4608
TASK: 460805
MONITOR: AFCML , 64 467

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTOR DEVICES; PREPARATION);
CADMIUM COMPOUNDS; TELLURIDES; SULFIDES; ZINC COMPOUNDS;
SELENIDES; ELECTRICAL PROPERTIES; HEAT TREATMENT;
ELECTRON BOMBARDMENT; IMPURITIES; COPPER; CHLORINE;
ALUMINUM; TRACER STUDIES; CRYSTAL LATTICE DEFECTS;
OPTICAL PROPERTIES; SINGLE CRYSTALS; GALLIUM ALLOYS;
ARSENIC ALLOYS; CRYSTAL GROWTH; LUMINESCENCE; ABSORPTION
SPECTRUM (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM TELLURIDE,
GALLIUM ARSENIDE, ZINC SELENIDE, ZINC SULFIDE (U)

STUDIES OF THE DEFECT CHEMISTRY OF THE II-VI
COMPOUNDS WERE CONTINUED (SEE AD-433 975) AND A
COMPARISON WAS MADE OF THE ELECTRICAL BEHAVIOR OF
CDTE, CUS, AND ZNSE FOLLOWING EITHER
THERMAL FIRINGS OR 1.5 MEV ELECTRON BOMBARDMENT.
THE DIFFUSION OF CU INTO UNDOPED ZNS AS WELL
AS CL-DOPED AND AL-DOPED ZNSE WAS
INVESTIGATED BY RADIOTRACER TECHNIQUES. THE
RESULTS WERE USED TO CORRELATE THE ELECTRICAL AND
OPTICAL ACTIVITY OF SOME DEFECT CENTERS IN II-VI
COMPOUNDS. THE HALOGEN TRANSPORT GROWTH OF
GAAS(X)P(1-X) CRYSTALS CONTINUED. LASER
QUALITY MATERIAL IS BEING PRODUCED, BUT THE INGOTS,
WHILE RELATIVELY HOMOGENEOUS, ARE POLYCRYSTALLINE.
SEVERAL INGOTS OF GAAS AND GAAS(X)P(1-
X) WERE MADE USING A LOWER FURNACE TEMPERATURE.
THESE INGOTS HAVE LARGE SINGLE-CRYSTAL REGIONS AND
ARE MORE HOMOGENEOUSLY DOPED THAN PREVIOUS ONES.
EXCITON AND RELATED LUMINESCENCE PHENOMENA THAT
OCCUR NEAR THE BAND EDGE OF A SEMICONDUCTOR ARE
DISCUSSED AND COMPARED WITH THE ABSORPTION SPECTRUM.
(AUTHOR) (U)

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UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-604 25U
MOTOROLA INC PHOENIX ARIZ

MICROWAVE ACOUSTIC DELAY LINE AND RELATED ACTIVE
DEVICES.

(U)

JUL 64 159P
CONTRACT: AF30 602 3076
PROJ: 5578
TASK: 557802
MONITOR: RADC , TOR64 246

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*DELAY LINES, MICROWAVE FREQUENCY),
(*ACOUSTIC EQUIPMENT, SEMICONDUCTOR DEVICES), (*CADMIUM
COMPOUNDS, SULFIDES), ELECTROACOUSTIC TRANSDUCERS,
ENERGY CONVERSION, SINGLE CRYSTALS, MICROWAVE
AMPLIFIERS, HEAT EXCHANGERS, CRYSTAL OSCILLATORS,
ELECTRODES, NEGATIVE RESISTANCE CIRCUITS, HALL EFFECT,
GENERATORS, PHONONS, ULTRASONIC RADIATION (U)
IDENTIFIERS: CADMIUM SULFIDE, GYRATORS (U)

GENERATION OF USEFUL HF POWER OUTPUTS IN CDS
CRYSTALS WAS DEMONSTRATED WITH OUTPUTS UP TO 156 MW
AT THE TERMINALS WITHOUT THE NEED FOR TRANSDUCERS.
HIGH EFFICIENCY (3 DB CONVERSION LOSS)
DIFFUSION LAYER INTEGRAL TRANSDUCERS WERE ACHIEVED IN
ULTRA HIGH PURITY CDS CRYSTALS. FEASIBILITY OF
COMPLETE FUNCTIONAL DEVICES FROM A SINGLE CRYSTAL OF
MATERIAL WAS SHOWN WITH INTEGRAL DELAY LINES AND
AMPLIFIERS. THE USE OF THERMAL HEAT SINKS AND
PROPER CHOICE OF CRYSTAL GEOMETRY WERE SHOWN TO
OVERCOME MOST OF THE OBSTACLES TO ACHIEVEMENT OF
CONTINUOUS OPERATION OF ELECTROACOUSTIC DEVICES.
INITIAL RESULTS INCLUDED SATISFACTORY OPERATION OF
A CDS OSCILLATOR AT A DUTY FACTOR GREATER THAN
0.1. EFFORTS WERE CONTINUED WITH SIGNIFICANT
RESULTS IN THE GENERAL AREAS OF MORE EFFICIENT
ELECTRIC/ACOUSTIC TRANSDUCERS, SUITABLE DRIFT FIELD
ELECTRODES AND NEGATIVE RESISTANCE ELEMENTS AND
CIRCUITS. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-604 341

LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY
DIV

RADIATION DAMAGE IN SOLIDS: COMPILATION OF
ABSTRACTS.

(U)

DESCRIPTIVE NOTE: SURVEYS OF SOVIET-BLOC SCIENTIFIC
AND TECHNICAL LITERATURE (REPT. NO. 1).

AUG 64 40P

REPT. NO. ATU-P-64-50

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, RADIATION DAMAGE),
(*CRYSTALS, RADIATION DAMAGE), (*RADIATION DAMAGE,
MATERIALS), (*ABSTRACTING, RADIATION DAMAGE), SILICON,
GERMANIUM, CADMIUM COMPOUNDS, SULFIDES, SELENIDES,
INDIUM ALLOYS, ANTIMONY ALLOYS, GALLIUM ALLOYS, ARSENIC
ALLOYS, MAGNESIUM COMPOUNDS, ZINC COMPOUNDS, TITANATES,
ALKALI METAL COMPOUNDS, HALIDES, POTASSIUM COMPOUNDS,
NITRATES, PHOSPHATE GLASS, QUARTZ, POLYMERS, SALTS,
DIELECTRICS, USSR (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE, INDIUM
ANTIMONIDE, GALLIUM ARSENIDE, MAGNESIUM TITANATES,
ZINC TITANATES (U)

ABSTRACTS ON RADIATION DAMAGE IN SEMICONDUCTORS
(SILICON, GERMANIUM, CADMIUM SULFIDE, CADMIUM
SELENIDE, INDIUM ANTIMONIDE, AND GALLIUM ARSENIDE);
IONIC CRYSTALS (ALKALI HALIDES, MAGNESIUM AND ZINC
TITANATES); AND OTHER MATERIALS (COVALENT, OTHER
CRYSTALLINE, AND AMORPHOUS SUBSTANCES). (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-604 742
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y

APPLICATION OF LIGHT AND IMAGE INTENSIFICATION. (U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL ENGINEERING REPT. NO.
7, 1-31 JAN 64,
FEB 64 7P SZEPESI, Z. ; THORNTON, W. A. ;
LAKE, R. E. W. ;
CONTRACT: N61339 144U

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-603 526.

DESCRIPTORS: (*IMAGE INTENSIFIERS (ELECTRONIC),
PREPARATION), (*PHOTOELECTRIC MATERIALS, IMAGE
INTENSIFIERS (ELECTRONIC)), (*LUMINESCENCE, IMAGE
INTENSIFIERS (ELECTRONIC)), PLASTICS, CAPACITANCE,
LAMINATES, PHOTOCONDUCTIVITY, POWDERS, PHOTOELECTRIC
CELLS (SEMICONDUCTOR), CADMIUM COMPOUNDS, SULFIDES,
LIGHT, INTENSITY, BRIGHTNESS, FILMS, ZINC COMPOUNDS,
ELECTRICAL INSULATION, SILICON COMPOUNDS, MONOXIDES,
MAGNESIUM COMPOUNDS, FLUORIDES (U)
IDENTIFIERS: CADMIUM SULFIDE, MAGNESIUM FLUORIDE,
SILICON MONOXIDE, ZINC SULFIDE (U)

THE EFFECT OF DIFFERENT PLASTIC MATERIALS ON THE
CHARACTERISTICS, AND CHIEFLY ON THE CAPACITANCE OF
PC LAYERS WAS STUDIED. THE EFFECT OF THE
SUBSTRATE MATERIAL WAS INVESTIGATED ALSO. SEVERAL
BATCHES OF PC POWDERS WERE PREPARED AND SOME IMAGE
INTENSIFIER PANELS WERE FABRICATED. A SIMPLE
LIGHTMETER, USING A LINEAR (CURRENT VS. LIGHT
INTENSITY) CDS PC CELL, FOR THE EASY MEASUREMENT
OF LIGHT INTENSITIES AND BRIGHTNESSES, WAS
CONSTRUCTED. IN THE EVAPORATED EL FILM PROGRAM
THE EFFECT OF AN INSULATING FILM ON EITHER OR BOTH
SIDES OF THE EL FILM WAS STUDIED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-605 425
HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF THIN FILM CADMIUM SULFIDE SOLAR
CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT. NO.
3, 26 MAY-25 AUG 64,
AUG 64 8P SCHAEFER, J. C.; HUMRICK, R. J. ;
BELT, R. F. ;
CONTRACT: AF33 615 1248
PROJ: 8173
TASK: 817301,817332

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-601 459.

DESCRIPTORS: (*SOLAR CELLS, FILMS), (*CADMIUM COMPOUNDS,
SULFIDES), ENERGY CONVERSION, BATTERIES AND COMPONENTS,
ELECTROPLATING, VAPOR PLATING, DEGRADATION, CHEMICAL
MILLING, COPPER COMPOUNDS, CHLORIDES, SILICON COMPOUNDS,
MONOXIDES, SURFACE PROPERTIES, EFFECTIVENESS (U)
IDENTIFIERS: THIN FILMS (M)

THE DEGRADATION OF ELECTROPLATED CELLS HAS BEEN
CLOSELY OBSERVED AND IT HAS BEEN FOUND THAT RECOVERY
CAN BE ACCOMPLISHED UNDER PROPER CONDITIONS.
CHEMICAL MILLING OF THE SUBSTRATE IS AN EXCELLENT
METHOD FOR PRODUCING HIGH POWER TO WEIGHT RATIO
CELLS. FABRICATION OF THE ONE-HALF AND ONE SQUARE
FOOT MECHANICAL SAMPLE ARRAYS INDICATE IMPROVED TOTAL
AREA UTILIZATION FACTORS. PHOTOVOLTAIC CELLS AND
DIODES HAVE BEEN PREPARED BY FIRST DEPOSITING A THIN
FILM OF CUCL ON CDS. THE CUCL WAS
SUBSEQUENTLY CONVERTED TO CU₉SS₅ BY MEANS OF
H₂S. OPTICAL STUDIES ON ELECTROPLATED AND
CHEMPLATED BARRIERS HAVE SERVED TO CONFIRM THE
PRESENCE OF CU₂S ALONE OR MIXED WITH CUS.
THIN LAYERS OF SiO₂ HAVE BEEN UTILIZED AS A
WATER VAPOR BARRIER TO SIGNIFICANTLY DECREASE
DEGRADATION OF CELLS. ADDITIONAL THEORETICAL WORK
HAS BEEN PERFORMED ON A HETEROUJUNCTION MODEL OF THE
CELL OPERATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-605 528

GIANNINI CONTROLS CORP DUARTE CALIF

BRUSHLESS PRECISION POTENTIOMETER.

(U)

DESCRIPTIVE NOTE: INTERIM DEVELOPMENT REPT. FOR 5 MAY 64
JUL 64.

JUL 64 1V

REPT. NO. GCC-ER-8645-1

CONTRACT: NOBSR91175

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (POTENTIOMETERS, PHOTOELECTIVE EFFECT),
PHOTOCONDUCTIVITY, PHOTOELECTRIC MATERIALS, CADMIUM
COMPOUNDS, SULPHIDES, PHOTSENSITIVITY, METAL FILMS,
DESIGN, PROCESSING, VOLTAGE

(U)

(U)

IDENTIFIERS: PHOTOPOTENTIOMETERS

THE PURPOSE OF THE PROGRAM IS TO PERFORM STUDIES
LEADING TO THE FABRICATION OF EIGHT BRUSHLESS
PRECISION POTENTIOMETERS. A DETAILED DESCRIPTION
OF THE PREPARATION OF CADMIUM SULPHIDE PHOTOSWITCHES
AND RESULTS OF PRELIMINARY TESTS TO DETERMINE PROPER
SENSITIZING TECHNIQUES ARE DESCRIBED. ALSO INCLUDED
ARE PRELIMINARY RESULTS OF TESTS TO DETERMINE A
CORRELATION BETWEEN PHOTOCONDUCTIVITY AND
PHOTSENSITIVE SURFACE GAP GEOMETRY. THE RESULTS
OF THE TESTS PERFORMED TO DATE, THAT ARE DESCRIBED IN
THE REPORT, HAVE NOT FURNISHED ANY CONCLUSIVE DATA. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-606 311

GENERAL ELECTRIC CO SCHENECTADY N Y

SEMICONDUCTOR DEVICE CONCEPTS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 8,
AUG 64 66P WOODBURY, H. H. AVEN, M. I
KENNICOTT, P. R. HALL, R. N. I
CONTRACT: AF19 628 329
PROJ: 4608
TASK: 460805
MONITOR: AFCHL , 64 702

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: A PORTION OF THE ORIGINAL DOCUMENT
CONTAINS FINE DETAIL WHICH MAY MAKE READING OF PHOTOCOPY
DIFFICULT. ALSO SEE AD-603 783.

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, SCIENTIFIC
RESEARCH), (*LASERS, DESIGN), SOLUBILITY, DIFFUSION,
SINGLE CRYSTALS, IMPURITIES, CADMIUM COMPOUNDS,
SULFIDES, COPPER, SILVER, ZINC COMPOUNDS, SELENIUM
COMPOUNDS, ELECTRICAL PROPERTIES, FREQUENCY
MODULATION

(U)

STUDIES ON THE SYSTEMS CDS:CU AND CDS:AG
HAVE LED TO THE FOLLOWING RESULTS: COPPER AND AG
DIFFUSE VERY RAPIDLY IN CDS EVEN BELOW 500C;
THE SEGREGATION COEFFICIENT OF AG FOR CDS:CU
CHANGES FROM 5 X 10 TO THE 7TH POWER TO .001 BETWEEN
500 AND 1000C; AND, THE SOLUBILITY OF AG IN
CDS DEPENDS STRONGLY ON THE PARTIAL PRESSURE OF
CU OVER THE CRYSTAL. THE EFFECT OF IMPURITIES ON
THE ELECTRICAL CHARACTERISTICS OF ZNSE SINGLE
CRYSTALS ARE INVESTIGATED BY HALL EFFECT STUDIES
COUPLED WITH MASS SPECTROMETRIC MEASUREMENTS.
CONSIDERABLE DIFFERENCES IN THE IMPURITY SPECTRUM
AS WELL AS THE ELECTRICAL BEHAVIOR OF THE CRYSTALS
WERE FOUND TO EXIST DEPENDING ON THE STARTING
MATERIALS, THE CRYSTAL GROWTH METHOD, AND THE
PURIFICATION TECHNIQUES USED. A JUNCTION LASER
STRUCTURE CAPABLE OF FREQUENCY MODULATION IS
DISCUSSED. FREQUENCY DEVIATIONS OF THE ORDER OF
100 GC AT MODULATION FREQUENCIES OF SEVERAL GC
APPEAR REASONABLE. MODULATION SIGNALS OF 200 VOLTS
PEAK-TO-PEAK ARE REQUIRED INTO A LOAD CONSISTING OF A
PURE CAPACITY OF A FRACTION OF A PF.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-607 035

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO

EXPERIMENTAL INVESTIGATION OF CURRENT LIMITING AND
OSCILLATION IN CDS. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
AUG 64 77P GARNER, DAVID R. (KUTTENBUER,
QUENTIN A. ;
MONITOR: AFIT , GE/EE/64 9

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (CADMIUM COMPOUNDS, SULFIDES), (SINGLE
CRYSTALS, OSCILLATION), LIMITERS, ELECTRIC CURRENTS,
ULTRASONIC RADIATION, AMPLIFIERS, PULSE GENERATORS,
SEMICONDUCTORS (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

THE CURRENT LIMITING AND OSCILLATIONS WHICH OCCUR
WHEN LOW RESISTIVITY CDS IS SUBJECTED TO HIGH
LEVEL VOLTAGE PULSES ARE EXPERIMENTALLY INVESTIGATED,
AND SEVERAL THEORIES PROPOSED TO EXPLAIN THE
PHENOMENA. THE MANUFACTURE OF THE TEST SAMPLES AND
THE DESIGN OF A PULSE GENERATOR UTILIZING A LUMPED
ELEMENT DELAY LINE AND A SILICON CONTROLLED RECTIFIER
ARE DESCRIBED. FROM THE EXPERIMENTAL RESULTS, A
DEPENDENCE OF THE FREQUENCY AND AMPLITUDE OF THE
OSCILLATIONS ON THE APPLIED VOLTAGE IS SHOWN. THE
THEORY WHICH BEST EXPLAINS THE PHENOMENA IS FOUND TO
BE THE TRANSFER OF ELECTRONIC MOMENTUM. (AUTHOR)
(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-607 297

MELPAR INC FALLS CHURCH VA

THIN-FILM MONOTRONICS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2: 12 JUN-12 SEP
64,

SEP 64 114P SMITH, RICHARD C. I
CONTRACT: N0W-64-0568

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ALSO SEE AD-602 872.

DESCRIPTORS: (*MOLECULAR ELECTRONICS, CIRCUITS),
(*SEMICONDUCTING FILMS, MATERIALS), (*SEMICONDUCTOR
DEVICES, MANUFACTURING METHODS), PRINTED CIRCUITS,
INTEGRATED CIRCUITS, DIELECTRIC FILMS, FILMS, VAPOR
PLATING, VACUUM APPARATUS, HIGH TEMPERATURE RESEARCH,
DIODES (SEMICONDUCTOR), RADIATION DAMAGE, TRIODES,
AMPLIFIERS, INTERMETALLIC COMPOUNDS,
MICROMINIATURIZATION (ELECTRONICS), CADMIUM COMPOUNDS,
SELENIDES, SULFIDES, TELLURIDES, ZINC ALLOYS, GADOLINIUM
ALLOYS, GERMANIUM, BORON, SILICON COMPOUNDS, NEODYMIUM
COMPOUNDS, DYSPRYSIUM COMPOUNDS (U)
IDENTIFIERS: THIN FILMS (U)

THE CURRENT EMPHASIS IN THE AREA OF MATERIALS
RESEARCH IS ON SEMICONDUCTING AND DIELECTRIC FILMS
FOR HIGHTEMPERATURE APPLICATION. SEMICONDUCTING
AND DIELECTRIC FILMS ARE BEING DEPOSITED BY THERMAL
EVAPORATION IN VACUUM, USING RESISTANCE HEATING OR
ELECTRON-BEAM BOMBARDMENT. THE CHARACTERIZATION OF
THE NEODYMIUM OXIDE-THIN DIELECTRIC FILM SYSTEM WAS
COMPLETED, AND EFFORT WAS DIRECTED TOWARD FINDING
ANOTHER DIELECTRIC FILM SYSTEM HAVING NOT ONLY THE
HIGH-TEMPERATURE ELECTRICAL STABILITY OF THE
NEODYMIUM OXIDE SYSTEM BUT ALSO THE PHYSICAL
STABILITY AT HIGH TEMPERATURES WHICH THE LATTER
SYSTEM LACKS. INTENSIVE WORK ON FIELD-EFFECT
DEVICES FOR HIGHTEMPERATURE CIRCUIT APPLICATION
CONTINUES. TEMPERATURE DATA ON CADMIUM SELENIDE
FIELD-EFFECT DEVICES ARE BEING GATHERED FOR USE IN
THE DESIGN OF THE OPERATIONAL AMPLIFIER. RADIATION-
RESISTANCE STUDIES ARE BEING CONDUCTED IN ACCORDANCE
WITH THE CONTRACTUAL REQUIREMENTS. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-609 204

NATIONAL CASH REGISTER CO DAYTON OHIO

INVESTIGATION OF CHEMICALLY SPRAYED THINFILM
PHOTOVOLTAIC CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2: 15 AUG-14 NOV
64,
NOV 64 36P CHAMBERLIN, R. K. ISKARMAN, J. S.

CONTRACT: AF33 615 1578
PROJ: 8173
TASK: 817301

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART
UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM THE BEST
AVAILABLE COPY.

DESCRIPTORS: (*SOLAR CELLS, MANUFACTURING METHODS),
(*PHOTOELECTRIC CELLS (SEMICONDUCTOR), MANUFACTURING
METHODS), (*SEMICONDUCTING FILMS, SULFIDES), COPPER
COMPOUNDS, CADMIUM COMPOUNDS, SPRAYS, BRONZE, STEEL,
TEST FACILITIES, COMPLEX COMPOUNDS (U)
IDENTIFIERS: CADMIUM SULFIDE, COPPER SULFIDES,
THIN FILMS (U)

THE REPORT DISCUSSES THE DETAILS OF THE CHEMICAL
SPRAY DEPOSITION TECHNIQUE THAT WAS USED FOR THE
DEPOSITION OF THE CdS AND Cu SUB X S SUB Y
SEMICONDUCTOR FILMS. TOPICS INCLUDE FILM
DEPOSITION TECHNIQUES, FILM STUDIES, CELL
FABRICATION, AND TEST INSTALLATION. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-609 434

NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT KJELLER

RESEARCH ON THE THEORY AND DESIGN OF ACTIVE NETWORKS.

(U)

DESCRIPTIVE NOTE: ANNUAL SUMMARY REPT. NO. 3, 1 JUL 63-30 JUN 64,

JUL 64 36P BLOTEKJAER, KJELL ISCHAUG-

PETTERSEN, TOR ;

REPT. NO. NDRE-E-36

CONTRACT: AF61 052 484

MONITOR: AFCKL , 64 823

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM THE BEST AVAILABLE COPY.

DESCRIPTORS: (*SOLID STATE PHYSICS, ACOUSTICS), (*MICROWAVES, ULTRASONIC RADIATION), (*ACOUSTICS, PIEZOELECTRIC CRYSTALS), (*ULTRASONIC RADIATION, PIEZOELECTRIC CRYSTALS), NETWORKS, CADMIUM COMPOUNDS, SULFIDES, HARMONIC ANALYSIS, NOISE, PROPAGATION, SEMICONDUCTORS, ELECTROMAGNETIC WAVES, AMPLIFIERS, TRANSDUCERS, ELECTRONS, PHONONS, TRAVELING-WAVE TUBES, OSCILLATION (U)
IDENTIFIERS: ELECTROACOUSTICS (U)

THE REPORT IS CONCERNED WITH STUDIES IN MICROWAVE ULTRASONICS AND ACOUSTIC WAVE PROPAGATION IN PIEZOELECTRIC SEMICONDUCTORS. SATURATION DUE TO ACOUSTIC OSCILLATIONS IN CADMIUM SULPHIDE HAVE BEEN OBSERVED EXPERIMENTALLY, AND THE DRIFT MOBILITY OF ELECTRONS IN THE SAMPLE HAS BEEN DETERMINED TO 210 SQUARE CM/VS AT ROOM TEMPERATURE. A NONLINEAR COUPLING BETWEEN ACOUSTIC WAVES AND ELECTROMAGNETIC WAVES IN PIEZOELECTRIC MATERIALS IS DESCRIBED, AND AN EXPERIMENT FOR PARAMETRIC EXCITATION OF SUBHARMONICS IS OUTLINED. THE THERMAL NOISE DUE TO FREE CARRIER IN ELECTROACOUSTIC AMPLIFIERS IS CALCULATED. THE EQUIVALENT NOISE TEMPERATURE CAN BE MADE CONSIDERABLY LOWER THAN THE TEMPERATURE OF THE AMPLIFYING CRYSTAL. A NOVEL DESIGN OF AN EFFICIENT PIEZOELECTRIC TRANSDUCER FOR HYPERSONIC WAVES IS DESCRIBED. THE COUPLER COMPRISES A NUMBER OF PIEZOELECTRIC DISCS IN A SPECIFIC ARRANGEMENT LOCATED IN THE GAP OF A REENTRANT MICROWAVE CAVITY. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 012

GENERAL ELECTRIC CO SCHENECTADY N Y

RESEARCH ON CDTL

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 13,

OCT 34 9P HALSTED, R. E. MARPLE, D. T. F. I

SEGALL, B. I.

CONTRACT: AF33 616 B264

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: THIS REPT. INCLUDES APPENDIX:
PHOTOLUMINESCENCE OF DEFECT-EXCITON COMPLEXES IN
II-VI COMPOUNDS. SEE ALSO AD-601 674.

DESCRIPTORS: (*SEMICONDUCTORS, IMPURITIES), (*CADMIUM
ALLOYS, TELLURIUM ALLOYS), (*LUMINESCENCE, IMPURITIES),
(*MOLECULAR SPECTROSCOPY, SEMICONDUCTORS), SINGLE
CRYSTALS, CRYSTAL LATTICES, ZINC COMPOUNDS, SELENIDES,
SULFIDES, EMISSIVITY, FLUORESCENCE, BAND SPECTRUM (U)

DURING THE PERIOD OF THIS REPORT TWO AREAS OF
RESEARCH ACTIVITY HAVE BEEN EMPHASIZED. ATTEMPTS
TO PREPARE CDTL SAMPLES WITH BAND-EDGE
FLUORESCENT EMISSION SPECTRA CORRELATED WITH THE
IDENTITY OF IMPURITY ADDITIONS HAVE BEEN SUCCESSFUL.
A THEORETICAL STUDY OF THE SHAPE OF THE ABSORPTION
EDGE HAS BEEN CONTINUED. IN ADDITION, RESEARCH
PERFORMED UNDER THIS CONTRACT HAS STIMULATED A
THEORETICAL STUDY WHICH HAS ACCOUNTED FOR A
DISCREPANCY BETWEEN THEORY AND EXPERIMENT ON THE
TEMPERATURE DEPENDENCE OF THE BAND GAP IN CDTL.
THE RESULTS ON ϵ SUB G(T) ARE SIGNIFICANT FOR A
NUMBER OF OTHER COMPOUNDS WHERE THE EXISTENCE OF A
SIMILAR PROBLEM IS WELL ESTABLISHED. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 366
HUGHES AIRCRAFT CO NEWPORT BEACH CALIF

ADVANCED FUNCTIONAL ELECTRONIC BLOCK
DEVELOPMENT. (U)

DESCRIPTIVE NOTE: INTERIM ENGINEERING REPT. NO. 3, 15
APR-15 JUN 63,

JUN 63 47P DILL, H. G. ;
CONTRACT: AF33 657 9771

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-403 654.

DESCRIPTORS: (*SEMICONDUCTING FILMS, PREPARATION),
(*INTEGRATED CIRCUITS, TRANSISTORS), (*TRANSISTORS,
SEMICONDUCTING FILMS), CADMIUM COMPOUNDS, SULFIDES,
ETCHED CRYSTALS, VAPOR PLATING, EVAPORATORS, PENODES,
CIRCUITS, ELECTRICAL PROPERTIES, TRANSISTOR AMPLIFIERS,
BROADBAND, BANDPASS AMPLIFIERS, OSCILLATORS (U)
IDENTIFIERS: CADMIUM SULFIDES, THIN FILMS (U)

THE FIRST PART OF THE REPORT DISCUSSES SOME
PROBLEMS OF THIN FILM TRANSISTOR (TFT) FABRICATION
FOR THE PURPOSE OF IMPROVING THE TFT AND TO GET NEW
INFORMATION FOR IMPROVING THE DESIGN OF FULLY
INTEGRATED THIN FILM CIRCUITRY. THE SECOND AND
MAIN PART OF THE REPORT DISCUSSES THE PROPERTIES OF
TFT IN COMPARISON WITH VACUUM PENODES AND DEFINES
SOME REQUIREMENTS OF THIN FILM CIRCUITRY. THE
SURVEY LEADS TO A PROMISING LINEAR AMPLIFIER
COMBINATION OF HIGH DC AND AC STABILITY. A DESIGN
OF A WIDE BAND AMPLIFIER CIRCUIT BASED ON THAT
PRINCIPLE AND SOME MEASUREMENT RESULTS ARE GIVEN. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-61U 395
RCA LABS PRINCETON N J

ACTIVE LOGIC ELEMENTS USING NON-GALVANIC MODIFYING
INPUTS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JUL 62-30 SEP 64,
OCT 64 36P HERZOG, G. IMU, K. C. LEWIN, M.
H. i

CONTRACT: AF19 628 1629
PROJ: 4641
TASK: 4641U4
MONITOR: AFCHL , 64 896

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTER LOGIC, INTEGRATED CIRCUITS),
(*INTEGRATED CIRCUITS, COMPUTERS), (*TRANSISTORS,
MATERIALS), SEMICONDUCTOR DEVICES, PHOTOELECTRIC
MATERIALS, CADMIUM COMPOUNDS, SULFIDES, TELLURIDES,
SEMICONDUCTING FILMS, VAPOR PLATING, EVAPORATION, AGING
(MATERIALS) (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM TELLURIDE (U)

LARGE ARRAYS OF BATCH-FABRICATED ACTIVE ELEMENTS
PRESENT A PROBLEM OF INTERCONNECTIONS. A GENERAL
INTERCONNECTION SCHEME WHICH CAN BE MODIFIED AT THE
CONVENIENCE OF THE USER IS SOUGHT. AN ARRAY OF 128
INSULATED-GATE FIELDEFFECT TRANSISTORS (IGFET) OF
THE METAL-OXIDE-SEMICONDUCTOR (MOS) TYPE WAS
ASSEMBLED TOGETHER WITH PHOTSENSITIVE CONTROL OF
SIGNAL PATHS. SIXTY-FOUR OF THE MOS TRANSISTORS
ACT AS NOR LOGIC GATES WITH THE REMAINING 64 MOS
TRANSISTORS ACTING AS ON-OFF SWITCHES IN SERIES
WITH THE SIGNAL PATH. THESE LATTER MOS
TRANSISTORS ARE CONTROLLED BY PHOTSENSITIVE ELEMENTS
STIMULATED BY A LIGHT PATTERN. THE LIGHT PATTERN
IS GENERATED BY HOLES IN A DATA-PROCESSING PUNCHED
CARD. THE PHOTSENSITIVE ELEMENTS IN THE PRESENT
ARRAY ARE CADMIUM SULFIDE PHOTOCONDUCTORS FABRICATED
ON CERAMIC PLATES, BUT EXTENSIVE WORK WAS DONE ON
CADMIUM TELLURIDE HIGH-VOLTAGE PHOTOVOLTAIC FILMS
INTENDED FOR USE DIRECTLY ON THE SUBSTRATE OF THE
ACTIVE LOGIC ELEMENTS. THE TEST ARRAY FABRICATED
DEMONSTRATES HOW THE SIGNAL PATH OF A COMPUTER MIGHT
BE CONTROLLED BY A PUNCHED CARD PREPARED EITHER BY
ITS OWN OUTPUT OR THE OUTPUT OF OTHER COMPUTERS.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 718

GIANNINI CONTROLS CORP DUARTE CALIF

BRUSHLESS PRECISION POTENTIOMETER.

(U)

DESCRIPTIVE NOTE: INTERIM DEVELOPMENT REPT. FOR 20 JUL-5
NOV 64.

FEB 65 22P

REPT. NO: GCC-ER-8645-2

CONTRACT: NOBSR91175

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-605 528.

DESCRIPTORS: (POTENTIOMETERS, PHOTOELECTRIC EFFECT),
PHOTOELECTRIC MATERIALS, PHOTSENSITIVITY, METAL FILMS,
SINTERING, TEMPERATURE, HEAT-RESISTANT GLASS, CADMIUM
COMPOUNDS, SULFIDES, SELENIDES, ALUMINUM COMPOUNDS,
OXIDES (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ALUMINUM OXIDES, PHOTOPOTENTIOMETERS (U)

TWO TECHNIQUES ARE DESCRIBED FOR THE DEPOSITION OF
PHOTOSENSITIVE LAYERS. ONE OF THESE IS A TECHNIQUE
FOR SENSITIZING EVAPORATED LAYERS OF CDS OR
CUSE AND THE OTHER A TECHNIQUE FOR DEPOSITING A
REASONABLE REPRODUCIBLE LAYER OF PHOTSENSITIVE
MATERIAL FOR SINTERING. ALSO INCLUDED ARE
PRELIMINARY RESULTS OF TESTS TO DETERMINE A
CORRELATION OF PHOTOCONDUCTIVITY AND GAP GEOMETRY.
SOME MEASUREMENTS HAVE BEEN MADE ON THE LINEARITY
OF A RESISTIVE STRIP EQUAL TO CIRCUMFERENCE OF A
BRUSHLESS POTENTIOMETER. PHOTOCONDUCTIVITY AS A
FUNCTION OF SINTERING TIME AND TEMPERATURE WAS
STUDIED AND SHOWN THAT THERE IS NO APPARENT
CORRELATION. HOWEVER, PHOTOCONDUCTORS ON AL2O3
ARE STATISTICALLY MORE SENSITIVE THAN THOSE ON GLASS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-610 738
STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

BAND STRUCTURE AND SURFACE EFFECTS IN CADMIUM SULFIDE
PHOTOEMISSION STUDIES, (U)

AUG 64 174P KINDIG, NEAL B. ;
REPT. NO. SEL-64-095. SEL-TR-5201-1
CONTRACT: SD87 GRANT NSF GP1033
PROJ: ARPA ORDER157

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PHOTOELECTRIC EFFECT, SEMICONDUCTORS),
(*CADMIUM COMPOUNDS, SULFIDES), MEASUREMENT, SINGLE
CRYSTALS, ELECTRON TRANSITIONS, ATOMIC ENERGY LEVELS,
SURFACE PROPERTIES, EXCITATION, CONDUCTIVITY, THEORY,
QUANTUM STATISTICS, EXPERIMENTAL DATA, TEST METHODS (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

PHOTOEMISSION MEASUREMENTS HAVE BEEN MADE ON SINGLE
CRYSTALS OF CADMIUM SULFIDE WHICH WERE CLEAVED AND
TESTED IN HIGH VACUUM AT PHOTON ENERGIES BETWEEN 7.2
AND 11.0 EV. THE ELECTRON AFFINITY IS FOUND TO BE
4.8 EV. ADDITIONAL MEASUREMENTS HAVE BEEN MADE
IN AN EXTENDED RANGE FROM 6 TO 21.2 EV USING
SURFACES CLEAVED IN AIR OR IN LOW VACUUM AND TESTED
IN LOW VACUUM. THE APPARATUS FOR CLEAVING AND
MEASURING PHOTOEMISSION IS DESCRIBED. IMPORTANT
FEATURES OF THE BAND STRUCTURE ARE DEDUCED FROM THE
ENERGY DISTRIBUTION AND QUANTUM YIELD MEASUREMENTS.
TWO CONDUCTION BAND MAXIMA ARE LOCATED ABOUT 6.7
AND 8.2 EV ABOVE THE TOP OF THE VALENCE BAND.
TWO VALENCE BAND MAXIMA ARE LOCATED ABOUT 1.2 AND
9.4 EV BELOW THE TOP OF THE VALENCE BAND. THE
EFFECTS OF SURFACE CONDITIONS ON PHOTOEMISSION FROM
CADMIUM SULFIDE HAVE BEEN STUDIED BY COMPARING
MEASUREMENTS MADE ON SAMPLES CLEAVED IN HIGH VACUUM
WITH THE CORRESPONDING RESULTS FROM SURFACES PREPARED
BY OTHER TECHNIQUES. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-612 679

IIT RESEARCH INST CHICAGO ILL

THIN FILMS FOR COMPOSITE MOLECULAR ELECTRONICS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JAN 62-31 JAN 63.
MAY 63 56P SCHOSSBERGER, F. V. ;
REPT. NO. ARF-3213-13
CONTRACT: AF33 657 7823
PROJ: 4150
TASK: 415003
MONITOR: ASD , TDR-63-460

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LIMITED NUMBER OF COPIES CONTAINING
COLOR OTHER THAN BLACK AND WHITE ARE AVAILABLE UNTIL STOCK
IS EXHAUSTED. REPRODUCTIONS WILL BE MADE IN BLACK AND
WHITE ONLY.

DESCRIPTORS: (*MOLECULAR ELECTRONICS, MATERIALS),
(*SEMICONDUCTOR FILMS, PREPARATION), (*ZINC COMPOUNDS,
SULFIDES), (*CADMIUM COMPOUNDS, SULFIDES), SINGLE
CRYSTALS, HYDROGEN COMPOUNDS, SULFIDES, X-RAY
DIFFRACTION ANALYSIS, ELECTRON DIFFRACTION ANALYSIS,
ELECTRON MICROSCOPY, CRYSTAL STRUCTURE, RESISTANCE
(ELECTRICAL), HALL EFFECT, DIODES (SEMICONDUCTOR), VAPOR
PLATING, COMPOSITE MATERIALS (U)
IDENTIFIERS: THICK FILMS, CADMIUM SULFIDE,
HYDROGEN SULFIDE, ZINC SULFIDE (U)

MONOCRYSTALLINE FILMS OF ZINC SULFIDE AND CADMIUM
SULFIDE 2 X 1 CM IN SIZE WERE PREPARED BY REACTION OF
MONOCRYSTALLINE (002) ZINC OR (101) CADMIUM
SURFACES WITH HYDROGEN SULFIDE. THE FORMATION OF
ZINC SULFIDE FILMS AT 235C AND OF CADMIUM SULFIDE
FILMS AT 135C WAS MONITORED IN A SPECIALLY BUILT
HIGH-TEMPERATURE X-RAY DIFFRACTOMETER ATTACHMENT.
REACTION TEMPERATURES AROUND 300C PRODUCED
POLYCRYSTALLINE FILMS. THE FILM THICKNESS VARIED
FROM 10 TO 1000 A AND THE RATE OF GROWTH FROM 3 TO
250 A PER HOUR. SELECTED FILMS WERE INVESTIGATED
BY POLARIZED-LIGHT AND ELECTRON MICROSCOPY AND BY X-
RAY AND ELECTRON DIFFRACTION. THE HEXAGONAL
WURTZITE STRUCTURE WAS FOUND, ALTHOUGH ONE CADMIUM
SULFIDE FILM HAD A DIFFERENT HEXAGONAL STRUCTURE.
FOR ELECTRICAL MEASUREMENTS OF CADMIUM SULFIDE
FILMS, THE FILMS WERE ISOLATED BY COATING WITH
LACQUER AND DISSOLVING THE SUBSTRATE IN MERCURY.
THE RESISTIVITY WAS BETWEEN 0.001 AND 40 OHM-CM.
SOME AREAS SHOWED GOOD N-TYPE ASYMMETRICAL DIODE
CHARACTERISTICS. (AUTHOR) 106 (U)

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JDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-612 703

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

ACTIVE ACOUSTIC DEVICES.

(U)

DESCRIPTIVE NOTE: INTERIM REPT. FOR 17 JUN-30 SEP 64,

FEB 65 31P BRENDENCKE, W. H. ;

CONTRACT: AF30 6U2 3478

PROJ: 5578

TASK: 557802

MONITOR: RADC , TR-64-517

UNCLASSIFIED REPORT

SUPPLEMENTARY NOT

DESCRIPTORS: (*TRANSDUCERS, SEMICONDUCTOR DEVICES),
(*ACOUSTIC EQUIPMENT, SEMICONDUCTOR DEVICES),
(*SEMICONDUCTOR DEVICES, TRANSDUCERS), ELECTROACOUSTIC
TRANSDUCERS, FILMS, VAPOR PLATING, VACUUM APPARATUS,
CADMIUM COMPOUNDS, SULFIDES, EPITAXIAL GROWTH,
PIEZOELECTRIC CRYSTALS, QUARTZ, RADIOFREQUENCY
AMPLIFIERS, ULTRASONIC PROPERTIES, SURFACE PROPERTIES,
RESONANCE, ZINC COMPOUNDS, OXIDES, VERY HIGH FREQUENCY,
ULTRAHIGH FREQUENCY, SOLID STATE PHYSICS, BROADBAND,
PHONONS, ENERGY CONVERSION (U)
IDENTIFIERS: CADMIUM SULFIDES (U)

INVESTIGATIONS OF THE SIX MAJOR TRANSDUCER TYPES
WERE INITIATED TO DETERMINE THE FEASIBILITY OF USING
EACH TYPE IN CONTINUOUS WAVE (CW) DEVICES. THE
MOST PROMISING IS THE THIN FILM TRANSDUCER DUE TO THE
CLOSE CONTROL OF GEOMETRIC FACTORS. EXACT CONTROL
OVER PLACEMENT, SIZE AND THICKNESS CAN BE ACHIEVED
THROUGH SELECTIVE MASKING AND PROCESS DEPOSITION
RATES. MECHANICAL POLISHING LIMITS THE BONDED
QUARTZ TRANSDUCER TO A MAXIMUM FREQUENCY OF 175 MC/
SEC. COMPENSATED REGION TRANSDUCERS WITH 2 TO 3 DB
LOSS HAVE BEEN CONSTRUCTED BETWEEN 10 AND 30 MC/SEC.
THE DIFFICULT GROWTH PROCESS WILL LIMIT EPITAXIAL
TRANSDUCERS TO VERY PRELIMINARY EXPERIMENTS,
DEPLETION LAYER TRANSDUCERS WILL BE ELIMINATED FROM
FURTHER INVESTIGATIONS DUE TO THE INABILITY OF II-
VI COMPOUNDS TO FORM P-N JUNCTIONS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-613 036

GENERAL ELECTRIC CO SYRACUSE N Y

FAILURE MECHANISMS AT SURFACES AND INTERFACES. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JUL 63-1AUG 64,
FEB 65 112P REINHARTZ, K. K.; RUSSELL, V.
A.; STOCKMAN, D. L. IVAN DER GRINTEN, W. J. ;
WILLIS, W. L. ;

CONTRACT: AF30 602 3085

PROJ: 5519

TASK: 551906

MONITOR: RADC , TDR64 454

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-604 349.

DESCRIPTORS: (*SEMICONDUCTING FILMS, SURFACE PROPERTIES), (*SEMICONDUCTOR DEVICES, RELIABILITY (ELECTRONICS)), (*FAILURE (MECHANICS), SEMICONDUCTING FILMS), TRANSISTORS, STRESSES, STORAGE, AGING (MATERIALS), VOLTAGE, DEGRADATION, CONTROLLED ATMOSPHERES, ELECTRICAL PROPERTIES, TEMPERATURE, SURFACES, HUMIDITY, GATES (CIRCUITS), GLASS CAPACITORS, DIELECTRICS, CADMIUM COMPOUNDS, SULFIDES, SELENIUM, SILICON COMPOUNDS, OXIDES (U)
IDENTIFIERS: FIELD EFFECT DEVICES (U)

A STUDY OF THE AGING AND FAILURE CHARACTERISTICS OF THIN FILM FIELD EFFECT TRIODES WAS CARRIED OUT. TECHNIQUES FOR APPLYING STRESS TO THE SAMPLE DEVICES UNDER CONTROLLED CONDITIONS WERE DEVELOPED AND THE RESULTING CHANGES OF THE CHARACTERISTICS WERE MEASURED. SAMPLES STORED UNDER DRY ARGON AT 30C REMAINED STABLE AFTER 1 YEAR. AN INCREASE OF THE HUMIDITY TO 30% CAUSED A DECREASE OF THE THRESHOLD VOLTAGE. DURING STORAGE AT A CONSTANT TEMPERATURE FROM 50C TO 122C, THE THRESHOLD VOLTAGE INCREASED REACHING A STABLE VALUE WITHIN A FEW DAYS. DURING D.C. ELECTRICAL STRESS THE THRESHOLD VOLTAGE EITHER DECREASED OR INCREASED REACHING A STABLE VALUE AT CONSTANT GATE VOLTAGE AFTER A FEW HUNDRED HOURS. THESE DIFFERENT FAILURE MODES UNDER ELECTRICAL STRESS COULD BE CORRELATED WITH DIFFERENCES IN THE SLOW RELAXATION CHARACTERISTIC OF THE FIELD EFFECT CONDUCTIVITY WHICH IN TURN WAS TRACED TO THE TREATMENT OF THE SEMICONDUCTOR SURFACE DURING DEVICE FABRICATION. THE THRESHOLD VOLTAGE WAS THE ONLY PARAMETER WHICH APPEARED TO BE CHANGING APPRECIABLY INDICATING THAT THE CHANGES WERE OCCURRING AT THE SEMICONDUCTOR-INSULATOR INTERFACE. (AUTHOR) (U)

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-613 187
HARSHAW CHEMICAL CO CLEVELAND OHIO

INVESTIGATION OF CdS THIN-FILM SOLAR CELLS. (U)

DESCRIPTIVE NOTE: REPT. FOR NOV 63-DEC 64.
FEB 65 122P
CONTRACT: AF 33(615)-1248
PROJ: AF-8173
TASK: 817301
MONITOR: AFAPL TR-65-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-605 425.

DESCRIPTORS: (*SEMICONDUCTING FILMS, SOLAR CELLS),
(*SOLAR CELLS, FILMS), (*CADMIUM COMPOUNDS, SULFIDES),
ENERGY CONVERSION, PLATING, COPPER COMPOUNDS, CHLORIDES,
VAPOR PLATING, VACUUM APPARATUS, SILICON COMPOUNDS,
MONOXIDES, DEGRADATION, SURFACE PROPERTIES, RADIATION
DAMAGE, EFFECTIVENESS, ENVIRONMENTAL TESTS, MOLYBDENUM,
QUARTZ, TANTALUM, SILICON, CALCIUM COMPOUNDS, FLUORIDES,
TITANIUM, NICKEL ALLOYS, IRON ALLOYS, SINGLE
CRYSTALS (U)
IDENTIFIERS: CADMIUM SULFIDE, THIN FILMS (U)

RESEARCH AND DEVELOPMENT OF FRONT WALL, THIN FILM,
FLEXIBLE, LIGHT WEIGHT CdS SOLAR CELLS WAS
CONTINUED AND DECIDED IMPROVEMENTS HAVE BEEN
ACCOMPLISHED. A ONE SQUARE FOOT ARRAY SHOWS A
POWER TO WEIGHT RATIO OF ABOUT 35.0 WATTS/LB. WITH AN
OVERALL AREA UTILIZATION FACTOR OF OVER 0.80. A
NEW CHEMICAL BARRIER FORMATION PROCESS WAS DEVELOPED
PROVIDING HIGHER CELL EFFICIENCIES. EXPOSURE OF
CELLS TO ELECTRON, PROTON AND COBALT 60 RADIATION
SHOW LITTLE OR NO DAMAGE. STUDIES ON THE FORMATION
OF THE CdS LAYER INDICATE A HIGHER DEGREE OF
PREFERRED ORIENTATION AND CRYSTALLITE SIZE AS THE
SUBSTRATE TEMPERATURE INCREASES. CRYSTALLITES OF
100 MICRON DIMENSION WERE OBSERVED. OPTICAL
MEASUREMENTS ON THE P-LAYER CONFIRM THE CONCLUSION
THAT THE BARRIER LAYER IS A HIGHLY CONDUCTING COPPER
SULFIDE. OVERLAYERS OF SiO DEPOSITED ON THE
CELL DECREASE THE RATE OF WATER VAPOR DEGRADATION,
BUT MECHANICAL IMPERFECTIONS RESTRICT THE THICKNESS
OF THE DEPOSITED LAYER. THEORETICAL ANALYSIS OF THE
EXPERIMENTAL DATA SHOW SERIOUS AND PROBABLY
INSURMOUNTABLE PROBLEMS WITH APPLICATION OF EITHER A
SURFACE STATE OR TRAP MODEL FOR THE CdS SOLAR
CELL. (AUTHOR) (U)

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-613 540
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

VAPOR DEPOSITED THIN FILM PIEZOELECTRIC TRANSDUCERS,
(U)

FEB 65 27P DE KLERK, J. ; KELLY, E. F. ;
REPT. NO. SP-64-9F5-108-PI ,SR-1
CONTRACT: AF19 628 4372
PROJ: 4600
TASK: 460003
MONITOR: AFCKL , 65-73

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PIEZOELECTRIC TRANSDUCERS, FILMS),
(*FILMS, VAPOR PLATING), VACUUM APPARATUS, CADMIUM
COMPOUNDS, SULFIDES, ZINC COMPOUNDS, PULSE GENERATORS,
MICROWAVE FREQUENCY, ELECTRON DIFFRACTION ANALYSIS,
CRYSTAL STRUCTURE (U)
IDENTIFIERS: CADMIUM SULFIDE, ZINC SULFIDE, THIN
FILMS (U)

A NEW VAPOR DEPOSITION TECHNIQUE HAS BEEN DEVELOPED
FOR THE PRODUCTION OF INSULATING THIN FILM CDS
AND ZNS PIEZOELECTRIC TRANSDUCERS. THESE HIGH
EFFICIENCY TRANSDUCERS HAVE BEEN USED TO GENERATE
EITHER SHEAR OR COMPRESSIONAL WAVES IN DIELECTRIC
MATERIALS AT FREQUENCIES IN THE GIGACYCLE RANGE.
THE THICKNESS, WHICH IS MEASURED BY MEANS OF A
QUARTZ CRYSTAL MICROBALANCE, IS CONTROLLED TO PRODUCE
FILMS WHICH OPERATE AT THEIR FUNDAMENTAL RESONANCE.
THE MODE OF THE GENERATED WAVES IS DETERMINED BY
THE ORIENTATION OF THE DRIVING ELECTRIC FIELD WITH
RESPECT TO THE CRYSTAL AXES OF THE FILM TRANSDUCER.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-613 699

BARUS RESEARCH LAB OF PHYSICS BROWN UNIV PROVIDENCE R
I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY CLEAN METALS
AND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 6, 1 JUN-31 DEC
64,

JAN 65 26P FARNSWORTH, H. E. CAMPBELL, B.

D. I

CONTRACT: DA28 043AMC0299E

PROJ: 1A105U1B010

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CADMIUM COMPOUNDS, SULFIDES), (*SURFACE
PROPERTIES, CADMIUM COMPOUNDS), (*SEMICONDUCTORS, SURFACE
PROPERTIES), OXYGEN, ADSORPTION, MASS SPECTROSCOPY,
CRYSTALS, X-RAY DIFFRACTION ANALYSIS, ION BOMBARDMENT,
CATALYSIS, ELECTRICAL PROPERTIES, METALS, ELECTRON
DIFFRACTION ANALYSIS (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

OXYGEN ADSORPTION ON THE (0001) MATTE SURFACE
OF CDS WAS ENHANCED WHEN AN INTENSE LIGHT WAS
INCIDENT ON THE CRYSTAL. A 3 TO 5 TORR-MIN
OXYGEN EXPOSURE IN INTENSE LIGHT EXTINGUISHED THE
DIFFRACTION PATTERN, WHEREAS A 750 TORR-MIN
EXPOSURE IN THE DARK HAD LITTLE EFFECT ON THE
PATTERN, ALTHOUGH IT CAUSED A SLIGHT DECREASE IN THE
CONDUCTIVITY OF THE SURFACE. HIGH TEMPERATURE
HEATING IN VACUUM (850C) PRODUCED (1103)
THERMAL ETCH PLANES ON THE (0001) MATTE SURFACE.
IT WAS FOUND THAT THE PRESENCE OF OXYGEN BEFORE OR
DURING THE LIGHT EXPOSURE INCREASED THE EFFECT OF THE
LIGHT. IT WAS ALSO FOUND THAT ION BOMBARDMENT
INCREASED THE DARK CONDUCTIVITY AND GREATLY DECREASED
THE EFFECT OF AN INTENSE LIGHT. FROM THESE
OBSERVATIONS IT IS NOTED THAT (1) THE OBSERVED
CHANGES IN CONDUCTIVITY TOOK PLACE IN A REGION CLOSE
TO OR AT THE SURFACE AS SUGGESTED BY THE EFFECT OF
ION BOMBARDMENT, AND (2) EXPOSURE OF THE CRYSTAL
TO OXYGEN AND/OR AN INTENSE LIGHT DECREASED THE
CONDUCTIVITY NEAR THE SURFACE, POSSIBLY INDICATING
PHOTOABSORPTION OF OXYGEN. UNLIKE THE (0001)
MATTE SURFACE THE (0001) SPECULAR SURFACE WAS
NOT AFFECTED BY EXPOSURE TO AN INTENSE LIGHT.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-614 439

DELAWARE UNIV NEWARK DEPT OF PHYSICS

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-
LIKE FIELD DISTRIBUTIONS IN PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: STATUS REPT. NO. 3, 1 OCT-31 DEC 64.

DEC 64 4P BOER, K. W. ;
CONTRACT: NONR433600 ,DA31 124AR0 D173

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-608 273.

DESCRIPTORS: (*SEMICONDUCTORS, FIELD THEORY),
(*PHOTOELECTRIC MATERIALS, FIELD THEORY), SINGLE
CRYSTALS, CRYSTAL GROWTH, CADMIUM COMPOUNDS, SULFIDES,
LUMINESCENCE, ELECTRICAL PROPERTIES, ELECTRON OPTICS,
DIELECTRICS (U)

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-LIKE FIELD
DISTRIBUTIONS IN PHOTOCONDUCTORS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-614 494
RCA LABS PRINCETON N J

TUNNELING PROCESSES ACROSS THE CDSELECTROLYTE
INTERFACE,

(U)

AUG 64 BP MANY.A. :
CONTRACT: DAJ1 124AR0084
MONITOR: AROD , 4017:6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN JOURNAL OF PHYSICS AND
CHEMISTRY OF SOLIDS V26 P587-93 1965 (COPIES AVAILABLE
ONLY TO DDC USERS).

DESCRIPTORS: (*TUNNELING (ELECTRONICS), CADMIUM
COMPOUNDS), (*CADMIUM COMPOUNDS, SULFIDES), FIELD
EMISSION, ELECTROLYTES, SEMICONDUCTORS, CRYSTALS,
SURFACE PROPERTIES, SULFUR

(U)

IDENTIFIERS: CADMIUM SULFIDE, SCHOTTKY BARRIERS

(U)

THE HIGH-FIELD BEHAVIOR OF THE INTERFACE BETWEEN A
CONDUCTING CDS CRYSTAL AND A BLOCKING ELECTROLYTE
CONTACT IS STUDIED BY THE USE OF PULSE TECHNIQUES.
THE METHOD EMPLOYED IS VERY SUITABLE FOR
DETERMINING THE CHARACTERISTICS OF THE SPACE-CHARGE
REGION AT THE CRYSTAL SURFACE. IN CONTRAST TO THE
CASE OF D.C. MEASUREMENTS, WHERE BREAKDOWN OF THE
BLOCKING CONTACT IS NOT APPARENT UP TO FIELDS OF AT
LEAST $2 \times 10,000,000$ V/CM, LARGE TRANSIENT CURRENTS
THROUGH THE INTERFACE ARE OBSERVED IN THE RANGE $5 \times$
 $1,000,000$ TO $10,000,000$ V/CM. THESE CURRENTS ARE
ASCRIBED TO FIELD EMISSION FROM SURFACE STATES INTO
THE CONDUCTION BAND OF THE CDS CRUSTAL/CRYSTAL.
THE SURFACE STATES ARE SHOWN TO BE INTIMATELY
CORRELATED WITH ELECTROLYTICALLY DEPOSITED SULPHUR.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-614 709

DELAWARE UNIV NEWARK DEPT OF PHYSICS

LAYERLIKE FIELD INHOMOGENEITIES IN HOMOGENEOUS SEMICONDUCTORS IN THE RANGE OF 'NEGATIVE DIFFERENTIAL CONDUCTIVITY', (U)

64 40P BOER, K. W. I
CONTRACT: NONR433600

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SUPPLEMENTARY NOTE: AVAILABLE COPY WILL NOT PERMIT FULLY LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF REQUESTED BY USERS OF DDC. COPY IS AVAILABLE FOR PUBLIC SALE.

DESCRIPTORS: (*SEMICONDUCTORS, FIELD THEORY), (*CADMIUM COMPOUNDS, SULFIDES), ELECTRICAL CONDUCTANCE, ELECTRONS, PARTIAL DIFFERENTIAL EQUATIONS, INTEGRAL EQUATIONS, MATHEMATICAL MODELS, ELECTRIC CURRENTS, PHOTOELECTRIC EFFECT, INFRARED RADIATION, SINGLE CRYSTALS (U)
IDENTIFIERS: CADMIUM SULFIDE, NEGATIVE DIFFERENTIAL CONDUCTIVITY (U)

CHARACTERISTIC LAYERLIKE FIELD INHOMOGENEITIES ARE SHOWN TO OCCUR IN HOMOGENEOUS SEMICONDUCTORS IF THE DECREASE IN CONDUCTIVITY IS STRONGER THAN LINEAR WITH INCREASING FIELD, AND ARE DISCUSSED UNDER A GENERAL ASPECT IN A MODEL USING POISSON- AND TRANSPORT-EQUATIONS AND THE FACT THAT THE NEUTRAL DENSITY OF ELECTRONS AND/OR THE MOBILITY DECREASES WITH INCREASING FIELD STRENGTH. THE METHOD OF CHARACTERISTICS IS USED FOR DISCUSSION AND PERMITS AN ANALYSIS OF THE EXPERIMENTAL OBSERVATIONS EASILY. FURTHER EXPERIMENTAL RESULTS ABOUT LAYERLIKE FIELD INHOMOGENEITIES IN CDS CONCERNING DOMAIN-WIDTH AND FIELD STRENGTHS, INFLUENCE OF OPTICAL EXCITATION AND QUENCHING, AND NET CHARGING OF CDS CRYSTALS ARE GIVEN AND SHOW GOOD AGREEMENT WITH THE PROPOSED THEORY. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-615 269
HARRY DIAMOND LABS WASHINGTON D C

MECHANISM OF HIGH CONDUCTIVITY IN VACUUMDEPOSITED
CADMIUM SULFIDE FILMS, (U)

MAR 65 45P READEY, D. W. ;
REPT. NO. TR-1280
PROJ: 96300 ,1P523801A300

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTING FILMS, ELECTRICAL
CONDUCTANCE), (*CADMIUM COMPOUNDS, SULFIDES), VAPOR
PLATING, VACUUM APPARATUS, HEAT TREATMENT, DIFFUSION
ATOMIC ENERGY LEVELS, CRYSTAL LATTICES, X-RAY
DIFFRACTION ANALYSIS, DYNAMICS (U)
IDENTIFIERS: CADMIUM SULFIDE, THIN FILMS (U)

CADMIUM SULFIDE THIN FILMS ARE OF INTEREST FOR
VARIOUS ELECTRONIC DEVICE APPLICATIONS. FILMS
DEPOSITED ON COLD SUBSTRATES HAVE HIGH CONDUCTIVITIES
UNSUITABLE FOR DEVICE UTILIZATION AND MUST BE HEAT-
TREATED TO IMPROVE THEIR PROPERTIES. THIS
INVESTIGATION WAS THEREFORE CONCERNED WITH THE HIGH
CONDUCTIVITY AND PHENOMENA RESULTING FROM HEAT-
TREATMENT TO ELUCIDATE THE MECHANISM THAT GIVES RISE
TO THEM. BASED ON KINETIC MEASUREMENTS MADE DURING
HEAT-TREATMENT AND OTHER EXPERIMENTS, IT IS CONCLUDED
THAT THE HIGH CONDUCTIVITY IS CAUSED BY A
NONSTOICHIOMETRIC EXCESS OF CADMIUM IN THE FILMS.
DURING HEAT-TREATMENT, THE EXCESS CADMIUM DIFFUSES
TO THE FILM SURFACE WHERE IT EVAPORATES, WITH
DIFFUSION BEING THE RATE-CONTROLLING MECHANISM.
ALSO, THE AS-DEPOSITED FILMS CONTAIN A NUMBER OF
ELECTRON TRAPPING SITES, MOST OF WHICH ARE ANNEALED
OUT DURING HEAT TREATMENT. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. 7222HT

AD-615 868

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

INVESTIGATING THE EFFECT OF GAMMA-RAYS, X-RAYS AND
NEUTRONS ON ELECTRIC PROPERTIES OF LDS-SE AND COSE-SE
RECTIFYING SYSTEMS. (U)

MAY 65 5P TALIBI, M. A. ABDULAEV, G. B.

REPT. NO. FTU-TT-64-1389
MONITOR: TT, 65-62392

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF MONO.
FOTOELEKTRICHESKIE I OPTICHESKIE YAVLENIYA V
POLUPROVODNIKAKH (PHOTOELECTRIC AND OPTIC PHENOMENA
IN SEMICONDUCTORS) KIEV 1959, 1P.

DESCRIPTORS: (*SEMICONDUCTORS, RADIATION DAMAGE),
(*CRYSTAL RECTIFIERS, PHOTOCONDUCTIVITY),
(*PHOTOCONDUCTIVITY, CRYSTAL RECTIFIERS), (*CADMIUM
COMPOUNDS, PHOTOCONDUCTIVITY), GAMMA RAYS, LIGHT,
X-RAYS, NEUTRON BOMBARDMENT, SULFIDES,
SELENIDES, IMPURITIES, SELENIUM, ELECTRICAL
PROPERTIES, USSR, CADMIUM ALLOYS, SELENIUM
ALLOYS (U)
IDENTIFIERS: CADMIUM SELENIDES, CADMIUM
SULFIDES (U)

THE EFFECTS OF LIGHT, GAMMA RAYS, X-RAYS, AND
NEUTRONS WERE STUDIED ON SEMICONDUCTING RECTIFIER
SYSTEMS OF SELENIUM DOPED CADMIUM SULFIDE AND CADMIUM
SELENIDE. THE RESULTS INDICATE THAT QUANTUM ENERGY
OF RADIATION IS NOT RELATED TO THE EFFECTS (VOLT-
AMPERE, VOLT-OHM, LUXAMPERE, ETC.) PRODUCED. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 U13
BATTTELLE MEMORIAL INST COLUMBUS OHIO

RADIATION EFFECTS IN GAAS. (U)

DESCRIPTIVE NOTE: REVISED ED.,
JAN 63 IUP AUKERMAN, L. W. ; DAVIS, P. W. ;
GNAFT, R. D. ; SHILLIDAY, T. S. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN JOURNAL OF APPLIED
PHYSICS V34 N12 P3590-9 DEC 1963 (COPIES NOT AVAILABLE
TO CDC OR CLEARINGHOUSE CUSTOMERS) SUPPORTED BY
AERONAUTICAL RESEARCH LAB., U. S. AIR FORCE.

DESCRIPTORS: (*RADIATION DAMAGE, SEMICONDUCTORS),
(*SEMICONDUCTORS, RADIATION DAMAGE), (*GALLIUM
ALLOYS, ARSENIC ALLOYS), HEAT TREATMENT,
RESISTANCE (ELECTRICAL), ATOMIC ENERGY LEVELS,
NEUTRONS, LIGHT TRANSMISSION, ATTENUATION, HEAT
OF ACTIVATION, ELECTRICAL PROPERTIES, OPTICAL
PROPERTIES, TELLURIUM ALLOYS, CADMIUM ALLOYS,
SULFIDES, CADMIUM COMPOUNDS (U)
IDENTIFIERS: GALLIUM ARSENIDE, CADMIUM TELLURIDES,
CADMIUM SULFIDE (U)

COMPARISON OF THE ANNEALING PROPERTIES OF
RADIATION INDUCED CONDUCTIVITY CHANGES IN GAAS
INDICATES THAT ABOUT 10% OF THE DAMAGE CREATED BY
REACTOR IRRADIATIONS ANNEALS IN A MANNER QUITE
SIMILAR TO BUT NOT IDENTICAL WITH THAT CREATED BY 1-
MEV ELECTRONS. THE REMAINING NEUTRON DAMAGE
REQUIRES MUCH HIGHER ANNEALING TEMPERATURES AND IS
PRESUMED TO RESULT FROM COMPLICATED DAMAGE STRUCTURES
CHARACTERISTIC OF HIGHLY ENERGETIC KNOCK-ON ATOMS
(E.G., DISORDERED REGIONS). HEAVY NEUTRON
IRRADIATION OF EITHER P- OR N-TYPE GAAS RESULTS
IN VERY HIGH RESISTIVITIES WHICH APPEAR TO BE
INFLUENCED BY THE PRESENCE OF SLOW SURFACE STATES.
ENERGY LEVELS RESULTING FROM NEUTRON IRRADIATION
ARE ESTIMATED TO LIE AT APPROXIMATELY 0.1 AND 0.5
EV BELOW THE CONDUCTION BAND AND AT 0.6 EV ABOVE
THE VALENCE BAND. MODERATE IRRADIATION OF GAAS
BY FAST NEUTRONS GIVES RISE TO A CONTINUOUS OPTICAL
ABSORPTION SPECTRUM FOR WAVELENGTHS BEYOND THE
FUNDAMENTAL ABSORPTION EDGE, WITH THE ABSORPTION
INCREASING AS THE INVERSE SQUARE OF THE WAVELENGTH.
SIMILAR BEHAVIOR OCCURS IN CdTe AND CdS
AFTER NEUTRON IRRADIATION.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 350

GENERAL ELECTRIC RESEARCH LAB SCHENECTADY N Y

NEW SOLID-STATE DEVICE CONCEPTS,

(U)

APR 65 39P AVEN, M. ; CARLSON, R. O. ; EMLE,
R. S. ; HALL, R. N. ; WOODBURY, H. H. ;
REPT. NO. SR-1 65-GC-U3046
CONTRACT: AF19 628 4976
PROJ: 4608
TASK: 460805
MONITOR: AFCKL , 65-296

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, MATERIALS),
(*CADMIUM COMPOUNDS, SULFIDES), (*ZINC COMPOUNDS,
OPTICAL PROPERTIES), (*SEMICONDUCTING FILMS,
PHYSICAL PROPERTIES), SILVER, DIFFUSION,
SOLUBILITY, IMPURITIES, SELENIDES, TELLURIDES,
CRYSTALS, ABSORPTION SPECTRUM, LUMINESCENCE,
ELECTROLUMINESCENCE, EMISSIVITY, REFLECTION,
ELECTRICAL PROPERTIES, GALLIUM ALLOYS, ARSENIC
ALLOYS, METAL FILMS (U)
IDENTIFIERS: CADMIUM SULFIDES, CADMIUM
SELENOTELLURIDES, GALLIUM ARSENIDE (U)

THE SOLUBILITY OF AG IN CDS WAS MEASURED
BETWEEN 375 AND 900C AND THE RESULTS ARE
INTERPRETED TO INDICATE AT LEAST TWO AND PROBABLY
THREE DIFFERENT FORMS OF AG IN CDS. DIFFUSION
PROFILES WERE OBTAINED BETWEEN 300 AND 500C. THE
RATE OF DIFFUSION OF AG SHOWS A STRONG
CONCENTRATION DEPENDENCE AND IS EXTREMELY RAPID FOR
DILUTE AG CONCENTRATIONS. THE PROFILES ARE
DISCUSSED IN TERMS OF THREE INDEPENDENT STEPS IN THE
INCORPORATION OF AG IN CDS. OPTICAL ABSORPTION
OF $ZnSe-xTe-x$ CRYSTALS IN THE BAND EDGE
REGION AND THEIR EMISSION CHARACTERISTICS UNDER
PHOTOLUMINESCENT AND ELECTROLUMINESCENT EXCITATION
WERE EXAMINED. THE EXISTENCE OF A MINIMUM IN THE
BAND GAP COMPOSITION RELATIONSHIP WAS CONFIRMED.
CONSIDERABLE BROADENING OF THE BAND EDGE PROPERTIES
WAS OBSERVED IN BOTH ABSORPTION AND EMISSION FOR THE
COMPOSITION RANGE OF $0.09 < x < 0.90$. P-N
JUNCTIONS FABRICATED FROM $ZnSe_{0.36}Te_{0.64}$
CRYSTALS DEMONSTRATED EXTERNAL QUANTUM EFFICIENCIES
OF 2.4% WITH THE MAJOR PEAK OF THE
ELECTROLUMINESCENCE SPECTRUM AT 2.0 EV.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 68J

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

MULTIPHONON PROCESSES IN THE PHOTOCONDUCTIVITY OF
CADMIUM SULFIDE AND CADMIUM SELENIDE SINGLE
CRYSTALS.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAR 65 87P BELL, JAMES ALBERT ;
REPT. NO. GSP-65A

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PHOTOCONDUCTIVITY, CADMIUM
COMPOUNDS), (*CADMIUM COMPOUNDS,
PHOTOCONDUCTIVITY), (*SULFIDES, CADMIUM
COMPOUNDS), (*SELENIDES, CADMIUM COMPOUNDS),
(*SINGLE CRYSTALS, CADMIUM COMPOUNDS), CRYOGENICS,
PHONONS, MEASUREMENT, SEMICONDUCTORS, ELECTRIC
CURRENTS, CRYSTAL LATTICES, ATOMIC ENERGY LEVELS,
ELECTRON TRANSITIONS, EXCITATION

(U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
MULTIPHONON PROCESS

(U)

THE PHOTOCONDUCTIVITY OF SINGLE CRYSTALS OF CDS
AND CDSE WAS INVESTIGATED AT 4.2K TO ASCERTAIN
WHETHER THE MULTIPHONON PROCESS DOES EXIST IN
CDSE, TO PROVIDE ADDITIONAL EVIDENCE OF THIS
PREVIOUSLY OBSERVED PHENOMENON IN CDS, AND TO
SHOW THAT SIMILAR ELECTRON AND PHONON PROCESSES WERE
RESPONSIBLE FOR THE MULTIPHONON PROCESS IN BOTH
CRYSTALS. PHOTOCONDUCTIVITY WAS INDUCED WITH
MONOCHROMATIC LIGHT PROVIDED BY A 1000 WATT TUNGSTEN
SOURCE COUPLED WITH A GRATING MONOCHROMATOR. THE
PHOTOCURRENTS WERE MEASURED BY A VARIABLE
ELECTROMETER AND SIMULTANEOUSLY PLOTTED AGAINST
EXCITING PHOTON ENERGIES BY AN X-Y RECORDER.
ANALYSIS OF DATA HAS INDICATED THAT THE MULTIPHONON
PROCESS DOES EXIST IN CDSE AND THAT THE
MULTIPHONON PROCESS IN BOTH CDS AND CDSE CAN
BE ATTRIBUTED TO SIMILAR ELECTRON AND PHONON
PROCESSES. IT WAS OBSERVED IN THE CDSE DATA
THAT BOTH FREE EXCITON AND BOUND EXCITON STATES COULD
ACT AS RECOMBINATION CENTERS FOR THE MULTIPHONON
PROCESS; ONLY FREE EXCITONS SEEMED TO DO SO IN
CDS. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 684

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

LENGTH CHANGE MEASUREMENTS OF ELECTRON IRRADIATED
CADMIUM SULFIDE IN THE ENERGY RANGE 275-935 KEV. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 65 73P RICHARD, STEPHEN PIERCE ;
REPT. NO. GSP-65b

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SINGLE CRYSTALS, ELECTRON
BOMBARDMENT), (*CADMIUM COMPOUNDS, SULFIDES),
(*ELECTRON BOMBARDMENT, SINGLE CRYSTALS), CRYSTAL
LATTICE DEFECTS, IMPURITIES, CRYOGENICS,
TEMPERATURE, SEMICONDUCTORS, SULFUR,
DEFORMATION, MEASUREMENT (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

SINGLE CRYSTAL CADMIUM SULFIDE WAS BOMBARDED WITH
275-935 KEV ELECTRONS FROM A VAN DE GRAAFF
ACCELERATOR AND THE CHANGE IN LENGTH WAS OBSERVED AT
ROOM (295K) AND LIQUID NITROGEN (77K)
TEMPERATURES. THE CRYSTAL SHOWED A BARELY
DETECTABLE CHANGE IN LENGTH, $(-5.7=7.6) \times 10^{-10}$ TO
THE MINUS 22ND POWER PER ELECTRON PER SQ CM, WHEN
BOMBARDED WITH ELECTRONS BELOW THE CADMIUM
DISPLACEMENT THRESHOLD AT 295K. ABOVE THE CADMIUM
THRESHOLD AN INITIAL CONTRACTION NOT PREDICTED BY THE
SIMPLE DISPLACEMENT THEORY OF THE ORDER OF $(-6.0$
 $\times 0.01) \times 10^{-10}$ WAS OBSERVED. AFTER THE INITIAL
CONTRACTION, AT 550 KEV THE LENGTH CHANGE WAS $(+$
 $1.0=9.8) \times 10^{-10}$ TO THE MINUS 23RD POWER PER
ELECTRON PER SQ CM, WHILE AT 755 AND 935 KEV, THE
LENGTH CHANGES WERE $(+4.6=1.5) \times 10^{-10}$ TO THE
MINUS 22ND POWER PER ELECTRON PER SQ CM AND $(-1.5=$
 $2.6) \times 10^{-10}$ TO THE MINUS 22ND POWER PER ELECTRON PER
SQ CM, RESPECTIVELY. THESE LENGTH CHANGES SHOW THE
EFFECT OF AN ANNEALING STAGE WHICH BECOMES DOMINANT
AT LARGE CONCENTRATIONS OF DISPLACED CADMIUM ATOMS.
THE 77K BOMBARDMENTS AT 275 AND 755 KEV SHOW
CONTRACTIONS OF $(-1.8=0.6) \times 10^{-10}$ TO THE MINUS
22ND POWER PER ELECTRON PER SQ CM AND $(-2.9=1.3)$
 $\times 10^{-10}$ TO THE MINUS 21ST POWER PER ELECTRON PER SQ CM,
RESPECTIVELY, WHICH ARE POSTULATED AS CAUSED BY THE
DIFFUSION OF INTERSTITIALS THROUGH THE LATTICE AND
THE SUBSEQUENT ACCUMULATION OF VACANCIES.
(AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-616 687

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

MEASUREMENT OF ELECTRON FREE LIFETIME AND TRAPPING
FACTOR IN HIGH PURITY CADMIUM SULFIDE, CADMIUM
SULFIDE/SELENIDE AND CADMIUM SELENIDE USING THE
METHOD OF ULTRASONIC AMPLIFICATION.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAR 65 94P KRAWETZ, BARTON ;
REPT. NO. SP/PH/65-13

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, TRANSPORT
PROPERTIES), (*CADMIUM COMPOUNDS, TRANSPORT
PROPERTIES), (*SULFIDES, TRANSPORT PROPERTIES),
(*SELENIDES, TRANSPORT PROPERTIES), TEST METHODS,
ULTRASONIC RADIATION, ELECTRON TRANSITIONS,
STRESSES, MECHANICAL WAVES, SINGLE CRYSTALS,
OXIDES, CRYSTAL GROWTH, PHOTOCONDUCTIVITY,
ABSORPTION, PROPAGATION, ATTENUATION,
AMPLIFIERS, HALL EFFECT, ACOUSTICS, CADMIUM
ALLOYS, SELENIUM ALLOYS
IDENTIFIERS: CADMIUM SELENIDES, CADMIUM
SULFIDES

(U)

(U)

CADMIUM SULFIDE, CADMIUM SULFIDE/SELENIDE, AND
CADMIUM SELENIDE WERE STUDIED IN AN EFFORT TO ARRIVE
AT ESTIMATES OF SEVERAL ELECTRON TRANSPORT
PARAMETERS. ELECTRON FREE LIFETIMES, TRAPPING
FACTORS, AND EFFECTIVE DRIFT MOBILITY WERE ALL
DEDUCED FROM DIRECT MEASUREMENT OF THE VARIATION OF
STRESS WAVE GAIN WITH APPLIED ELECTRIC FIELD AND
HALL MOBILITY. ATTEMPTS TO ISOLATE THE
CHARACTERISTIC ENERGY LEVEL STRUCTURE OF HIGH QUALITY
AMPLIFIER CRYSTALS WERE MADE BY MEANS OF
PHOTOCONDUCTIVITY AND ABSORPTION MEASUREMENTS AT BOTH
77K AND 300K. THESE METHODS, IN GENERAL, FAILED
TO INDICATE ANY PECULIARITIES WHICH COULD BE READILY
CORRELATED WITH AMPLIFIER PERFORMANCE. THE ONE
EXCEPTION, A SAMPLE OF CDS COMPENSATED IN
SELENIUM, SHOWED A SEVERE DECREASE IN SLOPE AND A
BROADENING OF THE PRIMARY ABSORPTION EDGE. DURING
ATTEMPTS TO COMPENSATE CDS IN FLOWING OXYGEN, IT
WAS DISCOVERED THAT 3 MM. CUBIC CRYSTALS FORMED ON
THAT PORTION OF THE CDS DIRECTLY EXPOSED TO THE
OXYGEN SOURCE. X-RAY POWDER MEASUREMENTS CONFIRMED
THAT THESE CRYSTALS WERE CDO.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-616 828

AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

OSCILLATORY PHOTOCONDUCTIVITY OF CDS, (U)

JUL 64 5P PARK, Y. S.; LANGER, D. W. I
REPT. NO. 65-57

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN PHYSICAL REVIEW LETTERS
V13 N13 P392-4 SEP 28 1964. (COPIES NOT AVAILABLE TO
DDC OR CLEARINGHOUSE CUSTOMERS).

DESCRIPTORS: (*PHOTOCONDUCTIVITY, SEMICONDUCTORS),
(*CADMIUM COMPOUNDS, PHOTOCONDUCTIVITY),
(*SULFIDES, CADMIUM COMPOUNDS), OSCILLATION,
SINGLE CRYSTALS, ATOMIC ENERGY LEVELS, ELECTRON
TRANSITIONS, PHOTONS, ENERGY, CRYOGENICS (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

A DISCUSSION IS PRESENTED OF PERIODIC OSCILLATIONS
OF THE PHOTOCONDUCTIVITY IN THE IMPURITY REGION MADE
AT 4 K ON SELECTED CDS SINGLE CRYSTALS. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-617 125
CINCINNATI UNIV OHIO

EXCITON STRUCTURE IN PHOTOCONDUCTIVITY OF CDS, CDSE,
AND CDS:SE SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: REVISED ED.,
JUL 63 10P PARK, Y. S. REYNOLDS, D. C. I
MONITOR: ARL , 65-56

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN PHYSICAL REVIEW V132 N6
P2450-7 DEC 15 1963 (COPIES NOT AVAILABLE TO DDC OR
CLEARINGHOUSE CUSTOMERS) REVISION OF MANUSCRIPT
SUBMITTED 24 JUN 63.

DESCRIPTORS: (*CADMIUM COMPOUNDS,
PHOTOCONDUCTIVITY), (*CADMIUM ALLOYS,
PHOTOCONDUCTIVITY), (*SINGLE CRYSTALS, CADMIUM
COMPOUNDS), (*PHOTOCONDUCTIVITY, CRYOGENICS),
SEMICONDUCTORS, SELENIUM ALLOYS, SULFIDES, ATOMIC
ENERGY LEVELS, ELECTRON TRANSITIONS, EXCITATION,
INTERMETALLIC COMPOUNDS, GROUND STATE, SOLID
SOLUTIONS, ABSORPTION SPECTRUM (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE (U)

EXCITON-LIKE STRUCTURE HAS BEEN OBSERVED IN THE
PHOTOCONDUCTIVE SPECTRAL RESPONSE CURVES OF CDS,
CDSE, AND CDS:SE SINGLE CRYSTALS AT 77 AND
4.2K. IT IS OBSERVED THAT A NUMBER OF PEAKS IN THE
PHOTOCONDUCTIVITY SPECTRA OF CDS AND CDSE
CORRESPOND TO THE EXCITON SPECTRA IDENTIFIED BY OTHER
OPTICAL MEASUREMENTS. IN CDS THE
PHOTOCONDUCTIVITY PEAKS CORRESPONDING TO $n = 1, 2,$
3 STATES AND THE SERIES LIMIT OF THE EXCITON FROM THE
FIRST AND SECOND VALENCE BANDS AND THE GROUND STATE
OF THE EXCITON ASSOCIATED WITH THE THIRD VALENCE BAND
WERE OBSERVED. FOR CDSE THE PEAKS CORRESPONDING
TO THE $n = 1, 2, 3$ STATES OF THE EXCITON FROM THE
FIRST AND SECOND VALENCE BANDS WERE IDENTIFIED.
ONLY THE GROUND STATE WAS IDENTIFIED IN THE SOLID
SOLUTIONS. ASSIGNMENT OF THE OBSERVED
PHOTOCONDUCTIVITY PEAKS WAS CARRIED OUT BY OBSERVING
OPTICAL SELECTION RULES IN POLARIZED LIGHT. WITHIN
A GIVEN SERIES THE PEAKS FORM NEARLY HYDROGEN-LIKE
ENERGY SPACINGS, AND IT IS OBSERVED THAT THE EXCITON
ABSORPTION LINES ALWAYS CORRESPONDED TO PHOTOCURRENT
MAXIMA. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-617 69J
HUGHES AIRCRAFT CO FULLERTON CALIF

IMPROVED DELAY LINE TECHNIQUES STUDY. (U)

DESCRIPTIVE NOTE: FINAL REPT.

MAY 65 84P
REPT. NO. FR-65-14-010
CONTRACT: AF30 602 3474
PROJ: AF-4506
MONITOR: RADC , TR-65-45

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*DELAY LINES, PULSE COMPRESSION),
(*PULSE COMPRESSION, DELAY LINES), BANDWIDTH,
TRANSDUCERS, HIGH FREQUENCY, FILMS, YTTRIUM,
IRON, GARNET, CADMIUM COMPOUNDS, SULFIDES (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

DISPERSIVE DELAY LINES ARE A VERY STABLE AND RELIABLE PULSE COMPRESSION TECHNIQUE. AS A RESULT OF INCREASED REQUIREMENTS PLACED ON PULSE COMPRESSION SYSTEMS SUCH AS BANDWIDTH, AND TIME-BANDWIDTH PRODUCTS, DISPERSIVE DELAY LINE TECHNIQUES MUST BE IMPROVED. IMPROVED DISPERSIVE DELAY LINE TECHNOLOGY AS APPLIED TO PULSE COMPRESSION SYSTEMS WAS INVESTIGATED. HIGHER FREQUENCY OF OPERATION, BROADER BANDWIDTH AND GREATER EASE OF FABRICATION WERE THE PRIMARY AREAS OF INTEREST. TWO DISPERSIVE DELAY LINE CONFIGURATIONS WERE INVESTIGATED. THE FIRST CONFIGURATION WAS A TECHNIQUE BASED ON THE DISPERSIVE CHARACTERISTIC WHICH RESULTS FROM ELASTIC WAVES PROPAGATING IN THIN METAL STRIPS, AND THE SECOND CONFIGURATION WAS BASED ON SLOW WAVE PROPAGATION IN A YTTRIUM IRON GARNET. AN INVESTIGATION WAS UNDERTAKEN TO DETERMINE A HIGHLY EFFICIENT TRANSDUCER TO BE USED IN CONJUNCTION WITH THE DISPERSIVE DELAY LINES. VACUUM DEPOSITED CADMIUM SULFIDE TRANSDUCERS PROVED TO BE MOST DESIRABLE AND SUCCESSFUL IN CONSTRUCTING DELAY LINES OF BROAD INSTANTANEOUS BANDWIDTH. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-617 749

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

ACTIVE ACOUSTIC DEVICES.

(U)

DESCRIPTIVE NOTE: INTERIM QUARTERLY REPT. NO. 2, 1 OCT-
31 DEC 64,

MAY 65 63P SAKIOTIS, N. G. IBRENDECKE, W. H.

THICKERNELL, F. S. I

CONTRACT: AF30 602 3478

PROJ: 5578

TASK: 557802

MONITOR: RADC , TR-65-89

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-612 703.

DESCRIPTORS: (*TRANSDUCERS, SEMICONDUCTOR DEVICES),
(*ACOUSTIC EQUIPMENT, SEMICONDUCTOR DEVICES),
(*SEMICONDUCTOR DEVICES, TRANSDUCERS), PHONONS,
SOLID STATE PHYSICS, ULTRASONIC PROPERTIES,
PIEZOELECTRIC CRYSTALS, EPITAXIAL GROWTH, CADMIUM
COMPOUNDS, SULFIDES, FILMS, VAPOR PLATING,
VACUUM APPARATUS, ZINC COMPOUNDS, OXIDES
IDENTIFIERS: CADMIUM SULFIDES

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(U)

INVESTIGATIONS OF SUITABLE HEAT SINK MATERIAL
NEEDED FOR CW OPERATION RESULTED IN THE DEVELOPMENT
OF A BELOADED EPOXY WITH A THERMAL CONDUCTIVITY
OF 1.6 BTU/HRFT-DEGREES F. THIS APPEARS
COMPATIBLE WITH THE REQUIREMENTS AS PREVIOUSLY
DETERMINED. THE OPEN-TUBE OR DYNAMIC TECHNIQUE WAS
DETERMINED TO BE THE MOST FEASIBLE FOR THE EPITAXIAL
GROWTH OF CDS TRANSDUCERS. THEORETICAL AND
EXPERIMENTAL INVESTIGATIONS OF THE VACUUM DEPOSITION
OF CDS RESULTED IN FILMS WITH RESISTIVITY VALUES
RANGING FROM 300 OHM-CM TO 7×10 TO THE 6TH POWER
OHM-CM. GOOD QUALITY CDS CRYSTALS WITH HIGH
MOBILITY AND INTERMEDIATE RESISTIVITY LEVELS WERE
OBTAINED BY ANNEALING IN A SULPHUR ATMOSPHERE.
INVESTIGATION OF THE PROPERTIES OF ZINC OXIDE
CRYSTALS WERE INITIATED. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-619 19U

DELAWARE UNIV NEWARK DEPT OF PHYSICS

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-
LIKE FIELD DISTRIBUTIONS IN PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: STATUS REPT. NO. 5, 1 APR-30 JUL 65:

JUL 65 4P BOER, K. W. ;
CONTRACT: NONR433600

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-614 439.

DESCRIPTORS: (*SEMICONDUCTORS, FIELD THEORY),
(*PHOTOELECTRIC MATERIALS, FIELD THEORY), ELECTRON
OPTICS, CADMIUM COMPOUNDS, SULFIDES, CRYSTAL
GROWTH, ELECTRODES, SINGLE CRYSTALS, CRYSTAL
GROWTH, DIELECTRICS (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

ELECTRO-OPTICAL METHOD FOR INVESTIGATION OF FIELD AND
CURRENT DISTRIBUTIONS IN SEMICONDUCTORS AND LAYER-LIKE FIELD
DISTRIBUTIONS IN PHOTOCONDUCTORS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-619 279

EAGLE-PICHER RESEARCH LABS MIAMI OKLA

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF
II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 MAR 62-28 FEB 65,
MAY 65 131P BROWN, LLOYD W. BUFORD, JOHN
T. FAHRIG, R. H. FLUESMEIER, A. L. MUSGRAVE, JOHN
R. I

CONTRACT: AF33 657 7127

PROJ: 7885

TASK: 788503

MONITOR: ARL , 65-100

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-276 416.

DESCRIPTORS: (*SEMICONDUCTORS, PURIFICATION),
(*CRYSTAL GROWTH, SEMICONDUCTORS),
(*SYNTHESIS(CHEMISTRY), SEMICONDUCTORS), CADMIUM,
ZONE MELTING, CADMIUM COMPOUNDS, SULFIDES,
CADMIUM ALLOYS, SELENIUM ALLOYS, ZINC COMPOUNDS,
ZINC ALLOYS, TELLURIUM ALLOYS, MERCURY COMPOUNDS,
MERCURY ALLOYS, BARIUM ALLOYS, IMPURITIES,
OXIDES, SINGLE CRYSTALS, ENERGY CONVERSION (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINC SULFIDE, ZINC SELENIDE, ZINC TELLURIDE,
MERCURIC SULFIDE, MERCURIC SELENIDE, MERCURIC
TELLURIDE, BARIUM TELLURIDE (U)

THE PREPARATION AND PURIFICATION OF ELEMENTAL
CADMIUM BY ZONE REFINING ARE DESCRIBED. A
COMPARISON OF THE EMISSION AND MASS SPECTROGRAPHIC
RESULTS ON THE ZONING OF A DOPED CADMIUM TEST BAR IS
PRESENTED. THE SYNTHESSES OF HIGH PURITY CADMIUM
SULFIDE, CADMIUM SELENIDE, ZINC SULFIDE, AND ZINC
SELENIDE BY THE DIRECT REACTION OF THEIR GASEOUS
ELEMENTAL CONSTITUENTS ARE DISCUSSED. EMISSION AND
MASS SPECTROGRAPHIC DATA ON SYNTHESIZED CADMIUM
SULFIDE ARE COMPARED. THE SYNTHESSES OF ZINC
TELLURIDE, MERCURIC SULFIDE, MERCURIC SELENIDE, AND
MERCURIC TELLURIDE BY THE COMBINATION OF THE ELEMENTS
IN THE LIQUID PHASE ARE OUTLINED. A METHOD FOR
PREPARING BARIUM TELLURIDE BY THE REDUCTION OF BARIUM
TELLURATE IS GIVEN. SPECIAL HANDLING TECHNIQUES
AND X-RAY CHARACTERIZATION OF THIS MATERIAL ARE
PRESENTED. CRYSTAL GROWTH OF CADMIUM SULFIDE, ZINC
SULFIDE, CADMIUM SELENIDE, ZINC SELENIDE, AND MIXED
CRYSTALS OF ZINC SULFIDE-ZINC SELENIDE FROM THE MELT
IN A HIGH PRESSURE FURNACE IS DISCUSSED. (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-620 297

CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. FOR 1 JAN 62-31
JAN 65.

MAY 65 215P SHIOZAWA, L. R. (JOST, J. M.)

CONTRACT: AF33 667 7399

PROJ: 7885

TASK: 788503

MONITOR: ARL , 65-98

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, MATERIALS),
(*CRYSTAL GROWTH, SEMICONDUCTORS), (*LUMINESCENCE,
SEMICONDUCTORS), CADMIUM ALLOYS, CADMIUM
COMPOUNDS, ZINC ALLOYS, SULFIDES, SELENIUM ALLOYS,
TELLURIUM ALLOYS, PURIFICATION, SINTERING,
CRYSTAL LATTICE DEFECTS, ELECTRICAL PROPERTIES,
MECHANICAL PROPERTIES, PHASE STUDIES, SOLID
SOLUTIONS, DEFORMATION, INTERMETALLIC COMPOUNDS (U)
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,
ZINC SELENIDE, ZINC TELLURIDE (U)

THE REPORT SUMMARIZES THREE YEARS OF RESEARCH ON
MATERIAL PURIFICATION AND CRYSTAL GROWTH OF CDS,
CDSE, ZNTE, AND CDSE-ZNSE AND ON THE
MEASUREMENT OF THE FUNDAMENTAL PROPERTIES OF THE
CRYSTALS. IN ADDITION, A PRELIMINARY INVESTIGATION
HAS BEEN MADE INTO THE LUMINESCENT PHENOMENA IN
CDS. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-620 854

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

ACTIVE ACOUSTIC DEVICES.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, JAN-31 MAR
65,

AUG 66 78P SAKIOTIS, N. G. BRENDENCKE, W. H.
HICKERNELL, F. S. I
CONTRACT: AF30 602 3478
PROJ: 5578
TASK: 557802
MONITOR: RADC , TR-65-203

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-612 703.

DESCRIPTORS: (*TRANSDUCERS, SEMICONDUCTOR DEVICES),
(*ACOUSTIC EQUIPMENT, SEMICONDUCTOR DEVICES),
(*SEMICONDUCTOR DEVICES, TRANSDUCERS),
SEMICONDUCTING FILMS, CADMIUM COMPOUNDS, SULFIDES,
PIEZOELECTRIC CRYSTALS, SOLID STATE PHYSICS, VAPOR
PLATING, VACUUM, GAIN, BERYLLIUM COMPOUNDS,
OXIDES, QUARTZ, VERY HIGH FREQUENCY, SURFACE
PROPERTIES, AMPLIFIERS, THERMAL CONDUCTIVITY,
ULTRASONIC PROPERTIES
IDENTIFIERS: CADMIUM SULFIDES

(U)

(U)

A HEAT SINK DESIGN HAS BEEN DEMONSTRATED WHICH
MAINTAINS THE MAXIMUM CRYSTAL TEMPERATURE RISE TO
LESS THAN 10 C ABOVE AMBIENT FOR A RANGE OF VALUES
OF DRIFT FIELD POWER DENSITY REQUIRED FOR USEFUL
CONTINUOUS ACOUSTIC GAIN. THE WORK ON THIN FILM
TRANSDUCERS HAS YIELDED PROCESSES AND TECHNIQUES FOR
THE DEPOSITION OF INSULATING CDS FILMS ON CDS
SUBSTRATES RESULTING IN CONVERSION LOSSES IN THE
RANGE OF 6-8 DB AND BANDWIDTHS OF THE ORDER OF 50%
IN THE FREQUENCY OF 100-300 MC/SEC. BUNDED QUARTZ
TRANSDUCERS OPERATING IN THE FIRST OVERTONE MODE AT
180 MC/SEC WITH CONVERSION LOSSES OF LESS THAN 10 DB
WERE DEMONSTRATED. ACOUSTIC AMPLIFIER UTILIZING
CDS MATERIAL WAS SHOWN TO OPERATE SATISFACTORILY
AT MAXIMUM CRYSTAL TEMPERATURES OF AT LEAST 70 C.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-620 973

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

OPTICAL QUANTUM CRYSTAL GENERATOR WITH EXCITATION BY
FAST ELECTRONS, (U)

JUN 65 BP BASOV, N. G. ; BUGDANKEVICH, O. V.
; DEVYATKOV, A. G. ;
REPT. NO. FTU-TT-65-555
MONITOR: TT ; 65-63914

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF
AKADEMIYA NUK SSSR. FIZICHESKII INSTITUT, 1964 7P.

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, LASERS),
(*LASERS, ELECTRON BOMBARDMENT), SINGLE CRYSTALS,
CADMIUM COMPOUNDS, SULFIDES, ELECTRON BOMBARDMENT,
EXCITATION, INTENSITY, PUMPING (ELECTRONICS),
LINE SPECTRUM, USSR (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

AN OPTICAL QUANTUM GENERATOR (LASER) WAS OBTAINED
PUMPING A CADMIUM SULFIDE SINGLE CRYSTAL WITH AN
ELECTRON BEAM, AND ITS SPECTRUM WAS STUDIED. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 138
NEW YORK UNIV N Y DEPT OF PHYSICS

STUDY OF THE MECHANISM AND PROPERTIES OF THE
PHOTOVOLTAIC AND PHOTOCONDUCTIVE EFFECTS IN ORGANIC
SUBSTANCES. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 NOV 63-31 OCT 64,
MAR 65 ZJP KALLMANN, HARTMUT P. I
CONTRACT: AF19 628 2446
PROJ: 8659
TASK: 865901
MONITOR: AFCLR , 65-240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ORGANIC MATERIALS, PHOTOELECTRIC
EFFECT), (*PHOTOELECTRIC EFFECT, ORGANIC
MATERIALS), (*PHOTOCONDUCTIVITY, ORGANIC
MATERIALS), POLYCYCLIC COMPOUNDS, GERMANIUM, ZINC
COMPOUNDS, SULFIDES, SEMICONDUCTING FILMS,
ILLUMINATION, ABSORPTION, PHOTOCHEMISTRY,
SOLUTIONS, CADMIUM COMPOUNDS, SINGLE CRYSTALS (U)
IDENTIFIERS: ANTHRACENES, CADMIUM SULFIDE, ZINC
SULFIDE (U)

RESEARCH RESULTS IN THE FOLLOWING AREAS ARE
REPORTED: LARGER THAN BAND GAP PHOTOVOLTAGES IN
ANTHRACENE, GERMANIUM LAYERS, AND EVAPORATED ZINC
SULFIDE LAYERS; AND PHOTOVOLTAGES DUE TO
INHOMOGENEOUS ABSORPTION OF LIGHT AND TO CHEMICAL
EFFECTS IN ORGANIC SOLUTIONS (E.G., ALPHA-METHYL
NAPHTHALENE, BENZENE, HEMIMELLITINE, MESITYLENE)
AND IN CADMIUM SULFIDE SINGLE CRYSTALS. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 424

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS

INTRODUCTION OF MICROIMPURITIES INTO SINGLE CRYSTALS OF CDS DURING THEIR GROWTH AND SOME CHARACTERISTICS OF THE ALLOYED SAMPLES (VVEDENNIA MIKHODOMISHOK V MONOKHRYSTALY CDS V PROTSESI IKH ROSTU TA DEIAKI KHAKTERYSTYKY LEGOVANYKH ZRAZKIV). (U)

DESCRIPTIVE NOTE: RESEARCH TRANSLATION,
SEP 64 9P BULAKH, B. M. IMIZETSKA, I. B.

REPT. NO. T-U-3
CONTRACT: AF19 628 388U
MONITOR: TT , 65-63977

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF UKRAYINSKYII FIZYCHNYI ZHURNAL (USSR) V7 N10 P1125-7 1962.

DESCRIPTORS: (*SEMICONDUCTORS, IMPURITIES), (*CADMIUM COMPOUNDS, SULFIDES), (*SINGLE CRYSTALS, SEMICONDUCTORS), GERMANIUM, GOLD, SILVER, COPPER, CHLORINE, CRYSTAL GROWTH, PHOTUSENSITIVITY, PHOTOCONDUCTIVITY, USSR (U)

THE OBJECT OF THE WORK WAS TO DEVELOP A METHOD OF ALLOYING SINGLE CRYSTALS OF CDS DURING THEIR GROWTH AND TO STUDY THE EFFECT OF MICROIMPURITIES ON CERTAIN PHYSICAL PROPERTIES OF THE ALLOYED SEMICONDUCTORS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 454

HARSHAW CHEMICAL CO CLEVELAND OHIO

RESEARCH ON PHOTOVOLTAIC CELLS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 MAY 62-30 APR 65,

JUN 65 125P MEYERDAHL, NORMAN E. HARVEY,

DONALD J. I

CONTRACT: AF33 657 7916

PROJ: 7885

TASK: 788502

MONITOR: ARL , 65-111

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-439 672.

DESCRIPTORS: (*SOLAR CELLS, SEMICONDUCTING FILMS),
(*SEMICONDUCTING FILMS, SOLAR CELLS), CADMIUM
COMPOUNDS, SULFIDES, SELENIUM, CADMIUM ALLOYS,
SELENIUM ALLOYS, TELLURIUM ALLOYS, ZINC ALLOYS,
GALLIUM ALLOYS, ARSENIC ALLOYS, CHEMICAL MILLING,
VAPOR PLATING, MAGNETIC PROPERTIES, ELECTRICAL
PROPERTIES, THERMOELECTRICITY, LIGHT
TRANSMISSION

(U)

IDENTIFIERS: THIN FILMS

(M)

THE REPORT DESCRIBES RESEARCH AND DEVELOPMENT ON
THIN FILM SOLAR BATTERIES. THE FABRICATION AND
STUDY OF THIN FILMS OF CDS:SE, CDSE,
CDTE, ZNSE, AND GAAS AND THIN FILM SOLAR
BATTERIES OF CDS:SE, CDSE, AND CDTE IS
DISCUSSED IN DETAIL. A STUDY OF THE ETCHING
BEHAVIOUR OF II-VI COMPOUNDS, COMPLETED AS A PART
OF THIS PROGRAM, HAS BEEN PUBLISHED ELSEWHERE. AN
ABSTRACT OF THE WORK IS INCLUDED IN THIS REPORT.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-621 941

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND
DEVELOPMENT CENTER

NEW SOLID-STATE DEVICE CONCEPTS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT.,

JUL 65 35P AVEN, M. | CARLSON, R. O. | EHLE,
R. S. | HALL, R. N. | WOODBURY, H. H. |

REPT. NO. SR-2, 65GC-0313G

CONTRACT: AF19 628 4976

PROJ: 4608

TASK: 460805

MONITOR: AFCL , 65-611

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-616 350.

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, MATERIALS),
(*LASERS, SEMICONDUCTOR DEVICES), (*CADMIUM
COMPOUNDS, SULFIDES), (*ZINC COMPOUNDS, ELECTRICAL
PROPERTIES), (*SEMICONDUCTING FILMS, PHYSICAL
PROPERTIES), OXYGEN, SULFUR COMPOUNDS, OXIDES,
SULFIDES, TRANSPORT PROPERTIES,
ELECTROLUMINESCENCE, SELENIDES, TELLURIDES,

METAL FILMS, SILVER, GOLD, ALUMINUM, GALLIUM
ALLOYS, ARSENIC ALLOYS, OPTICAL PROPERTIES

(U)

IDENTIFIERS: CADMIUM SULFIDE, GALLIUM ARSENIDE,
ZINC SELENOTELLURIDES, ZINC SULFIDE

(U)

ATTENTION ON CDS WAS SHIFTED TO STOICHIOMETRIC
PROBLEMS AND THE EFFECTS OF O₂. BECAUSE OF THE
HIGH STABILITY OF SO₂, FIRING CDS IN O₂
PRODUCES A 'REDUCING' ACTION ON THE BULK CRYSTAL,
EQUIVALENT TO A SMALL EXCESS CD FIRING.
ELECTRICAL TRANSPORT AND CONTACT PROPERTIES OF 1 TO
10 OHM-CM N-TYPE ZNS CRYSTALS WERE STUDIED. TWO
TYPES OF LEVELS WERE FOUND BELOW THE CONDUCTION BAND
OF ZNS: SHALLOW DONOR LEVELS AT 0.014 EV AND
DEEPER LEVELS BETWEEN 0.10 AND 0.29 EV. INJECTION
ELECTROLUMINESCENT P-N JUNCTIONS HAVE BEEN PREPARED
FROM ZNSE_{0.36}TEO_{0.64} WHICH SHOW EXTERNAL QUANTUM
EFFICIENCIES OF 18% AT 70K. THE RESISTANCE OF
VARIOUS ALLOYED CONTACTS AND GOLD THERMOCOMPRESSION
BONDS TO N- AND P-TYPE GAAS WAS MEASURED. THE
INTERFACE RESISTANCE OF EVAPORATED FILMS OF AG,
AU, AND AL APPLIED TO GAAS IS HIGH UNLESS THE
FILMS ARE SUBJECTED TO A HIGH-TEMPERATURE ALLOYING
STEP WHICH DAMAGES THEIR REFLECTING PROPERTIES.

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-622 695

HARRY DIAMOND LABS WASHINGTON D C

VACUUM-DEPOSITED CADMIUM SULFIDE THIN FILMS, (U)

JUL 65 41P AVIS, G. G. BOESMAN, W. C. I
READEY, D. W. I
REPT. NO. TR-1297
PROJ: DAIP523801A300 , HDL96300

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTING FILMS, VAPOR PLATING),
(*CADMIUM COMPOUNDS, SULFIDES), VACUUM APPARATUS,
RESISTANCE (ELECTRICAL), HEAT TREATMENT, CRYSTAL
STRUCTURE, SANDWICH CONSTRUCTION, ELECTRICAL
PROPERTIES (U)
IDENTIFIERS: THIN FILMS (M)

CADMIUM SULFIDES WAS VACUUM-DEPOSITED ONTO GLASS
SUBSTRATES AT APPROXIMATELY 0.00002 TORR USING
ELECTRON BEAM HEATING. INITIAL RESISTIVITIES WERE
IN THE RANGE 0.1 TO 1 OHM-CM. AFTER HEATING IN
VACUUM AT 360 TO 370C FOR 1/2 HR, THE RESISTIVITIES
INCREASED TO THE RANGE 0.3 TO 300,000 OHM-CM. TO
CORRELATE RESISTIVITY WITH CRYSTAL STRUCTURE, THE
CADMIUM SULFIDE FILMS WERE STUDIED BY MEANS OF X-
RAY AND ELECTRON DIFFRACTION, AND SPECTROPHOTOMETRY.
IT WAS FOUND THAT THESE CADMIUM SULFIDE FILMS WERE
HEXAGONAL AND HIGHLY ORIENTED WITH THE C-AXIS
PERPENDICULAR TO THE PLANE OF THE SUBSTRATE. GRAIN
SIZE PERPENDICULAR TO THE C-AXIS WAS MUCH LESS THAN
100 A AFTER DEPOSITION ONTO ROOM-TEMPERATURE
SUBSTRATES, AND INCREASED TO 100 TO 200 A IN
DIAMETER AFTER HEAT TREATMENT. TO DETERMINE THE
TYPE OF CONTACT THE COMMONLY DEPOSITED METALS MAKE TO
CADMIUM SULFIDE, A MASK CHANGER WAS EMPLOYED TO ALLOW
THE DEPOSITION OF LAYERIZED ARRAYS OF METAL-CADMIUM
SULFIDE-METAL IN A SINGLE PUMPDOWN. ALUMINUM,
INDIUM, SILVER, AND GOLD WERE THEREBY DEPOSITED IN
SEVERAL DIFFERENT ELECTRODE COMBINATIONS.
COMBINATIONS HAVING ALUMINUM AS ONE (OR BOTH)
OF THE ELECTRODES EXHIBITED RECTIFYING
CHARACTERISTICS; ALL OTHER COMBINATIONS EXHIBITED
OHMIC CHARACTERISTICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 045

STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE

PHOTO-HALL STUDIES OF OXYGEN ADSORPTION EFFECTS ON
PHOTOCONDUCTIVITY IN SINTERED LAYERS. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
APR 65 BP ROBINSON, ARTHUR L. BUBE,
RICHARD H. I
MONITOR: AROU , 4119:6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN JOURNAL OF THE
ELECTROCHEMICAL SOCIETY V112 NO P10U2-5 OCT 1965
(COPIES NOT AVAILABLE TO DDC OR CLEARINGHOUSE
CUSTOMERS).

DESCRIPTORS: (*SEMICONDUCTORS, CHEMISORPTION),
(*HALL EFFECT, CHEMISORPTION), (*PHOTOCONDUCTIVITY,
CHEMISORPTION), (*CADMIUM COMPOUNDS,
PHOTOCONDUCTIVITY), (*CHEMISORPTION,
SEMICONDUCTORS), SULFIDES, SELENIDES, OXYGEN,
ADSORPTION, HEAT TREATMENT (U)
IDENTIFIERS: PHOTOADSORPTIVE EFFECT (U)

THE HALL MOBILITY AND THE FREE ELECTRON DENSITY
IN SINTERED LAYERS OF CDS-COSE WERE MEASURED
AS A FUNCTION OF PHOTOEXCITATION INTENSITY,
TEMPERATURE, AND AMBIENT ATMOSPHERE. BOTH FREE
CARRIER DENSITY AND HALL MOBILITY ARE REDUCED BY
THE ADSORPTION OF OXYGEN AND INCREASED BY THE
DESORPTION OF OXYGEN. THE MAGNITUDES OF THE
EFFECTS ARE SUCH THAT IN ALL CASES THE HALL
MOBILITY CHANGE DUE TO ADSORPTION CONTRIBUTES
SIGNIFICANTLY TO THE PHOTOCONDUCTIVITY CHANGE.
EFFECTS ASSOCIATED WITH PHOTOADSORPTION OF OXYGEN
ARE REVERSIBLE BY ANNEALING IN VACUUM. RESULTS CAN
BE CONSISTENTLY DESCRIBED IN TERMS OF THE MODEL FOR
CHEMISORPTION OF OXYGEN ON SINTERED LAYERS PROPOSED
BY SHEAR, HILTON, AND BUBE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 165

BELL AND HOWELL RESEARCH CENTER PASADENA CALIF

ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF TRACE
IMPURITIES IN CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: TECHNICAL DOCUMENTARY REPT. FOR JUN
62-31 MAY 65,

JUN 65 61P WILLARDSON, R. K. ISOCHA, A. J.

CONTRACT: AF33 657 8976

PROJ: 7805

TASK: 780503

MONITOR: ARL , 65-130

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, IMPURITIES),
(*CADMIUM COMPOUNDS, SULFIDES), (*MASS
SPECTROSCOPY, SEMICONDUCTORS), SPECTRUM ANALYZERS,
SPARKS, POWDERS, SINGLE CRYSTALS, CONTAMINATION,
IONIZATION POTENTIALS, ZINC ALLOYS, ZINC
COMPOUNDS, SELENIUM ALLOYS, SOLID SOLUTIONS,
CADMIUM, ZINC, CADMIUM ALLOYS (U)
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE, (U)
ZINC SELENIDE, ZINC SULFIDE

ANALYTICAL TECHNIQUES WERE DEVELOPED FOR THE
ANALYSIS OF TRACE IMPURITIES IN CADMIUM SULFIDE.
THE DETECTION LIMIT FOR MOST IMPURITIES IS LESS
THAN 10 PARTS PER BILLION (ATOMIC). MATERIALS
ANALYZED WERE IN THE FORM OF FINE POWDERS, FRAGILE
NEEDLES AND PLATELETS, AS WELL AS BULK CRYSTALS OF
CDS, CDSE, ZNS, ZNSE, CDS:CDSE,
CDS:ZNSE, CU AND ZN. THE APPROACHES USED
FOR OBTAINING ACCURATE ANALYTICAL RESULTS ARE
APPLICABLE TO MOST SOLID STATE MATERIALS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 722ZHT

AD-623 174

BROWN UNIV PROVIDENCE R I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY CLEAN METALS AND SEMICONDUCTORS. PART 1. STUDY OF CDS SURFACES BY LEED. PART 2. COMBINED LEED AND MASS SPECTROMETER MEASUREMENTS FOR ADSORPTION AND CATALYSIS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 7, 1 JAN-30 JUN 65,

JUL 65 29F FARNSWORTH, H. E. KAMBELL, B. D.

IONCHI, M. I

CONTRACT: DA28 043AMC00299E

PROJ: DA 1A0 105010010

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-623 174.

DESCRIPTORS: (*SEMICONDUCTORS, SURFACE PROPERTIES), (*CADMIUM COMPOUNDS, SULFIDES), (*NICKEL, SURFACE PROPERTIES), CRYSTAL GROWTH, PURIFICATION, ION BOMBARDMENT, HEAT TREATMENT, OXYGEN, ADSORPTION, PHOTOELECTRIC EFFECT, X-RAY DIFFRACTION ANALYSIS, CATALYSIS, CARBON COMPOUNDS, MONOXIDES, MASS SPECTROSCOPY (U)
IDENTIFIERS: CADMIUM SULFIDE, CARBON MONOXIDE (U)

THE (000/1) MATTE NATURAL GROWTH SURFACE OF A VAPOR GROWN CDS CRYSTAL WHICH HAD NOT BEEN POLISHED OR ETCHED WAS STUDIED. IT WAS NOT POSSIBLE TO OBTAIN A CLEAN SURFACE BY HEATING ALONE BECAUSE OF CONTAMINATION FROM THE BULK. ION BOMBARDMENT AND ANNEALING PRODUCED (10/1/4) PLANES AS WAS FOUND ON PREVIOUSLY STUDIED CRYSTALS. OXYGEN ADSORPTION STUDIES OF THE (000/1) MATTE SURFACE, AFTER USING GA-IN EUTECTIC TO MAKE CONTACT TO THE CRYSTAL MOUNT, WERE MADE. HOWEVER, THE MAGNITUDE OF THESE CHANGES WAS NOT REPRODUCIBLE. OXYGEN ADSORPTION STUDIES OF THE (000) SPECULAR SURFACE WITH NO GA-IN CONTACT REVEALED THAT PHOTOASSISTED ADSORPTION OCCURRED. THE CHANGE IN SURFACE POTENTIAL WAS APPROXIMATELY DIRECTLY PROPORTIONAL TO THE CHANGE IN OXYGEN COVERAGE AS ESTIMATED FROM DECREASES IN DIFFRACTION PATTERN INTENSITIES. THIS INDICATES THAT THE OXYGEN FORMS NEGATIVE SURFACE STATES. THE SYSTEM INVOLVING A COMBINATION OF LEED AND QUADRUPOLE MASS SPECTROMETER WAS ASSEMBLED AND TESTED WITH SELF OXIDATION OF CO ON A (100) NICKEL CRYSTAL SURFACE. (THE DIAGONAL MARK (1) IS HERE USED TO INDICATE THE ROTATION-INVERSION AXIS). (U)

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 363

DELAWARE UNIV NEWARK DEPT OF PHYSICS

LAYER-LIKE FIELD INHOMOGENEITIES IN HOMOGENEOUS
SEMICONDUCTORS IN THE RANGE OF 'N-SHAPED NEGATIVE
DIFFERENTIAL CONDUCTIVITY', (U)

MAR 65 12P BOER, K. W. I

CONTRACT: DA-31-124-ARO(D)-173, NONR-4J36(UD)

MONITOR: AROU, 4461:4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN THE PHYSICAL REVIEW V139
N6A PA1949-59 SEP 13 1965 (COPIES NOT AVAILABLE TO
DDC OR CLEARINGHOUSE CUSTOMERS).

DESCRIPTORS: (*SEMICONDUCTORS; FIELD THEORY),
(*TRANSPORT PROPERTIES; SEMICONDUCTORS); ELECTRIC
FIELDS; ABSORPTION SPECTRUM; ELECTRICAL CONDUCTANCE,
VOLTAGE, EXCITATION, QUENCHING (INHIBITION),
SINGLE CRYSTALS, CADMIUM COMPOUNDS, SULFIDES (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

CHARACTERISTIC LAYER-LIKE FIELD INHOMOGENEITIES ARE
SHOWN TO OCCUR IN HOMOGENEOUS SEMICONDUCTORS IF THE
DECREASE IN CONDUCTIVITY IS STRONGER THAN LINEAR WITH
INCREASING FIELD. THESE INHOMOGENEITIES ARE
DISCUSSED GENERALLY IN A MODEL USING POISSON AND
TRANSPORT EQUATIONS, AND THE FACT THAT THE NEUTRAL
DENSITY OF ELECTRONS AND/OR THE MOBILITY DECREASES
WITH INCREASING FIELD STRENGTH. THE METHOD OF
CHARACTERISTICS IS USED FOR DISCUSSION IN ORDER TO
FACILITATE ANALYSIS OF THE EXPERIMENTAL OBSERVATIONS.
FURTHER EXPERIMENTAL RESULTS ABOUT LAYER-LIKE FIELD
INHOMOGENEITIES IN CDS CONCERNING DOMAIN WIDTH
AND FIELD STRENGTHS, INFLUENCE OF OPTICAL EXCITATION
AND QUENCHING, AND NET CHARGING OF CDS CRYSTALS
ARE GIVEN AND SHOW GOOD AGREEMENT WITH THE PROPOSED
THEORY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-623 895 20/2 20/12
DELANARE UNIV NEWARK DEPT OF PHYSICS

X-RAY DAMAGE AND ANNEALING OF THESE DEFECTS IN CDS
SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 65 12P BOER, K. W. ; O'CONNELL, J. C. ;
SCHUBERT, R. ;
REPT. NO. TR-3
CONTRACT: NONR-4336(00)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SINGLE CRYSTALS, DEGRADATION),
(*CADMIUM COMPOUNDS, SULFIDES), CRYSTAL LATTICE
DEFECTS, X RAYS, ANNEALING, PHOTOCONDUCTIVITY,
ELECTRICAL PROPERTIES, ELECTRIC CURRENTS, TEST
METHODS, SEMICONDUCTORS (U)

THE INFLUENCE OF X-RAY DAMAGE AT 250 KEV AND 300
KEV IN ULTRA-HIGH VACUO ON THE SPECTRAL
DISTRIBUTION OF PHOTOCONDUCTIVITY AND CONDUCTIVITY
GLOW CURVES IS DESCRIBED. THE OBSERVED DAMAGE CAN
BE EXPLAINED BY ASSUMING A PRODUCTION OF SULFUR
VACANCIES BY X-RAYS AND A LATER DIFFUSION DETERMINED
FORMATION OF ASSOCIATES OF THESE VACANCIES WITH
ACCEPTORS RESULTING IN RECOMBINATION CENTERS. THE
THRESHOLD ENERGY FOR SULFUR VACANCY FORMATION LIES AT
ABOUT 250 KEV. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-625 476 20/12
BROWN UNIV PROVIDENCE R I METALS RESEARCH LAB

PHYSICAL RESEARCH ON PROPERTIES OF II-VI COMPOUND
SEMI CONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT., APR 62-APR 65,
JUN 65 529 ELBAUM, CHARLES ; LORD, ARTHUR
TRUPELL, RHON ;
CONTRACT: AF33(657)-8317
PROJ: AF-7385
TASK: 788503
MONITOR: ARL , 65-123

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
(*CADMIUM COMPOUNDS, SULFIDES), ULTRASONIC
PROPERTIES, ELECTRICAL PROPERTIES, MECHANICAL
WAVES, STRESSES, ULTRASONIC RADIATION, DAMPING,
HARMONIC GENERATORS, TEMPERATURE, PIEZOELECTRIC
EFFECT, ANNEALING (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

THE WORK DESCRIBED IN THIS REPORT WAS CONCERNED
PRIMARILY WITH ULTRASONIC AND ELECTRICAL MEASUREMENTS
MADE ON CADMIUM SULPHIDE SINGLE CRYSTALS FOR THE
PURPOSE OF STUDYING THE INTERACTION OF HIGH FREQUENCY
STRESS WAVES WITH CHARGE CARRIERS. THE TEMPERATURE
DEPENDENCE OF ULTRASONIC ATTENUATION, ABOVE ROOM
TEMPERATURE, WAS FOUND TO FOLLOW THE PREDICTED
DEPENDENCE ON THE DENSITY OF THERMALLY EXCITED CHARGE
CARRIERS. THE GENERATION OF THE SECOND HARMONIC OF
AN ULTRASONIC WAVE HAS BEEN STUDIED AS A FUNCTION OF
LIGHT INTENSITY (DENSITY OF CHARGE CARRIERS).
THE AMPLITUDE OF THE SECOND HARMONIC GENERALLY
INCREASES INITIALLY WITH INCREASING LIGHT INTENSITY
AND THEN REACHES A SATURATION VALUE OR BROAD MAXIMUM.
THE GENERAL BEHAVIOR OF THE SECOND HARMONIC IS
QUITE COMPLICATED AND IT CANNOT AT PRESENT BE FITTED
WITH ANY SIMPLE FORMALISM OF NONLINEAR PHENOMENA IN
SOLIDS. MEASUREMENTS OF ELECTRICAL RESISTIVITY AS
A FUNCTION OF POSITION IN THE SAMPLE AND AS A
FUNCTION OF LOCALIZED ILLUMINATION REVEAL VERY
SUBSTANTIAL INHOMOGENEITY IN RESPONSE TO LIGHT OF ALL
THE SPECIMENS STUDIED THUS FAR. THE TRANSDUCING
PROPERTIES OF CADMIUM SULPHIDE HAVE BEEN FOUND TO
DEPEND ON HEAT TREATMENT THROUGH THE FORMATION OF
SURFACE FILMS WHICH CAN BE MECHANICALLY REMOVED AND
REFORMED. (AUTHOR) (U)

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 530 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1, 1 JAN-31 MAR
62,
AFR 62 SIP SHIOZAWA, LEBO R. IBARRETT, J.
L. ICHOTKEVYS, G. P. IDEVLIN, S. S. IUGST, J. M. I
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 532.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
PURIFICATION, CRYSTAL GROWTH, CADMIUM COMPOUNDS,
SULFIDES, SELENIUM ALLOYS, CADMIUM ALLOYS, ZINC
ALLOYS, TELLURIUM ALLOYS, INTERMETALLIC COMPOUNDS,
ZONE MELTING, VAPOR PRESSURE, DIFFUSION,
ELECTRICAL PROPERTIES, CRYSTAL GROWTH (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINTELLURIDE (U)

FIRST QUARTER PROGRESS ON THE PURIFICATION, CRYSTAL
GROWTH, AND PROPERTIES OF CDS, CDSE, AND
ZNTE ARE SUMMARIZED. DIFFICULTIES WERE
ENCOUNTERED WHEN ZONE REFINING OF CDSE WAS
ATTEMPTED. THE ADVANTAGES OF USING SHAPED TUBES
FOR VAPOR-PHASE GROWTH OF CRYSTALS ARE DESCRIBED.
THE VAPOR PRESSURE OF CDSE IS DISCUSSED AND
COMPARED WITH EXPERIMENTAL DATA. THE DIFFUSION OF
CD IN CDSE WAS ANALYZED BY CONDUCTIVITY
MEASUREMENTS; AND THE DATA ARE SHOWN TO AGREE CLOSELY
WITH SIMPLE DIFFUSION THEORY. A DIFFUSION CONSTANT
OF 5.41×10^{-10} TO THE MINUS 10TH POWER SQ CM/SEC IS
OBTAINED FOR A CRYSTAL TEMPERATURE OF 1000C. THE
TEMPERATURE DEPENDENCE OF THE CARRIER MOBILITY SHOWS
THAT THE DOMINANT LATTICE SCATTERING IN CDSE AND
ZNTE IS DUE TO OPTICAL MODES AS IN CDS. THE
MOBILITY OF THE CARRIERS IN N-TYPE CDSE AND P-
TYPE ZNTE IS 5300 SQ CM/VOLT SEC AND 2550 SQ CM/
VOLT SEC RESPECTIVELY AT 79K IN THE PARTICULAR
CRYSTALS MEASURED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 532 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2, 1 APR-30 JUN
62.

AUG 62 33P SHIOZAWA, LEBO R.; JOST, J. M.;
DEVLIN, S.; CHOTKEVYS, G. P.; BARRETT, J. L.;
CONTRACT: AF33(697)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 530.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
CADMIUM ALLOYS, SELENIUM ALLOYS, PHASE STUDIES,
CADMIUM COMPOUNDS, SULFIDES, ZINC ALLOYS,
TELLURIUM ALLOYS, VAPOR PRESSURE, DIFFUSION,
THERMAL EXPANSION, ELECTRICAL PROPERTIES, SOUND
TRANSMISSION, OPTICAL PROPERTIES, COLORS, HEAT
OF SUBLIMATION, ENTROPY, HEAT OF ACTIVATION,
ELASTICITY, INTERMETALLIC COMPOUNDS, CRYSTAL
GROWTH (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINC TELLURIDE (U)

EFFORTS IN THE SECOND QUARTER CONTINUE TO
EMPHASIZE PHASE EQUILIBRIA IN THE SYSTEM CD:SE.
THE VAPOR PRESSURE OF CDSE DETERMINED BY A FREE
SUBLIMATION METHOD IN THE TEMPERATURE RANGE 972 TO
1247°C YIELDED A STANDARD HEAT AND ENTROPY OF
SUBLIMATION OF 87 KCAL/MOLE AND 53 CAL/MOLE/K
RESPECTIVELY. THE TEMPERATURE-PRESSURE PROJECTION
OF THE SE-RICH PORTION OF THE CD:SE PHASE
DIAGRAM WAS APPROXIMATELY DEFINED. NEW DIFFUSION
MEASUREMENTS AT 1052 AND 1100°C GIVE AN ACTIVATION
ENERGY FOR DIFFUSION OF CD DONORS IN CDSE OF 88
KCAL/MOLE, AND A PRE-EXPONENTIAL TERM OF 900,000 SQ
CM /SEC. THERMAL EXPANSION COEFFICIENTS FOR
ZNTL, CDSE, AND CDSE WERE DETERMINED IN
THE RANGE 0 - 300°C. A COMPLETE SET OF ELASTIC,
PIEZO-ELECTRIC, AND DIELECTRIC CONSTANTS OF ZNSE
WERE OBTAINED AND ARE FOUND TO BE INTERMEDIATE IN
VALUE BETWEEN THOSE OF ZNS AND ZNTL. THE
VELOCITY OF SOUND IN CDSE AND CDS CALCULATED
FROM ELASTIC CONSTANTS ARE FOUND TO BE IN GOOD
AGREEMENT WITH DIRECT PULSE-ECHO MEASUREMENTS. THE
CRITICAL FIELD FOR SOUND AMPLIFICATION IN CDS AND
CDSE FOR DIFFERENT MODES OF WAVE PROPAGATION ARE
TABULATED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 533 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 JUL-30 SEP
62.

NOV 62 23P SHIOZAWA,LEBO ;JUST,J. M. ;
DEVLIN,S. S. ;CHOTKEVYS,G. P.;BARRETT,J. L. ;
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 532.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
CADMIUM ALLOYS, SELENIUM ALLOYS, CADMIUM COMPOUNDS,
SULFIDES, ZINC ALLOYS, TELLURIUM ALLOYS,
INTERMETALLIC COMPOUNDS, VAPOR PRESSURE, HEAT OF
SUBLIMATION, ENTROPY, PHASE STUDIES, DIFFUSION,
THERMAL EXPANSION, ELECTRICAL PROPERTIES,
ELASTICITY, IONIZATION, CRYSTAL GROWTH,
CRYOGENICS (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINCTELLURIDE (U)

NEW DATA ON THE TEMPERATURE DEPENDENCE OF THE VAPOR
PRESSURE OF CDSE, DETERMINED BY A FREE-
SUBLIMATION METHOD, YIELDED IMPROVED VALUES FOR THE
STANDARD HEAT AND ENTROPY OF SUBLIMATION OF 84 KCAL/
MOLE AND 51 CAL/MOLE/K RESPECTIVELY. THE
PRESSURE-TEMPERATURE PROJECTION OF THE CD-RICH
PORTION OF THE CD:SE PHASE DIAGRAM HAS
ESTABLISHED BY OBSERVING THE STATE OF CDSE
CRYSTALS SUBJECTED TO KNOWN TEMPERATURES AND CD-
PRESSURES. THE MAXIMUM CD-PRESSURE WITH WHICH
SOLID CDSE CAN BE IN EQUILIBRIUM IS 16.6 ATM.
THIS OCCURS AT A CRYSTAL TEMPERATURE OF 1145C.
THE DIFFUSION CONSTANT OF CD IN CDSE WAS FOUND
TO BE 4.4×10 TO THE 11TH POWER SQ CM /SEC AT 904C.
THIS IS IN APPROXIMATE AGREEMENT WITH EARLIER
MEASUREMENTS. THE THERMAL EXPANSION COEFFICIENTS OF
CDSE AND CDSE PARALLEL TO C WERE FOUND TO BE
APPROXIMATELY 60% OF THOSE PERPENDICULAR TO C. A
COMPLETE SET OF ELASTIC, DIELECTRIC, AND
PIEZOELECTRIC CONSTANTS OF CDSE AT 77K WERE
ESTABLISHED. ANALYSIS OF HALL EFFECT
MEASUREMENTS ON ZNTE YIELDS A HOLE EFFECTIVE MASS
OF 0.60 = 0.58M AND AN ACCEPTOR IONIZATION ENERGY OF
0.155 EV. A HYDROGENIC ACCEPTOR LEVEL AT
APPROXIMATELY 0.05 EV WAS ALSO FOUND. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 534 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4, 1 OCT-31 DEC
62,
FEB 63 35P SHIOZAWA, L. R. ; JOST, J. M. ;
DEVLIN, S. S. ; CHOTKEVYS, G. P. ; BARRETT, J. L. ;

CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 533.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
SELENIUM ALLOYS, CADMIUM ALLOYS, CADMIUM COMPOUNDS,
SULFIDES, ZINC ALLOYS, TELLURIUM ALLOYS,
INTERMETALLIC COMPOUNDS, CRYSTAL GROWTH,
EMISSIVITY, CRYSTAL LATTICE DEFECTS, THERMAL
EXPANSION, DIFFUSION, HEAT TREATMENT, HALL
EFFECT, PURIFICATION, CRYOGENICS, LUMINESCENCE (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINC TELLURIDE (U)

FOURTH QUARTER PROGRESS IN THE PREPARATION AND
PROPERTIES OF II-VI COMPOUNDS IS SUMMARIZED.
VAPOR PHASE GROWTH ON LARGE AREA SEED CRYSTALS WERE
ATTEMPTED AND RESULTS ARE ENCOURAGING. A
DIFFUSION-PRECIPITATION PROCESS INVOLVING CD
INTERSTITIALS AND SE VACANCIES IS DEVELOPED TO
EXPLAIN RESISTIVITY PROFILES THAT RESULT FROM HEAT
TREATMENTS IN ELEMENTAL VAPORS. LIGHT EMISSION
FROM CDS JUNCTIONS AT 77K BY HOLE INJECTION WAS
ACHIEVED AND ELEMENTARY DESIGN CONSIDERATIONS ON
ACHIEVING COHERENT EMISSION ARE DISCUSSED. THE
FIRST PHOTOGRAPH OF IMPERFECTIONS IN CDS TAKEN BY
AN X-RAY DIFFRACTION TECHNIQUE ARE SHOWN AND
DISCUSSED. NEW MEASUREMENTS INCLUDE THE THERMAL
EXPANSION OF CDS AND CDSE PARALLEL TO C, AND
THE ENERGY GAPS AND LATTICE CONSTANTS OF
ZNSEZNTI MIXED CRYSTALS. A THEORETICAL
ANALYSIS OF THE TEMPERATURE DEPENDENCE OF HALL
CARRIER CONCENTRATION LEADS TO A SET OF LINEARIZED
EQUATIONS WHICH INCLUDES AS A VARIABLE A TEMPERATURE
DEPENDENT HALL FACTOR $R = \eta E R$. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 535 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 5, 1 JAN-31 MAR
63,
MAY 63 28P SHIOZAWA, L. R. ; JOST, J. M. ;
DEVLIN, S. S. ; CHOTKEVYS, G. P. ; BARRETT, J. L. ;

CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 534.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,
SELENIUM ALLOYS, ZINC ALLOYS, CRYSTAL GROWTH,
EPITAXIAL GROWTH, TWINNING (CRYSTALLOGRAPHY),
CRYSTAL STRUCTURE, IMPURITIES, PHASE STUDIES,
INTERMETALLIC COMPOUNDS, SOLID SOLUTIONS,
SURFACE PROPERTIES, ETCHING, HALL EFFECT, VAPOR
PRESSURE, LUMINESCENCE, CRYOGENICS (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINCSELENIUM (U)

IN THE FIFTH QUARTER, EPITAXIAL GROWTH ON
LARGE-AREA SEED CRYSTALS OF CDS WAS ACHIEVED FOR
THE FIRST TIME. IMPROVEMENTS WERE MADE IN THE
VERTICAL TUBE METHOD OF CRYSTAL GROWTH.
RADIOISOTOPIC STUDIES OF THE SEGREGATION OF
IMPURITIES DURING SINTERING AND CRYSTAL GROWTH HAVE
BEGUN. THE SIMILARITY OF THE STRUCTURE OF TWINS IN
CUBIC II-VI CRYSTALS AND IN ANNEALED METALS LEADS
TO THE HYPOTHESIS THAT THEY HAVE IDENTICAL ORIGINS.
TWINNING OCCURS DURING GRAIN GROWTH WHENEVER A NET
DECREASE IN INTERFACIAL ENERGY RESULTS. THE
MINIMUM VAPOR PRESSURE OF CDSE MEASURED IN THIS
LABORATORY IS COMPARED WITH THOSE MEASURED IN THREE
OTHER LABORATORIES AND LEADS TO WHAT IS NOW BELIEVED
TO BE FIRM VALUES FOR THIS QUANTITY. IMPROVED DATA
ON THREE-PHASE EQUILIBRIA IN THE SYSTEM CDSE ARE
PRESENTED. LATTICE CONSTANT MEASUREMENTS IN THE
SYSTEM CDSE:ZNSE INDICATE A WURTZITE-
SPHALERITE TRANSITION IN THE VICINITY OF 50 MOLE %
AND ALSO AN IMMISCIBILITY DOME WITHIN THE SOLID-
SOLUBILITY FIELD OF THE PHASE DIAGRAM. A CONSOLUTE
TEMPERATURE OF 1030C IS ESTIMATED. THE (0001)
SURFACE OF CDS IS SHOWN TO ETCH IN 6N HCL
ABOUT 50% FASTER THAN THE (1001) SURFACE.
(AUTHOR) 146 (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 536 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 6, 1 APR-JUN
63.

AUG 63 46P SHIOZAWA, L. R. ; JOST, J. M. ;
CHOTKEVYS, G. P. ; DEVLIN, S. S. ; BARRETT, J. L. ;
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 535.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,
SELENIUM ALLOYS, ZINC ALLOYS, TELLURIUM ALLOYS,
INTERMETALLIC COMPOUNDS, PURIFICATION,
RADIOACTIVATION ANALYSIS, LUMINESCENCE,
REFRACTIVE INDEX, OPTICAL PROPERTIES, EPITAXIAL
GROWTH, ELECTRON OPTICS, TRANSDUCERS, DELAY LINES,
DOPING (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINTELLURIDE (U)

EPITAXIAL GROWTH OF CDS AND CDSE FROM THE
VAPOR PHASE WAS EXAMINED BY DIRECT VISUAL
OBSERVATIONS. THE RELATIVE EASE WITH WHICH LARGE
CRYSTALS WERE PRODUCED INDICATES THAT THIS SHOULD
SOON BECOME THE PREFERRED METHOD OF GROWTH.
RADIOISOTOPIC STUDIES, CARRIED OUT IN NEWLY
DESIGNED MINIATURE GROWTH FURNACES, SHOW THAT IN¹¹⁴
ACCUMULATES IN THE SUPPLY WHICH LEADS TO
CONCENTRATION GRADIENTS IN THE SUBLIMED CRYSTALS.
CRYSTAL COLOR AND LOWTEMPERATURE FLUORESCENCE ARE
CORRELATED WITH IN¹¹⁴ CONCENTRATION. NEW
MEASUREMENTS ON INJECTION LUMINESCENCE FROM FORWARD
BIASED CDS CELLS AT 7°K YIELD: SOURCE
BRIGHTNESS APPROXIMATELY 0.01 WATTS/SQ CM, POWER
EFFICIENCY ≈ 10 TO THE MINUS 8TH POWER TO 0.0001
RISING RAPIDLY WITH VOLTAGE, RISE TIME < 0.2
MICROSEC, DECAY TIME APPROXIMATELY/MICRO SEC AND
POLARIZATION E PERPENDICULAR TO C $> 90\%$.
REFRACTIVE INDEX MEASUREMENTS (BAND EDGE TO 1.5
MICROS YIELD LONG-WAVELENGT. OPTICAL DIELECTRIC
CONSTANTS OF 7.26 ± 0.03 FOR ZNTE AND $5.96 \pm$
 0.02 (E PERPENDICULAR TO C) AND 6.05 ± 0.02
(E PARALLEL TO C) FOR CDSE. ELECTRO-OPTIC
COEFFICIENTS (R SUB 13 -R SUB 33) AND R SUB 51
FOR CDS WERE DETERMINED AS 4×10 TO THE MINUS 12TH
POWER AND 3.7×10 TO THE MINUS 12TH POWER M/V.

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 537 2U/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 7, 1 JUL-30 SEP
63,

DEC 63 61P SHIOZAWA, L. R. ; JOSE, J. H. ;
DEVLIN, D. S. ; CHUTKEVYS, G. P. ;
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 536.

DESCRIPTORS: (SEMICONDUCTORS, SOLID STATE PHYSICS),
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,
SELENIUM ALLOYS, ZINC ALLOYS, TELLURIUM ALLOYS,
INTERMETALLIC COMPOUNDS, PURIFICATION,
SUBLIMATION, CRYSTAL GROWTH, REFRACTIVE INDEX,
OPTICAL PROPERTIES, LUMINESCENCE, ABSORPTION,
TRANSPORT PROPERTIES, TRANSDUCERS, DELAY LINES,
INFRARED RADIATION, CRYOGENICS (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINC TELLURIDE (U)

THE SEPARATION OF RADIOACTIVE AG DURING
SUBLIMATION OF CDS AND CDSE WAS INVESTIGATED
AND EFFECTIVE DISTRIBUTION COEFFICIENTS OF 0.6 AND
0.15, RESPECTIVELY, ARE ESTIMATED. TRIAL RUNS IN A
NEW, TRAVELLING-HOT-ZONE FURNACE SHOW THAT LARGE,
SEED-ORIENTED, CRYSTALS OF CDSE CAN BE
SUCCESSFULLY GROWN. AN ANALYSIS OF PRECIPITATION
MECHANISMS IN II-VI CRYSTALS LEADS TO THE
CONCLUSION THAT PRECIPITATION OF VACANCIES IS
REQUIRED IN ALL CASES. NEW MEASUREMENTS OF THE
REFRACTIVE INDICES OF CDS (BAND EDGE TO 1.4
MICRONS) YIELD LONG-WAVE OPTICAL DIELECTRIC
CONSTANTS OF 5.16 ± 0.02 FOR E PERPENDICULAR TO
C AND 5.23 ± 0.02 FOR E PARALLEL TO C.
BIREFRINGENCE DATA FOR CDS AND CDSE ARE
COMPARED WITH THE RESULTS OF OTHERS. MEASUREMENTS
ON INJECTION LUMINESCENCE IN CDS DIODES SHOW THAT
THE GREEN EMISSION AT 77K PEAKS AT 5194A AND HAS
A HALFWIDTH OF 150A. A RED BAND AT APPROXIMATELY
6500A IS ALSO NOTED. PULSE MEASUREMENTS INDICATE
A 0.2 MICROSEC DELAY BETWEEN THE START OF EXCITATION
AND THE ONSET OF EMISSION. SOME MEASUREMENTS AT
4.2K ARE ALSO DESCRIBED. THE EXPRESSIONS FOR THE
TRANSPORT PROPERTIES, APPLICABLE WHEN MORE THAN ONE
SCATTERING MECHANISM IS PRESENT, ARE OBTAINED IN THE
RELAXATION TIME APPROXIMATION. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-626 538 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 8, 1 OCT-31 DEC
63,
MAR 64 32P SHIOZAWA, L. R. IJOST, J. M. I
DEVLIN, S. S. BROUDY, R. M. I
CONTRACT: AF33(657)-7399
PROJ: 302860

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 537.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
SELENIUM ALLOYS, CADMIUM ALLOYS, CADMIUM COMPOUNDS,
SULFIDES, ZINC ALLOYS, TELLURIUM ALLOYS,
INTERMETALLIC COMPOUNDS, CRYSTAL GROWTH,
DEFORMATION, CRYSTAL LATTICE DEFECTS, PHASE
STUDIES, SCATTERING, LUMINESCENCE, TRANSPORT
PROPERTIES (U)
IDENTIFIERS: CADMIUM SULFIDES, CADMIUM SELENIDE,
ZINC TELLURIDE (U)

VAPOR-PHASE GROWTH ON ORIENTED SEED CRYSTALS WAS
EMPHASIZED IN THE EIGHTH QUARTER. A NOTEWORTHY
ACCOMPLISHMENT WAS THE GROWTH OF A LARGE TWIN-FREE
ZNTI CRYSTAL BY THIS METHOD. PLASTIC
DEFORMATION OF CDS CRYSTALS BY THREE-POINT
BENDING WAS INITIATED IN THIS QUARTER. EARLY
RESULTS INDICATE THAT SLIP OCCURS ON (1010) AND
(1120) PLANES AND THAT THE SLIP DIRECTION IS
(1120). RAPID DEFORMATION OCCURS ABOVE 700C;
AND THE CRITICAL RESOLVED SHEAR STRESS IS ESTIMATED
TO BE 0.3 KG/SQ MM. THE SYSTEM CDSE-ZNSE
WAS INVESTIGATED AND COMPLETE SOLID MISCIBILITY IS
SHOWN TO EXIST BETWEEN 900 AND 1200C. THE SYSTEM
ZNS-ZNTI WAS ALSO INVESTIGATED AND A
PLAUSIBLE PHASE DIAGRAM IS DERIVED FROM THE X-RAY
RESULTS. THE VARIATIONAL METHOD OF SOLVING THE
BOLTZMANN EQUATION WAS EXTENDED TO COVER MORE THAN
ONE SCATTERING MECHANISM. DETAILED RESULTS ARE
PRESENTED FOR MIXTURES OF OPTICAL MODE AND
PIEZOELECTRIC SCATTERING. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 539 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 9, 1 JAN-31 MAR
64,
MAY 64 28P SHIOZAWA, L. R. IDEVLIN, S. S.
POST, J. M. 1
CONTRACT: AF33(657)-7399
PROJ: 302860

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 538.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
CADMIUM COMPOUNDS, CADMIUM ALLOYS, SULFIDES,
SELENIUM ALLOYS, ZINC ALLOYS, TELLURIUM ALLOYS,
INTERMETALLIC COMPOUNDS, CRYSTAL GROWTH,
IMPURITIES, EPITAXIAL GROWTH, SINGLE CRYSTALS,
DEFORMATION, LUMINESCENCE, TRANSPORT PROPERTIES,
CRYSTAL LATTICE DEFECTS (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINCTELLURIDE (U)

EXPERIMENTAL WORK IN THE NINTH QUARTER
CONTINUED TO EMPHASIZE VAPOR-PHASE CRYSTAL GROWTH ON
ORIENTED SEED CRYSTALS OF CDS. THE EFFECTS OF
INERT GAS AND NONSTOICHIOMETRIC VAPOR IN THE GROWTH
TUBE ARE EXAMINED. A POSSIBLE ORIGIN OF SMALL-ANGLE
BOUNDARIES IS DISCUSSED IN TERMS OF DISLOCATIONS
RESULTING FROM VACANCY PRECIPITATION DURING GROWTH.
A NEWLY RECOGNIZED MODE OF CRYSTAL CONTAMINATION
INVOLVING VAPOR TRANSPORT AGENTS IS DISCUSSED.
SPECIFIC EXAMPLES OF EPITAXIAL GROWTH EXPERIMENTS
AND SOME OF THE DIFFICULTIES ENCOUNTERED ARE
PRESENTED. THE INTRINSIC MOBILITY OF CDS,
CDSE AND ZNTE WAS CALCULATED USING A
VARIATIONAL METHOD AND THE RESULTS COMPARED WITH
EXPERIMENT. THE AGREEMENT WAS EXCELLENT.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 540 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 10, 1 APR-JO JUN
64,
AUG 64 41P SHIOZAWA, L. R. DEVLIN, S. S.
; JOST, J. M. ;
CONTRACT: AF33(657)-7399
PROJ: 302860

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 539.

DESCRIPTORS: (•SEMICONDUCTORS, SOLID STATE PHYSICS),
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,
SELENIUM ALLOYS, ZINC ALLOYS, TELLURIUM ALLOYS,
INTERMETALLIC COMPOUNDS, CRYSTAL GROWTH,
DEFORMATION, CRYSTAL LATTICE DEFECTS, ELECTRICAL
PROPERTIES, DOPING, HARDNESS, TRANSPORT
PROPERTIES, EPITAXIAL GROWTH, ANISOTROPY,
LITHIUM, SODIUM, OPTICAL PROPERTIES (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINTELLURIDE (U)

EXPERIMENTAL VAPOR PHASE GROWTH OF CDS ON
ORIENTED SEEDS HAS RESULTED IN A BETTER UNDERSTANDING
OF INITIATING SEED GROWTH. THE HEAT BALANCE AT THE
SEED, DETERMINED MAINLY BY RADIATION, IS THE MOST
IMPORTANT FACTOR AFFECTING THE TEMPERATURE OF THE
GROWTH SURFACE. THE ELECTRICAL PROPERTIES OF
CDS ARE GREATLY MODIFIED BY PLASTIC DEFORMATION
DUE MAINLY TO THE EFFECT OF DISLOCATION CLIMB.
KNOOP MICROHARDNESS TESTS HAVE SHOWN HARDNESS
ANISOTROPIES ON THE DIFFERENT SURFACES OF CDS, IN
COMPARING BOTH SIMILAR DIRECTIONS ON DIFFERENT
SURFACES AND DIFFERENT DIRECTIONS ON THE SAME
SURFACE. ELECTROELASTIC MEASUREMENTS HAVE BEEN
MADE ON LI- AND NA-DOPED CDS CRYSTALS WITH
SOME UNACCOUNTABLE RESULTS. THE ANISOTROPIES OF
THE MOBILITY AND HALL EFFECT IN SEMICONDUCTORS WITH
SLIGHTLY ELLIPTICAL BANDS AND OPTICAL MODE SCATTERING
WERE CALCULATED UNDER VERY RESTRICTIVE ASSUMPTIONS.
THE NUMERICAL VALUES ARE NOT SIGNIFICANT BUT THE
EXPLICIT TEMPERATURE DEPENDENCE OF THE ANISOTROPIES
IS OF INTEREST. THE MOBILITY OF SEVERAL SAMPLES OF
CDS AND CDSE WERE FITTED TO THE THEORY TAKING
INTO ACCOUNT ALL SCATTERING MECHANISMS. THE FIT
WAS USED TO DETERMINE THE IMPURITY CONCENTRATIONS.
(AUTHOR)

151

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 595 7/4 20/12
IIT RESEARCH INST CHICAGO ILL

OPTICAL VIBRATION SPECTRA OF SOLIDS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 14 JAN 63-13 MAY 65,
AUG 65 232P MITRA, SHASHANKA S. ;
REPT. NO. IITRI-A6019
CONTRACT: AF19(628)-2418
PROJ: AF-5621
TASK: 562105
MONITOR: AFCHL , 65-828

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INFRARED SPECTROSCOPY, SOLIDS),
(*RAMAN SPECTROSCOPY, SOLIDS), (*ULTRAVIOLET
SPECTROSCOPY, SOLIDS), (*SEMICONDUCTORS,
PHONONS), CADMIUM COMPOUNDS, ZINC COMPOUNDS,
BORON COMPOUNDS, NICKEL COMPOUNDS, COBALT
COMPOUNDS, MANGANESE COMPOUNDS, ALUMINUM COMPOUNDS,
MAGNESIUM COMPOUNDS, COPPER COMPOUNDS, OXIDES,
SULFIDES, NITRIDES, HYDROXIDES, ALKALI METAL
COMPOUNDS, HALIDES, CRYSTALS, CRYSTAL LATTICE
DEFECTS, ABSORPTION SPECTRUM

(U)

THE INFRARED REFLECTION AND/OR TRANSMISSION SPECTRA
OF CDS, ZNS, ZNO, BN, NIO, COO, AND
THEIR MIXED CRYSTALS, MNO, AL₂O₃, MG(OH)₂
AND CU₂S ARE REPORTED AT ONE OR MORE
TEMPERATURES. THE RAMAN SPECTRUM OF ZNO IS
ALSO REPORTED. THE EXPERIMENTAL INVESTIGATIONS
ALSO INCLUDED THE STUDY OF CRYSTAL FIELD SPECTRA OF
NI(2+), CO(2+) AND MN(2+) IN THEIR
RESPECTIVE MONOXIDES. THE INFRARED AND THE
ULTRAVIOLET ABSORPTION BY U-CENTERS IN ALKALI
HALIDES WAS STUDIED AND INTERPRETED IN TERMS OF
LOCALIZED VIBRATIONAL MODES OF THE IMPURITY CENTERS.
THEORETICAL INVESTIGATIONS INCLUDE DISCUSSIONS ON:
(I) THE TRENDS IN THE CHARACTERISTIC PHONON
FREQUENCIES OF THE II-VI COMPOUNDS, (II) THE
ASSIGNMENT OF THE MULTIPHONON INFRARED ABSORPTION IN
GAAS USING THE SPACE GROUP SELECTION RULES,
(III) THE VALIDITY OF THE LYDDANESACHS-
TELLER RELATIONSHIP AT LONG WAVELENGTHS, (IV)
THE COMBINATION OF THE LATTICE MODES WITH THE
INTERNAL MODES IN A CRYSTAL CONTAINING POLYATOMIC
GROUPS, AND (V) THE GRUNEISEN PARAMETER FOR
LONG WAVELENGTH OPTICAL MODES IN IONIC CRYSTALS.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-626 734 20/12 20/3 20/6
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND
APPLIED PHYSICS

HIGH PRESSURE RESEARCH.

(U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 36 ON HIGH
PRESSURE,

AUG 65 14P ZALLEN, RICHARD ;
CONTRACT: NONR-1866(10)

UNCLASSIFIED REPORT

DESCRIPTORS: (*HIGH-PRESSURE RESEARCH,
SEMICONDUCTORS), (*SEMICONDUCTORS, HIGH-PRESSURE
RESEARCH), (*METALS, HIGH-PRESSURE RESEARCH),
OPTICAL PROPERTIES, ELECTRICAL PROPERTIES, LEAD
COMPOUNDS, TIN, REFLECTIVITY, ELECTRON SPIN
RESONANCE, TRANSITION ELEMENTS, OXIDES, NICKEL
COMPOUNDS, SPECTRUM ANALYZERS, MAGNETO-OPTIC
EFFECT, FILMS, GERMANIUM, SULFIDES, CADMIUM
ALLOYS, MERCURY ALLOYS, TELLURIUM ALLOYS, BAND
THEORY OF SOLIDS, DIODES(SEMICONDUCTOR)
IDENTIFIERS: THIN FILMS

(U)
(M)

WORK IS SUMMARIZED ON THE FOLLOWING TOPICS:
OPTICAL AND ELECTRICAL PROPERTIES OF THE LEAD SALTS
UNDER PRESSURE; ELECTRICAL PROPERTIES OF GRAY TIN
AS A FUNCTION OF PRESSURE; EFFECT OF PRESSURE ON
REFLECTIVITY SPECTRA; SPIN RESONANCE MEASUREMENTS
ON SEMICONDUCTORS; PROPERTIES OF THE TRANSITION
METAL OXIDES; RATIO TYPE SPECTROMETER FOR THE
MEASUREMENT OF SMALL INCREMENTS IN ABSORPTION
COEFFICIENTS; SEMICONDUCTING PROPERTIES OF
FURSTERITE; FARADAY ROTATION IN SEMICONDUCTORS;
OPTICAL PROPERTIES OF SEMICONDUCTOR THIN FILMS;
BAND STRUCTURE OF GALLIUM ANTIMONIDE; INFRARED
SHIFT OF THE EMISSION OF LEAD SALT DIODES WITH
PRESSURE.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-627 381 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON II-VI COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 11, 1 JUL-30 SEP
64,
NOV 64 25P SHIOZAWA, L. K.; JOSE, J. M. ;
DEVLIN, D. S. ;
CONTRACT: AF33(657)-7399

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-626 540.

DESCRIPTORS: (*SEMICONDUCTORS, SOLID STATE PHYSICS),
CADMIUM COMPOUNDS, SULFIDES, CADMIUM ALLOYS,
SELENIUM ALLOYS, PURIFICATION, IMPURITIES,
SINGLE CRYSTALS, SILICON COMPOUNDS, DIOXIDES,
CRYSTAL LATTICE DEFECTS, LUMINESCENCE, HALL
EFFECT, THERMAL CONDUCTIVITY, CRYOGENICS (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE (U)

PURIFICATION OF CDS BY VACUUM SUBLIMATION HAS
RESULTED IN MORE CONSISTANT YIELDS OF BRIGHT YELLOW
SINGLE CRYSTALS HAVING NEAR INTRINSIC LOW-TEMPERATURE
ELECTRON MOBILITY. THE LOW-ANGLE GRAIN-BOUNDARIES
PRESENT IN SEED-GROWN CRYSTALS WAS TRACED TO SURFACE
DAMAGE ON THE SEEDS. DEEP ETCHING OF SEEDS HAS
ELIMINATED THIS PROBLEM. EFFORTS TO REDUCE THE
AMOUNT OF SiO₂ INCLUSION HAVE RESULTED IN ONLY
MINOR IMPROVEMENTS. THE FORMATION OF SCREW
DISLOCATIONS WAS TRACED TO THE SiO₂ PARTICLES.
THE THERMALLY STIMULATED 'TAP EFFECT' IN CDS
WAS INVESTIGATED AND IS SHOWN TO BE AN
ELECTROLUMINESCENT EFFECT WHICH RESULTS FROM THE
PYROELECTRIC NATURE OF CDS. ROOM TEMPERATURE
EDGE EMISSION IN CDS WAS OBTAINED WHEN A CRYSTAL
CONTAINED IN AN EVACUATED TUBE WAS EXCITED BY A HIGH
VOLTAGE, HIGH FREQUENCY DISCHARGE ON THE OUTSIDE OF
THE TUBES. THE EXPERIMENTAL HALL MOBILITY OF
CDS₆ IS COMPARED WITH THE COMPLETE THEORY AND
RESULTS INDICATE THAT THESE CRYSTALS ARE ONLY WEAKLY
COMPENSATED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-627 426 20/6 9/1 9/5
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y ELECTRONIC TUBE
DIV

APPLICATION OF LIGHT AND IMAGE INTENSIFICATION. (U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL ENGINEERING REPT. NO.
27, 1-30 SEP 65,
OCT 65 IUP FOWLIS, D. C. ; HARDER, R. D. ;
SZEPESI, Z. ;
CONTRACT: N61339-1440

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-620 318.

DESCRIPTORS: (*IMAGE INTENSIFIERS(ELECTRONICS),
PREPARATION), (*PHOTOELECTRIC MATERIALS, IMAGE
INTENSIFIERS(ELECTRONICS)), LUMINESCENCE,
PHOTOCONDUCTIVITY, CADMIUM ALLOYS, SELENIUM
ALLOYS, ZINC COMPOUNDS, SULFIDES, CADMIUM
COMPOUNDS, POWDERS, FILMS, SINTERING, SANDWICH
PANELS, GAIN (U)

IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE (U)

SEVERAL 6 IN X 6 IN SIZE LOW RESOLUTION TYPE IMAGE
INTENSIFIER PANELS WERE FABRICATED. THE PANELS
COULD BE CLASSIFIED IN TWO GROUPS: (1) HIGH
GAIN-SLOW PANELS WITH STANDARD LUMINOUS GAINS OF
SEVERAL HUNDRED; (2) LOW GAINFAST PANELS WITH
GAINS IN THE ORDER OF TEN. PANELS OF THE LAST
GROUP HAD DECAY TIME CONSTANTS LOWER THAN 20
MILLISECONDS AND PROVED TO BE ACCEPTABLE FOR MOVIE
FILM PROJECTION DISPLAY. THE FABRICATION OF
DOUBLE-LAYER CDS-CDSE PANELS WAS
UNSUCCESSFUL. SOME IMAGE INTENSIFIER PANELS WERE
CONSTRUCTED USING THE EVAPORATED EI FILMS
SANDWICHED WITH CDS PC POWDER EMBEDDED IN EPOXY
RESIN. THE MAXIMUM RESOLUTION OF THESE PANELS WAS
250 LINES/INCH, AND THE MAXIMUM GAIN WAS AROUND TEN.
A VERY DISTURBING NONUNIFORMITY EXISTS ON THESE
PANELS WHICH HAS TO BE ELIMINATED BEFORE ANY
PRACTICAL USE CAN BE MADE OF THEM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-628 453 20/12 20/2 20/6
DELAWARE UNIV NEWARK DEPT OF PHYSICS

HIGH AMPLITUDE CURRENT AND OPTICAL TRANSMISSION
OSCILLATIONS IN CDS SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
FEB 66 9P WARD, JOSEPH J. ;
REPT. NO. TR-5,
CONTRACT: DA-31-124-ARO(D)-173,
MONITOR: AROD , 4461:5

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, ELECTRIC CURRENTS),
(*CADMIUM COMPOUNDS, SULFIDES), (*SINGLE CRYSTALS,
OPTICAL PROPERTIES), ELECTRIC FIELDS MODULATION,
ILLUMINATION, LIGHT TRANSMISSION,
PHOTOCONDUCTIVITY, MONOCHROMATIC LIGHT,
INTENSITY, VOLTAGE, OSCILLATION, TEMPERATURE. (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

LOW FREQUENCY CURRENT OSCILLATIONS WITH CURRENT
MODULATION OF TWO ORDERS OF MAGNITUDE OR MORE HAVE
BEEN OBSERVED IN CDS SINGLE CRYSTAL PLATELETS
UNDER CONDITIONS OF HIGH ELECTRIC FIELD AND
ILLUMINATION WITH MONOCHROMATIC LIGHT NEAR THE
FUNDAMENTAL ABSORPTION EDGE. THE OBSERVED
FREQUENCIES OF OSCILLATIONS WERE IN THE RANGE FROM
0.1 TO 5.0 CPS, INCREASING WITH INCREASING LIGHT
INTENSITY AND VOLTAGE. FOR MOST CRYSTALS THE
TEMPERATURE OF MAXIMUM PHOTOCONDUCTIVITY OCCURRED AT
APPROXIMATELY 130K. OSCILLATIONS FOR THESE
CRYSTALS WERE OBSERVED ONLY IF THE TEMPERATURE
WITHOUT FIELD WAS BELOW 120K. ONLY CERTAIN KINDS
OF CRYSTALS EXHIBITED THE ABOVE DESCRIBED
OSCILLATIONS. BESIDES THE TEMPERATURE DEPENDENCE
OF THE PHOTOCONDUCTIVITY, THESE CRYSTALS SHOW A
PRONOUNCED THERMALLY STIMULATED CURRENT
(CONDUCTIVITY GLOW)-PEAK AT 280K, AND THOSE
WHICH OSCILLATE ONLY AT THE LOWER TEMPERATURE SHOW
ANOTHER PEAK AT 140K. (EXTRACTED) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-628 770 20/12 9/1
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND
DEVELOPMENT CENTER

NEW SOLID-STATE DEVICE CONCEPTS. (U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT.,
DEC 65 42P AVEN. M. HALL, R. N. ROSENBERG,
L. M. WOODBURY, H. H. I
REPT. NO. SCIENTIFIC-3,65-GC-0319
CONTRACT: AF 19(628)-4976,
PROJ: AF-4608,
TASK: 460805,
MONITOR: AFCL , 65-896

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD 621 941.

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, MATERIALS),
(*LASERS, SEMICONDUCTOR DEVICES), SEMICONDUCTORS,
GALLIUM COMPOUNDS, SULFIDES, DOPING, SELENIUM,
DIFFUSION, TRACER STUDIES, ZINC ALLOYS, SELENIUM
ALLOYS, TELLURIUM ALLOYS, TRANSPORT PROPERTIES,
ELECTROLUMINESCENCE, SEMICONDUCTING FILMS, GALLIUM
ALLOYS, ARSENIC ALLOYS, OPTICAL PROPERTIES,
ELECTRONIC SWITCHING, DIODES (SEMICONDUCTOR) (U)
IDENTIFIERS: THIN FILMS (M)

DATA ON THE DIFFUSION OF SE INTO CDS AS
FUNCTIONS OF TIME AND SULFUR PRESSURE BETWEEN 900 AND
1000C SHOW THAT THE DIFFUSION PROFILES ARE
INDEPENDENT OF PREDOPING WITH SE, PREANNEALING THE
CRYSTALS, SURFACE PREPARATION, AND IN DOPING.
THE DIFFUSION IS NOT SIMPLE, AND THE DATA ARE BEING
ANALYZED TO DETERMINE A SUITABLE MODEL. A
SUCCESSFUL NEW TECHNIQUE FOR GROWING ZnSe SUB X,
TE SUB (1-X) MATERIALS IS DESCRIBED, AND DATA ON
THE PROPERTIES OF JUNCTIONS PREPARED FROM A NEW
COMPOSITION CORRESPONDING TO X = 0.14 ARE GIVEN.
LIGHT INTENSITY VS CURRENT AND TEMPERATURE ARE
GIVEN AND DISCUSSED IN TERMS OF A PROPOSED ENERGY
LEVEL DIAGRAM. THIN-FILM GAAS SWITCHING DIODES
HAVE BEEN CONSTRUCTED BY EVAPORATION OF GA AND AS
ONTO MO SUBSTRATES. THE CHARACTERISTICS RESEMBLE
THOSE DESCRIBED BY MIZUSHIMA EXCEPT THAT THEY ARE
ASYMMETRICAL WITH RESPECT TO VOLTAGE. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-629 42J 20/12
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

NEWS OF INSTITUTIONS OF HIGHER LEARNING. PHYSICS.
(SELECTED ARTICLES). (U)

JAN 66 25P
REPT. NO. FTD-TT-65-1452,
MONITOR: TT, 66-60725

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF
IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENII. FIZIKA
(USSR) N3 P134-43 1964.

DESCRIPTORS: (*SEMICONDUCTORS, PHYSICAL PROPERTIES),
(*CADMIUM COMPOUNDS, SULFIDES), (*SEMICONDUCTING
FILMS, SULFIDES), ELECTRICAL CONDUCTANCE,
MOBILITY, THICKNESS, SCATTERING, ABSORPTION
SPECTRUM, SUBLIMATION, OPTICAL PROPERTIES, USSR (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

CONTENTS: ELECTRIC PROPERTIES OF POLYCRYSTALLINE
CADMIUM SULFIDE FILMS; CONCERNING THE NATURE OF
OPTICAL ABSORPTION OF POLYCRYSTALLINE FILMS OF
CADMIUM SULFIDE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-629 493 20/12
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH
WRIGHT-PATTERSON AFB OHIO

A STUDY OF HOMOGENEITY OF SOLID SOLUTIONS OF CADMIUM
SULFIDE AND CADMIUM SELENIDE BY X-RAY FLUORESCENCE. (U)

64 19P CHAN, FRANK L. ; BROOKS,
DONALD A. ;
REPT. NO. ARL-65-269,
PROJ: AF-702J,
TASK: 702300 , 702307

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN ADVANCES IN X-RAY
ANALYSIS V8 P420-30 1965. COPIES TO DDC USERS ONLY.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, SOLID SOLUTIONS),
(*CADMIUM COMPOUNDS, SEMICONDUCTORS), (*CADMIUM
ALLOYS, SEMICONDUCTORS), SULFIDES, SELENIUM
ALLOYS, FLUORESCENCE, PHASE STUDIES, CHEMICAL
ANALYSIS, TEST METHODS (U)
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE (U)

THE HOMOGENEITY OF SOLID SOLUTIONS OF CADMIUM
SELENIDE AND CADMIUM SULFIDE WAS INVESTIGATED.
CRYSTALS OF THE SOLID SOLUTIONS HAVING DIFFERENT
SELENIUM CONTENTS WERE GROWN IN THE AEROSPACE
RESEARCH LABORATORIES BY THE CONVENTIONAL METHODS
AS DESCRIBED IN THE EARLIER CONFERENCES. THE
COMPOSITION OF THESE SOLID SOLUTIONS WERE ANALYZED
CHEMICALLY FOR THEIR SELENIUM CONTENT BY A PROCEDURE
PERFECTED IN THE AEROSPACE RESEARCH
LABORATORIES. CRYSTALS IN THE FORM OF LUMPS WERE
CUT TO OPTIMUM SIZE SUITABLE TO BE INSERTED INTO THE
COMMERCIALY AVAILABLE SAMPLE HOLDER. THE SELENIUM
CONTENT OF THESE CRYSTALS WAS ASCERTAINED BY SCANNING
THE SAMPLES WITH STATIONARY COLLIMATORS OF SMALL
APERTURE. THE SPECTROGRAPH USED FOR THE PRESENT
STUDY WAS OPERATED AT 75 KVP AND 50 MA. THE
TARGET TUBE WAS CONSTRUCTED OF MOLYBDENUM. THE
RESULTS FROM THE CHEMICAL METHOD WERE USED TO
CORRELATE THE COUNTS PER SECOND OBTAINED FROM THE
X-RAY SPECTROGRAPH. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZH

AU-63U 022 9/2 9/5
RCA LABS PRINCETON N J

ACTIVE LOGIC ELEMENTS USING NON-GALVANIC MODIFYING
INPUTS. (U)

DESCRIPTIVE NOTE: FINAL REPT. : OCT 64-30 SEP 65,
MAR 66 29P HERZUG, G. ; GUARRACINI, J. ;
POWLUS, R. A. ;
CONTRACT: AF 19(628)-4387,
PROJ: AF-4641,
TASK: 464104,
MONITOR: AFCL , 66-29

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTERS, INTEGRATED CIRCUITS),
(*PHOTOELECTRIC EFFECT, COMPUTERS), (*INTEGRATED
CIRCUITS, COMPUTERS), (*OPTICAL EQUIPMENT,
COMPUTERS), COMPUTER LOGIC, TRANSISTORS,
SEMICONDUCTOR DEVICES, OSCILLATORS, PUNCHED
CARDS, PHOTOELECTRIC MATERIALS, GATES(CIRCUITS),
SEMICONDUCTING FILMS, DIODES(SEMICONDUCTOR),
CADMIUM COMPOUNDS, SULFIDES, TELLURIDES (U)
IDENTIFIERS: THIN FILMS, CADMIUM SULFIDE,
CADMIUM TELLURIDE, FIELD-EFFECT TRANSISTORS,
METAL OXIDE SEMICONDUCTORS (U)

A LOGIC ARRAY OF 128 MOS TRANSISTORS WAS
CONSTRUCTED THAT HAS THE ABILITY TO OPERATE AS A
HALF-ADDER, A RING OSCILLATOR WITH ANY ODD NUMBER OF
STAGES UP TO 15, A GROUP OF COUPLED FLIP-FLOPS OR ANY
ONE OF MANY OTHER SPECIAL CONFIGURATIONS. THE
DESIRED LOGIC NETWORK IS SPECIFIED BY AN OPTICAL
RADIATION PATTERN DETERMINED BY THE HOLES PUNCHED IN
A STANDARD BUSINESS DATA CARD. PHOTOCONDUCTORS
SENSE THE RADIATION AND TURN ON MOS TRANSISTORS
THAT CLOSE THE SIGNAL PATHS BETWEEN MOS TRANSISTOR-
NOR GATES. THE LOGIC PERFORMED THEREFORE DEPENDS
ON WHICH PATHS ARE CLOSED BETWEEN THE VARIOUS NOR
GATES. INSULATED-GATE FIELD-EFFECT TRANSISTORS
(IGFET) OF THE METAL-OXIDE-SEMICONDUCTOR (MOS)
VARIETY WERE SELECTED FOR THIS USE BECAUSE OF THE
SMALL AMOUNT OF ENERGY REQUIRED TO CONTROL THEIR
CONDUCTION. EXPERIMENTS WITH THIN-FILM VERSIONS OF
THE IGFET INDICATE EQUIVALENT USEFULNESS AND THE
PROMISE OF LARGE LOW-COST MODIFIABLE ARRAYS OF LOGIC
GATES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-630 491 20/12
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH
WRIGHT-PATTERSON AFB OHIO

IMPURITY CONDUCTIVITY IN SINGLE CRYSTAL CDS, (U)

APR 65 9P KULP, B. A. ; GALE, K. A. ;
SCHULTZ, R. G. ;
REPT. NO. ARL-66-0050,

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW
V140 N1A PA252-6 OCT 4 1965. COPIES TO DDC USERS
ONLY.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, ELECTRICAL
CONDUCTANCE), (*CADMIUM COMPOUNDS, SULFIDES),
IMPURITIES, SINGLE CRYSTALS, TRANSPORT PROPERTIES,
ELECTRONS, BAND THEORY OF SOLIDS, HEAT OF
ACTIVATION, RESISTANCE (ELECTRICAL), DOPING (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

THE TRANSPORT PROPERTIES OF ELECTRONS IN CDS
GROWN WITH GROUP I IMPURITIES WHICH SHOW THE
PHENOMENON OF 'STORAGE' HAVE BEEN STUDIED TO
DETERMINE THE MECHANISM OF CONDUCTION. THE
MOBILITY PARALLEL TO THE C AXIS AT LOW TEMPERATURE IS
OF THE ORDER OF 1 TO 10 SQ CM/ VOLT SEC AND IS VERY
ANISOTROPIC, THE MOBILITY PERPENDICULAR TO THE C AXIS
BEING 10 TO 30 TIMES THAT PARALLEL TO THE C AXIS.
THE RESISTIVITY OF THE CRYSTALS SHOWS AN ACTIVATION
ENERGY OF ABOUT 0.001 EV AT LOW TEMPERATURE. THE
RESISTIVITY IS VERY SENSITIVE TO EITHER DONOR OR
ACCEPTOR CONCENTRATION. THESE CHARACTERISTICS
INDICATE THAT THE CONDUCTION MECHANISM IS NOT A
RESULT OF ELECTRONS IN THE NORMAL CONDUCTION BAND BUT
IS A RESULT OF AN IMPURITY CONDUCTIVITY. THE
ACTIVATION ENERGY OF 0.001 EV IS THOUGHT TO
CORRESPOND TO EPSILON SUB 3 IN SILICON AND GERMANIUM
IMPURITY-CONDUCTION THEORY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-630 680 9/1 20/12
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

INSULATED-GATE FIELD-EFFECT TRANSISTOR USING SINGLE
CRYSTAL CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: REVISED ED.,
SEP 65 3P CONKAGAN, J. MULLER, R. S. I
CONTRACT: DA-31-124-ARO(DI)-385,
MONITOR: AROD, 5537:1

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN SOLID STATE
ELECTRONICS V9 P182 1966. COPIES TO DDC USERS ONLY.
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 27
JUL 65.

DESCRIPTORS: (*TRANSISTORS, *SEMICONDUCTORS),
INORGANIC COMPOUNDS, OXIDES, CADMIUM COMPOUNDS,
SULFIDES, FILMS, SINGLE CRYSTALS, ELECTRIC
CURRENTS, VOLTAGE, FIELD THEORY,
GATES(CIRCUITS), VAPOR PLATING, VACUUM
APPARATUS (U)
IDENTIFIERS: THIN FILMS, CADMIUM SULFIDE, FIELD-
EFFECT TRANSISTORS (U)

METAL-OXIDE-SEMICONDUCTOR (MOS) TRANSISTORS WERE
CONSTRUCTED ON PREPARED SUBSTRATES OF HIGH
RESISTIVITY, SINGLE-CRYSTAL CADMIUM SULFIDE. THE
TRANSCONDUCTANCE, OUTPUT CONDUCTANCE, GATE-SOURCE AND
GATE-DRAIN CAPACITANCES FOR THESE DEVICES WERE OF THE
SAME GENERAL MAGNITUDES AS WERE OBTAINED ON DEPOSITED
POLYCRYSTALLINE CDS THIN-FILM TRANSISTORS
(TFT'S) OF SIMILAR DIMENSIONS. INITIAL TESTS
INDICATE THAT THE DRAIN CURRENT-DRAIN VOLTAGE
CHARACTERISTICS OF THE SINGLE-CRYSTAL CDS MOS
TRANSISTOR ARE LESS TEMPERATURE SENSITIVE THAN ARE
THE CHARACTERISTICS OF DEPOSITED, POLYCRYSTALLINE,
THIN-FILM, CDS DEVICES (TFT'S). IN BOTH
SINGLE CRYSTAL AND THIN-FILM TRANSISTORS, THE OXIDE
LAYER AND ELECTRODES ARE VACUUM DEPOSITED USING
SIMILAR PROCEDURES. THE LARGE DIFFERENCE IN THE
TEMPERATURE STABILITIES OF THE TWO TYPES OF DEVICES
INDICATES THAT THE SOURCE OF THE TEMPERATURE
DEPENDENCE LIES IN THE DEPOSITED THIN-FILM NATURE OF
THE SEMICONDUCTOR LAYER. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-630 863 20/12 7/4
BROWN UNIV PROVIDENCE R I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY-CLEAN METALS AND SEMICONDUCTORS. PART I. STUDY OF CDS SURFACES BY LEED. PART II. COMBINED LEED AND MASS SPECTROMETER MEASUREMENTS FOR ADSORPTION AND CATALYSIS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 8 (SEMI-ANNUAL),
1 JUL-31 DEC 65,
MAR 66 49P FARNSWORTH, H. E. CAMPBELL, B.
D. IONCHI, M. I
CONTRACT: DA-28-043-AMC-00299(E),
PROJ: DA-200-14501-8118

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-623 174.

DESCRIPTORS: (*SEMICONDUCTORS, SURFACE PROPERTIES),
(*CATALYSTS, SURFACE PROPERTIES), (=CADMIUM
COMPOUNDS, SULFIDES), (*NICKEL, ADSORPTION),
METALS, ELECTRON DIFFRACTION ANALYSIS, MASS
SPECTROSCOPY, ILLUMINATION, OXYGEN, HEATING,
VOLTAGE CARBON MONOXIDE, OXIDATION,
CATALYSIS (U)
IDENTIFIERS: CADMIUM SULFIDE, LEED (U)

A STUDY WAS MADE OF CADMIUM SULFIDE SURFACES BY LOW ENERGY ELECTRON DIFFRACTION (LEED). THE INFLUENCE OF ILLUMINATION ON THE ADSORPTION OF OXYGEN WAS OBSERVED FOR VARIOUS CONDITIONS OF THE SURFACE. THE PHOTO-STIMULATED ADSORPTION OF OXYGEN WAS COMPARED WITH THE ADSORPTION PROMOTED BY THE PRESENCE OF A HOT FILAMENT NEAR THE SAMPLE. FROM THE CHANGES IN POTENTIAL MEASURED DURING THE ADSORPTION PROCESS IT WAS CONCLUDED THAT ATOMIC OXYGEN IS PROBABLY THE ADSORBATE SPECIES. COMBINED ELECTRON DIFFRACTION AND MASS SPECTROMETER MEASUREMENTS WERE APPLIED TO THE ADSORPTION OF CARBON MONOXIDE ON NICKEL. THESE TECHNIQUES ENABLED THE OBSERVATION OF SURFACE STRUCTURES AS A FUNCTION OF THE ADSORBED SPECIES AS WELL AS THE CONDITIONS OF THE SURFACE WHICH ENHANCED THE ADSORPTION OF THE CARBON MONOXIDE AND DESORPTION WITH SELF-OXIDATION TO FORM CARBON DIOXIDE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-631 408 9/1
RCA LABS PRINCETON N J

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 3, 1 JAN-31 MAR
65,

JUN 65 56P WEIMER, P. K. ; BORKAN, H. ;
BOWE, J. J. ; FRANTZ, V. L. ; HOPKINS, R. S. ;
CONTRACT: DA-28-U43-AMC-U0231(E),
PROJ: DA-1P622001A056,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TRIODES, SEMICONDUCTING FILMS),
(*TRANSISTORS, SEMICONDUCTING FILMS), CADMIUM
COMPOUNDS, SELENIDES, SULFIDES, CADMIUM ALLOYS,
HALL EFFECT, RESISTANCE(ELECTRICAL), VAPOR
PLATING, VACUUM APPARATUS, MANUFACTURING METHODS,
SEMICONDUCTOR DEVICES, EVAPORATION, SELENIUM
ALLOYS (U)
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,
THIN FILMS (U)

A PROCESS FOR FABRICATING CDSE THIN-FILM-
TRANSISTORS (TFT'S) REPRODUCIBLY IN LARGE ARRAYS
HAS BEEN DEVELOPED. THE DEPOSITION OF THE
SEMICONDUCTOR BY EVAPORATION UPON AN UNHEATED
SUBSTRATE IS CONTROLLED BY MEANS OF ELECTRICAL
MONITORING OF A SAMPLE TFT DEPOSITED ON THE SAME
BLANK WITH THE CIRCUIT ARRAY. WIRE GRILL MASKS IN
THE VACUUM SYSTEM ARE USED TO DEFINE THE PATTERNS.
INTEGRATED THIN-FILM CIRCUITS INCORPORATING 540
CDSE TFT'S HAVE OPERATED CONTINUOUSLY FOR MORE
THAN 500 HOURS WITHOUT FAILURE. THE HALL
MOBILITY AND RESISTIVITY OF VACUUM-DEPOSITED
CDSE FILMS HAVE BEEN STUDIED FOR VARIOUS
DEPOSITION CONDITIONS. METAL-INSULATOR-
SEMICONDUCTOR (M-I-S) STRUCTURES HAVE BEEN USED
TO STUDY INSTABILITY MECHANISMS IN THE TFT. A
SYSTEMATIC PROGRAM OF FABRICATION AND LIFE-TESTING OF
CDSE TFT'S IS BEING CARRIED OUT. ANALOG AND
DIGITAL CIRCUITS INCORPORATING TFT'S WERE STUDIED.
MASKS WERE DESIGNED AND ORDERED FOR A THREE-INPUT
DIGITAL GATE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-631 409 9/1
RCA LABS PRINCETON N J

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 4, 1 APR-30 JUN
65.

SEP 65 41P WEIMER, P. K. ; BOWE, J. J. ;
LAZNOVSKY, W. H. ; SADASIV, A. G. ; SCHELHORN, R. L. ;

CONTRACT: DA-28-043-AMC-00231(E),
PROJ: DA-1P622001AUS5,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-631 408.

DESCRIPTORS: (*TRIODES, SEMICONDUCTING FILMS),
(*TRANSISTORS, SEMICONDUCTING FILMS), CADMIUM
COMPOUNDS, SELENIDES, SULFIDES, CADMIUM ALLOYS,
SELENIUM ALLOYS, LIFE EXPECTANCY,
FAILURE (ELECTRONICS), STABILITY, DEPOSITION,
GATES (CIRCUITS), RESISTORS, NICKEL ALLOYS,
CHROMIUM ALLOYS (U)
IDENTIFIERS: NICHROME, THIN FILMS (U)

A PROCESS OF STABILIZING CADMIUM SULFIDE TFT'S
HAS BEEN DEVELOPED. PRELIMINARY DATA BASED ON
1000-HOUR SHELF-LIFE AND OPERATING-LIFE TESTS
INDICATE THAT THE STABILIZED TFT'S DO NOT HAVE THE
REVERSIBLE GATE INSULATOR-SEMICONDUCTOR INSTABILITY.
SHELF LIFE AND OPERATING LIFE HAVE REVEALED THAT
RANDOM I SUB D INSTABILITIES HAVE BEEN GREATLY
REDUCED. FROM EARLY OPERATING LIFE-TEST
COMPARISONS, THE LONG-TERM DECAY OBSERVED IN PREVIOUS
TFT'S HAS ALSO BEEN GREATLY REDUCED. OPERATING
TESTS OF UNITS AT 130C AND 185C FOR 300-HOUR
PERIODS INDICATE THE PRESENCE OF A LONG-TERM DECAY
MECHANISM. INTEGRATED THIN-FILM THREE-INPUT GATE
CIRCUITS INCORPORATING CDS TFT'S AND NICHROME
RESISTORS HAVE BEEN FABRICATED AND TESTED. A
PROCEDURE FOR DEPOSITING CDSE TFT'S UPON AN
UNHEATED SUBSTRATE HAS YIELDED GOOD REPRODUCIBILITY,
STABILITY, AND LIFE. AN UNENCAPSULATED CIRCUIT
INCORPORATING 540 CDSE TFT'S WAS OPERATED OVER
2000 HOURS AT ROOM TEMPERATURE BEFORE ANY UNITS
FAILED. ANOTHER CIRCUIT OF THE SAME TYPE HAS
OPERATED 700 HOURS AT 85C WITHOUT FAILURE.
(AUTHOR) (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-631 744 20/12 20/2
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE

FURTHER CONSIDERATIONS ON A THEORY OF SUPERLINEARITY
IN CDS AND RELATED MATERIALS, (U)

APR 65 9P DUSSEL, GUSTAVO A. ; BUBE,
RICHARD H. ;
CONTRACT: DA-31-124-ARO(D)-73,
MONITOR: AROU , 4119:7

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SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, *PHOTOCONDUCTIVITY),
(*CARRIERS (SEMICONDUCTORS), PHOTOCONDUCTIVITY),
(*CADMIUM COMPOUNDS, SULFIDES), SELENIDES, SINGLE
CRYSTALS, IONIZATION, ELECTRON TRANSITIONS, BAND
THEORY OF SOLIDS (U)
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,
ELECTRON TRAPPING (U)

A THEORY OF SUPERLINEARITY BY CARDON AND BUBE
IS EXTENDED BY CONSIDERING THE EFFECT OF A HIGH
DENSITY OF SHALLOW TRAPS, EITHER DISCRETE OR WITH A
QUASIEXPONENTIAL DISTRIBUTION. NEW CONDITIONS FOR
THE BREAKPOINTS OF SUPERLINEARITY ARE INTRODUCED.
THESE NEW CONDITIONS ALLOW THE EXPLANATION OF
SEVERAL FEATURES OF SUPERLINEARITY IN SINTERED
LAYERS, INCLUDING THE 'ANOMALOUS' OBSERVATION OF
LIFETIME DECREASE ABOVE THE SUPERLINEAR REGION, AS
DESCRIBED IN INVESTIGATIONS ON CDSE BY STUFP.
A POSSIBLE RELATIONSHIP BETWEEN SUCH TRAP
DISTRIBUTIONS AND AN APPARENT DECREASE IN SENSITIZING
CENTER HOLE IONIZATION ENERGY IN HIGHLY IMPURE SINGLE
CRYSTALS OF CDS IS SUGGESTED. A SUMMARY OF ALL
THE BASIC SUPERLINEARITY CONDITIONS IS GIVEN, WITH
PRINCIPAL EMPHASIS ON THE PHYSICS OF THE INVOLVED
MECHANISMS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-631 791 2U/12
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE

DETERMINATION OF ELECTRON TRAPPING PARAMETERS, (U)

MAY 65 11P BUBE, RICHARD H.; DUSSEL,
GUSTAVO A.; HO, CHING-TAO; MILLER, LEWIS D. ;
CONTRACT: DA-31-124-ARO(D)-73,
MONITOR: AROU , 4119:8

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PHYSICS V37 N1 P21-31 JAN 1966. COPIES TO DDC USERS
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SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, ELECTRON CAPTURE),
(•CARRIERS (SEMICONDUCTORS), MATHEMATICAL
ANALYSIS), CADMIUM COMPOUNDS, SULFIDES,
SELENIDES, PHOTOCONDUCTIVITY, THERMAL PROPERTIES,
PROBABILITY, CRYSTALS, ELECTRONS (U)
IDENTIFIERS: ELECTRON TRAPPING, THERMALLY
STIMULATED CONDUCTIVITY, CADMIUM SELENIDE, CADMIUM
SULFIDE (U)

A DETAILED INVESTIGATION OF DIFFERENT METHODS FOR
DETERMINING ELECTRON TRAP PARAMETERS WAS MADE ON
CRYSTALS OF CDS-CDSE. THE PRINCIPAL
TECHNIQUES INVOLVED ARE DECAY OF PHOTOCONDUCTIVITY
AND THERMALLY STIMULATED CONDUCTIVITY (TSC).
DIRECT EVIDENCE OF A QUASICONTINUOUS TRAP
DISTRIBUTION WITH TOTAL DENSITY OF 5×10^{10} TO THE 15TH
POWER/CM, TRAP DEPTH RANGE OF 0.1-0.7 EV, AND
CAPTURE CROSS SECTIONS OF THE ORDER OF 10 TO THE -
16TH POWER SQ CM IS OBTAINED, FOR WHICH CORRECT
VALUES OF THE PARAMETERS CAN BE CALCULATED FROM
FERMI-LEVEL ANALYSIS OF EITHER DECAY OR TSC DATA.
IN THE SAME CRYSTALS A DISCRETE TRAP LEVEL WITH
DENSITY OF 2×10^{10} TO THE 14TH POWER /CM, DEPTH OF
0.73 EV, AND APPARENT CROSS SECTION OF 10 TO THE -
14TH POWER SQ CM IS ALSO FOUND. IN SPITE OF THE
LARGE VALUE OF CROSS SECTION DERIVED FROM THE FREEING
OF TRAPPED ELECTRONS, THESE TRAPS EXACTLY OBEY
MONOMOLECULAR KINETICS. A TEMPERATURE THRESHOLD AT
180K IS FOUND, BELOW WHICH IT IS NOT POSSIBLE TO
FILL THESE TRAPS. EXAMINATION OF A NUMBER OF
POSSIBILITIES FAVORS THE PROPOSAL THAT THESE TRAPS
ARE CHARACTERIZED BY A COULOMB -REPULSIVE BARRIER.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-632 998 20/12 20/5 9/1 11/6
LINCOLN LAB MASS INST OF TECH LEXINGTON

SOLID STATE RESEARCH 1966-1.

(U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL SUMMARY REPT. 1

NOV 65-31 JAN 66,

JAN 66 76P

MCWHORTER, ALAN L. ;

CONTRACT: AF 19(628)-5167;

PROJ: AF-649L;

MONITOR: ESD ;

TR-66-42

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-629 040.

DESCRIPTORS: (*SOLID STATE PHYSICS, SCIENTIFIC RESEARCH); (*SEMICONDUCTOR DEVICES, SCIENTIFIC RESEARCH); (*LASERS, SCIENTIFIC RESEARCH); (*INTERMETALLIC COMPOUNDS, SCIENTIFIC RESEARCH); PUMPING(ELECTRONICS), ELECTRON BEAMS, SELENIDES, SULFIDES, CADMIUM COMPOUNDS, GALLIUM ALLOYS, ARSENIC ALLOYS, PHOSPHORESCENT MATERIALS, ZINC COMPOUNDS, TITANIUM COMPOUNDS, OXIDES, IRON, CYCLOTRON RESONANCE PHENOMENA, MAGNETISM, SPINELS, MAGNETIC RESONANCE, THULIUM, ELECTRICAL PROPERTIES, MERCURY COMPOUNDS, TELLURIDES, LEAD COMPOUNDS, RHENIUM COMPOUNDS (U)

IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE, CADMIUM TELLURIDE, GALLIUM ARSENIDE, LEAD SELENIDE, MERCURIC TELLURIDE, TITANIUM OXIDES, RHENIUM OXIDES (U)

CONTENTS: SOLID STATE DEVICE RESEARCH; OPTICAL TECHNIQUES AND DEVICES; MATERIALS RESEARCH; PHYSICS OF SOLIDS. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-633 645 20/12 7/4 20/6
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL
OF ENGINEERING

ULTRAVIOLET REFLECTIVITY STUDIES OF CdS:Se SINGLE
CRYSTAL SOLID SOLUTIONS. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 66 106P GUTHEINZ, LEE MORGAN I
REPT. NO. GSP/PH/66-8,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ULTRAVIOLET SPECTROSCOPY,
*SEMICONDUCTORS), (*CADMIUM ALLOYS, ULTRAVIOLET
SPECTROSCOPY), (*SELENIUM ALLOYS, ULTRAVIOLET
SPECTROSCOPY), SINGLE CRYSTALS, SOLID SOLUTIONS,
BAND THEORY OF SOLIDS, ATOMIC ENERGY LEVELS,
ELECTRON TRANSITIONS, CRYSTALLOGRAPHY, CADMIUM
COMPOUNDS, SULFIDES (U)

THE REFLECTION SPECTRA OF CdS:CdSe SOLID
SOLUTION ALLOYS HAVE BEEN MEASURED AT ROOM
TEMPERATURE FOR PHOTON ENERGIES IN THE RANGE 4.0 -
10.0 EV. THE SHIFT IN ENERGY OF SEVERAL DIRECT
INTERBAND TRANSITIONS (E_0 , E_0' , E_1 , E_2)
WITH VARYING CATION COMPOSITION HAS BEEN OBSERVED.
THE STRUCTURE IS INTERPRETED IN TERMS OF AN
ANALOGOUS ZINCBLLENDE MODEL, WHICH HAS BEEN SHOWN TO
DIFFER FROM THE WURTZITE IN THE (0, 0, 1)
DIRECTION IN THE FOLDED ZONE SCHEME OF BIRMAN ONLY
BY THE OMISSION OF A SMALL TRIGONAL FIELD
PERTURBATION. THE OBSERVED MONOTONICALLY
INCREASING VARIATION IN E_0 IS IN GOOD AGREEMENT
WITH THAT REPORTED BY HANDELMAN AND KAISER. THE
VARIATION IN THE TRANSITIONS IS QUALITATIVELY
INTERPRETED AS RESULTING FROM AN EFFECTIVE LATTICE
PARAMETER DILATION WHICH OCCURS IN THE ALLOYING
PROCESS. THIS DILATION IS SHOWN TO GIVE RISE TO A
POTENTIAL OF DEFORMATION WHICH HAS A PERTURBING
EFFECT ON THE BAND EDGES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-633 715 20/12 20/2
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL
OF ENGINEERING

ULTRASONIC STRESS WAVES IN CADMIUM SULFIDE, (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAR 66 IOUP MAHAFFY, CRAIG EUGENE ;
REPT. NO. GSP/PH/66-12,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ULTRASONIC PROPERTIES,
SEMICONDUCTORS), (•CADMIUM COMPOUNDS, SULFIDES),
STRESSES, SINGLE CRYSTALS, RELAXATION TIME,
ELECTRON CAPTURE, COPPER, SILVER, IMPURITIES (U)
IDENTIFIERS: THESES (U)

THE COPPER AND SILVER DOPED CADMIUM SULFIDE CRYSTALS OBSERVED IN THE EXPERIMENT EXHIBITED ESSENTIALLY THE SAME ULTRASONIC AMPLIFICATION CHARACTERISTICS AS CRYSTALS GROWN FROM UNDOPED, HIGH-PURITY, CADMIUM SULFIDE POWDER. THE RELAXATION TIME OF ELECTRON TRAPPING IS NOT AFFECTED BY THE PRESENCE OF THE IMPURITY ELEMENTS COPPER AND SILVER, AT LEAST IF THE IMPURITY-ELEMENT CONCENTRATIONS ARE RESTRICTED TO THOSE USED IN THIS EXPERIMENT. THE CALCULATED VALUE OF .3 FOR THE TRAPPING FACTOR IN CRYSTAL 4 (CDS:CU-30PPM), AS COMPARED TO .5 CALCULATED FOR ALL OTHER CRYSTALS, IS A POSSIBLE INDICATION THAT THE IMPURITY ATOMS FORMED TRAPPING CENTERS NOT PRESENT IN THE OTHER, LESS HEAVILY DOPED, CRYSTALS. IF THE RESTRICTIONS IMPOSED BY THE LINEAR (SMALL SIGNAL) APPROXIMATION ARE NOT VIOLATED, THE MODIFIED AMPLIFICATION EQUATION OF UCHIDA ET AL. CORRECTLY DESCRIBES THE EXPERIMENTALLY OBSERVED ULTRASONIC AMPLIFICATION IN CADMIUM SULFIDE. THE DISADVANTAGE OF THE MODIFIED EQUATION, IN THE EXPERIMENTAL SITUATION, IS THAT IT IS POSSIBLE TO OBTAIN APPARENT AGREEMENT BETWEEN THEORY AND EXPERIMENT WHEN NONLINEAR CONDITIONS ARE ACTUALLY PRESENT IN THE CRYSTAL. THIS SITUATION IS MADE POSSIBLE BY THE DEPENDENCE OF THE THEORETICALLY PREDICTED GAIN VALUES ON THE EXPERIMENTALLY OBSERVED VALUES OF MAXIMUM AND MINIMUM GAIN. FOR EXAMPLE, THE EFFECTS OF ACOUSTIC GAIN SATURATION CAN REDUCE THE OBSERVED MAXIMUM GAIN WHICH IN TURN WILL RESULT IN THE RATIO OF THE THEORETICALLY PREDICTED MAXIMUM GAIN TO MINIMUM GAIN BEING REDUCED AS WELL. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-634 032 20/12 20/2 20/3
DELAWARE UNIV NEWARK DEPT OF PHYSICS

THE INFLUENCE OF OXYGEN IN THE ULTRAHIGH VACUUM RANGE
ON ELECTRICAL PROPERTIES OF CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 66 17P BOER, KARL W. ISCHUBERT, R.

REPT. NO. TR-7,
CONTRACT: DA-31-124-ARO(D)-173,
MONITOR: AROD, 4461:8

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CADMIUM COMPOUNDS, SULFIDES),
(*SULFIDES, ELECTRICAL PROPERTIES), SINGLE
CRYSTALS, ADSORPTION, OXYGEN, HYDROGEN, CARBON
DIOXIDE, VACUUM, TEMPERATURE, PHOTOCONDUCTIVITY,
MASS SPECTRUM, PRESSURE, SEMICONDUCTORS (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

UNDOPED CDS SINGLE CRYSTALS ARE KEPT IN A VACUO
OF $P < 10$ TO THE -9 TH POWER TORR. ADSORPTION OF
DIFFERENT GASES (O_2 , H_2 , CO_2) WAS ALLOWED BY
BACKFILLING THE SYSTEM UP TO A PRESSURE IN THE
 0.00001 TORR RANGE THROUGH A SENSITIVE LEAK VALVE.
CRYSTAL CONDUCTANCE IS MONITORED SIMULTANEOUSLY.
CHANGES OF THE PHOTOCURRENT UP TO 0.000003 AMPERES
AND SENSITIVITY TO CHANGES IN THE PARTIAL PRESSURE OF
OXYGEN AS SMALL AS 10 TO THE -10 TH POWER TORR ARE
REPORTED FOR DIFFERENT TEMPERATURES. GASES ARE
DESORBED BY A TIME LINEAR INCREASE OF TEMPERATURE
FROM $800K$ TO $600K$. THE DESORPTION IS MONITORED
WITH A MASS SPECTROMETER LOCKED IN THE INVESTIGATED
MASS NUMBER. SIMULTANEOUS CHANGES OF ELECTRICAL
PROPERTIES ARE STUDIED USING TSC CURVES.
CONSEQUENT DESORPTION SHOW, IN GENERAL, MORE THAN
ONE DESORPTION PEAK, INDICATING MULTISITE ADSORPTION.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-634 088 9/1
RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 6. 1 OCT-31 DEC
65.

MAY 66 61P BOWE, J. J. ; SCHELHORN, R. L.
; SHALLCROSS, F. V. ; WAXMAN, A. S. ; WEIMER, P. K.

CONTRACT: DA-28-043-AMC-00231(E).
PROJ: DA-1P6-22001-A056,
TASK: 1P6-22001-A05602,
MONITOR: ECOM , 00231-6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-631 409.

DESCRIPTORS: (*TRIODES, SEMICONDUCTING FILMS),
(*TRANSISTORS, SEMICONDUCTING FILMS),
MICROSTRUCTURE, CADMIUM ALLOYS, SELENIUM ALLOYS,
CADMIUM COMPOUNDS, SILICON COMPOUNDS, SULFIDES,
OXIDES, PHOTOELECTRIC EFFECT, VOLTAGE (U)
IDENTIFIERS: THIN FILMS (H)

CAPACITANCE MEASUREMENTS ON CDS-SiO-AL
STRUCTURES AT VARIOUS WELL-CONTROLLED TEMPERATURES
HAVE INDICATED THAT THE NATURE OF THE INSTABILITIES
UNDER APPLIED BIAS CAN BE IRREVERSIBLY CHANGED BY
HEATING THE SAMPLE IN VACUUM FROM 25 TO 50 C.
SEVERAL MECHANISMS APPEAR TO BE INVOLVED IN THESE
INSTABILITIES. SILICA FILMS DEPOSITED BY
RESISTANCE HEATING OF SiO₂ ARE UNDER STUDY AS
ENCAPSULANTS FOR M-I-S STRUCTURES; REFRACTIVE
INDEX DATA IMPLY THAT THE SiO₂ FILMS ARE NOT
COMPLETELY STOICHIOMETRIC. PHOTOEMISSION OF
ELECTRONS INTO THIN-FILM VAPOR-DEPOSITED INSULATORS
HAS BEEN USED TO STUDY THE ENERGY BAND DIAGRAM OF
THIN-FILM VAPOR-DEPOSITED METAL-INSULATOR-
SEMICONDUCTOR CONTACTS AND THIN-FILM METAL-INSULATOR-
METAL CONTACTS. THE INSULATORS STUDIED TO DATE
HAVE BEEN SiO AND SiO₂. WE HAVE FOUND A
BARRIER BETWEEN SiO AND AU OF 3.6 PLUS OR MINUS
0.15 EV AND AN ENERGY BARRIER OF 4.8 PLUS OR MINUS
0.2 EV BETWEEN SiO AND CDSE. THE
PHOTOCURRENT-VOLTAGE RELATIONSHIPS OF M-I-S
STRUCTURES AND METAL-INSULATOR-METAL STRUCTURES ARE
BRIEFLY DISCUSSED. (AUTHOR) (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-634 591 20/12 20/2
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF
II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 4, IS
JAN-14 APR 66,
APR 66 26P FAHRIG, R. H. ; BROWN, L. W. ;
WEBB, G. N. ;
CONTRACT: AF 33(615)-2947;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-470 918.

DESCRIPTORS: (*SINGLE CRYSTALS, SEMICONDUCTORS),
(*SEMICONDUCTORS, SINGLE CRYSTALS), (*CRYSTAL
GROWTH, SINGLE CRYSTALS), SULFIDES, SELENIDES,
TELLURIDES, IMPURITIES, SYNTHESIS(CHEMISTRY),
PURIFICATION, LABORATORY FURNACES, SEMICONDUCTORS,
ZINC ALLOYS, CADMIUM ALLOYS, SELENIUM ALLOYS,
TELLURIUM ALLOYS, CADMIUM COMPOUNDS, ZINC
COMPOUNDS, INTERMETALLIC COMPOUNDS (U)
IDENTIFIERS: CADMIUM SULFIDE, ZINC SELENIDE,
CADMIUM TELLURIDE (U)

A STUDY WAS MADE OF THE FACTORS INFLUENCING THE
SYNTHESIS, PURITY, AND CRYSTALLIZATION OF GROUP
II-VI COMPOUND SEMICONDUCTOR MATERIALS.
SYNTHESIS OPERATIONS WERE LIMITED TO CDS,
ZNSE AND CDTE. A MILESTONE IN PURITY WAS
REACHED IN CDS LOT 274 WHEN ONLY 325 PARTS PER
BILLION TOTAL IMPURITIES WERE FOUND BY MASS
SPECTROGRAPHIC ANALYSIS. PURITIES IN GENERAL WERE
BELIEVED TO BE SOMEWHAT BETTER THAN USUAL ALTHOUGH
THIS CANNOT BE SUPPORTED BY THE EMISSION
SPECTROGRAPHIC DATA RECEIVED. CRYSTALS OF CDS,
ZNS, CDTE, AND ZNSE WERE GROWN FROM THE
MELT. MIXED CRYSTALS OF CDZNS, ZNSETE,
AND ZNCUSE WERE ALSO GROWN. TESTS OF THE
CONTROLLER AND PROGRAMMER FOR THE NEW PRESSURE
FURNACE SYSTEM WERE CONCLUDED. THE UNITS
FUNCTIONED AS ANTICIPATED AND DEMONSTRATED THAT
CRYSTALS GROWN USING THIS APPARATUS ARE SUPERIOR IN
APPEARANCE TO ONES GROWN BY MANUAL CONTROL. ALSO
TESTED WAS THE COVER FOR THE NEW PRESSURE FURNACE.
THE SUCCESSFUL COMPLETION OF THE TESTS ON THIS ITEM
CLEARED THE WAY FOR HARDENING OF THE FURNACE DESIGN
AND PROCEEDING WITH THE CONSTRUCTION.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-635 332 20/12 20/10
LINCOLN LAB MASS INST OF TECH LEXINGTON

CYCLOTRON RESONANCE OF PIEZOELECTRIC POLARONS. (U)

AUG 65 9P LARSEN, DAVID M. I
REPT. NO. JA-2625,
CONTRACT: AF 19(628)-5167;
MONITOR: ESD TR-66-183

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PHYSICAL REVIEW V142 N2
P428-35 FEB 11 1966.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CADMIUM COMPOUNDS, SULFIDES),
(*PHONONS, *CYCLOTRON RESONANCE PHENOMENA),
(*PIEZOELECTRIC EFFECT, QUANTUM MECHANICS),
ELECTRONS, MAGNETIC FIELDS, PERTURBATION THEORY,
SEMICONDUCTORS, PIEZOELECTRIC CRYSTALS (U)
IDENTIFIERS: POLARONS (U)

THE MAGNETIC FIELD DEPENDENCE OF THE ENERGY AND LINEWIDTH OF THE TRANSITION FROM THE $N = 1$ TO THE $N = 0$ LANDAU LEVEL OF A PIEZOELECTRIC POLARON HAS BEEN CALCULATED NUMERICALLY FOR POLARONS AT ZERO TEMPERATURE. A WEAK ISOTROPIC PIEZOELECTRIC COUPLING BETWEEN THE ELECTRON AND THE ACOUSTIC PHONON MODES IS ASSUMED, AND IS TREATED AS A PERTURBATION ON FREE-ELECTRON MAGNETIC EIGENSTATES. IT IS FOUND THAT THE SHIFT IN THE CYCLOTRON RESONANCE FREQUENCY DUE TO PIEZOELECTRIC ELECTRON-PHONON INTERACTION BEGINS TO DIFFER DRASTICALLY FROM THAT EXPECTED FROM THE POLARON EFFECTIVE-MASS THEORY WHEN $(\hbar\bar{\omega}(\Omega \text{ SUB } 0)/mC \text{ SQ.}) > 1$, WHERE $(\hbar\bar{\omega}(\Omega \text{ SUB } C))$ IS THE SEPARATION IN ENERGY OF THE UNPERTURBED MAGNETIC LEVELS, m IS THE BAND MASS OF THE ELECTRON, AND C IS THE VELOCITY OF SOUND IN THE CRYSTAL. THE SEMICLASSICAL THEORY OF MAHAN AND HOPFIELD IS REVIEWED AND SHOWN NOT TO BE SUITABLE FOR INTERPRETING RECENTLY REPORTED CYCLOTRON-RESONANCE EXPERIMENTS IN CDS, WHERE THE LANDAU-LEVEL SPACINGS WERE SUBSTANTIALLY GREATER THAN THE MEAN THERMAL ENERGY PER ELECTRON. DIFFICULTIES ENCOUNTERED IN EXTENDING THE PRESENT PERTURBATION CALCULATION TO FINITE TEMPERATURE ARE POINTED OUT. FINALLY, THE WEAK-COUPLING ENERGY SHIFT OF THE $N = 0$ TO $N = 1$ TRANSITION FOR OPTICAL POLARONS (ELECTRONS COUPLED TO LONGITUDINAL OPTICAL PHONONS) IS EVALUATED AS A FUNCTION OF MAGNETIC FIELD AND COMPARED TO PREVIOUS RESULTS DERIVED FOR WEAK FIELDS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-636 420 9/1 13/8
DELAWARE UNIV NE-ARK DEPT OF PHYSICS

MULTILAYER OHMIC CONTACTS ON CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.
JUL 66 22P BOER, KARL W. HALL, ROBERT

B. I
REPT. NO. TR-10,
CONTRACT: NONR-4336(DD),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPPORTED IN PART BY NASA.

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, *ELECTRIC
TERMINALS), (*CADMIUM COMPOUNDS, SULFIDES),
CIRCUIT INTERCONNECTIONS, ELECTRODES, VAPOR
PLATING, TITANIUM, ALUMINUM, PLATINUM,
EVAPORATION, ELECTRICAL PROPERTIES, LAMINATES (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

A MULTILAYER TECHNIQUE IS PROPOSED FOR EVAPORATION
OF OHMIC CONTACTS ONTO CDS WHICH DOES NOT CHANGE
THEIR ELECTRICAL PROPERTIES AFTER HEAT TREATMENT UP
TO 350C. THIS TECHNIQUE CONSISTS OF A SEQUENTIAL
EVAPORATION OF A PREPARATIVE LAYER, AN ACTIVE METAL
AND POSSIBLE A COVERING METAL. THE TI
(PREPARATIVE)-AI (ACTIVE)-PT (COVER)
SEQUENCE WAS FOUND MOST SUCCESSFUL. ALL OF THE
MORE THAN FORTY EVAPORATIONS INVESTIGATED -ON CDS
SINGLE CRYSTALS, OR ON EVAPORATED RECRYSTALLIZED
LAYERS- SHOWED OHMIC CHARACTERISTICS BETWEEN 2 MV
AND 200 V AND SHOWED GENERATION-RECOMBINATION NOISE
ABOVE (AT MOST) 500 HZ. THE ELECTRICAL
PROPERTIES OF THE CONTACTS DID NOT MARKEDLY CHANGE
AFTER VACUUM HEAT TREATMENT UP TO 350C. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-636 504 20/12 9/1
RCA LABS PRINCETON N J

LOW TEMPERATURE INFRARED PHOTOCONDUCTORS. (U)

DESCRIPTIVE NOTE: SUMMARY REPT., 31 MAY 65-30 MAY 66.
AUG 66 4UP SCHULTZ, M. L. IDALVEN, R. I
ROWLEY, C. D. I
CONTRACT: NONR-2225(00),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-617 325.

DESCRIPTORS: (*INFRARED PHOTOCONDUCTORS,
CRYOGENICS), (*PHOTOMULTIPLIERS, INFRARED
PHOTOCONDUCTORS), CARRIERS(SEMICONDUCTOR), FILMS,
PHOTOCONDUCTIVITY, SEMICONDUCTORS, BAND THEORY OF
SOLIDS, IONIZATION, SELENIUM, SILVER COMPOUNDS,
CHLORIDES, CADMIUM COMPOUNDS, SULFIDES,
GERMANIUM, LEAD ALLOYS, TELLURIUM ALLOYS (U)

THE FIRST RESULTS OBTAINED IN STUDIES DIRECTED TOWARD THE DEVELOPMENT OF AN INFRARED PHOTOCONDUCTIVE MULTIPLIER ARE SUMMARIZED. THIS DEVICE, WHICH IS A SOLID STATE ANALOG OF THE SECONDARY EMISSION MULTIPLIER FOR PHOTOELECTRONS, IS TO BE A MULTI-LAYERED STRUCTURE CONSISTING OF A SUITABLE PHOTOCONDUCTOR FOLLOWED BY ALTERNATE LAYERS OF WIDE AND NARROW BAND GAP SEMICONDUCTORS. CARRIERS OPTICALLY EXCITED IN THE PHOTOCONDUCTOR ARE ACCELERATED IN THE FIRST WIDE BAND GAP SEMICONDUCTOR LAYER. WHEN THESE ENTER THE NARROW BAND GAP MATERIAL, THEIR EXCESS ENERGY IS LOST IN PRODUCTION OF ELECTRON-HOLE PAIRS BY INTRINSIC IMPACT IONIZATION. THE ADDITIONAL CARRIERS SO PRODUCED ARE ACCELERATED IN THE SECOND WIDE BAND GAP LAYER TO PRODUCE ADDITIONAL MULTIPLICATION IN THE SECOND NARROW BAND GAP LAYER, AND SO ON. THE PROBLEM CONSIDERED IN THE PRESENT REPORT IS THE CHOICE OF SUITABLE MATERIALS FOR THE WIDE BAND GAP LAYERS. ONE SUCH MATERIAL IS AMORPHOUS SELENIUM. HOLES PHOTOEXCITED IN A PHOTOCONDUCTOR CAN BE INJECTED INTO AND TRANSPORTED THROUGH SE LAYERS. ELECTRONS ARE NOT TRANSPORTED. OTHER POSSIBLE WIDE BAND GAP MATERIALS INCLUDE SILVER CHLORIDE AND CADMIUM SULFIDE. THESE HAVE NOT YET BEEN EXTENSIVELY INVESTIGATED. THE PROBLEM OF ACCELERATING CARRIERS TO HIGH ENERGIES IN THE WIDE BAND GAP MATERIAL WILL RECEIVE PRIMARY ATTENTION IN THE NEXT PHASE OF THE WORK. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 171 9/1
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y ELECTRONIC TUBE
DIV

SOLID STATE IMAGE INTENSIFIERS. (U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL ENGINEERING REPT. NO.
3, 1 JUN-30 JUN 66.
JUL 66 8P FOWLIS, D. C. INOVICE, M. A. I
SZEPESI, Z. ;
CONTRACT: N61339-66-C-0064,
PROJ: 7270-2,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*IMAGE INTENSIFIERS(ELECTRONICS),
SEMICONDUCTOR DEVICES), SEMICONDUCTOR FILMS,
CADMIUM COMPOUNDS, SULFIDES, VAPOR PLATING,
SINTERING, REFLECTION (U)

CDS MIXTURES OF DIFFERENT COMPOSITION WERE
PREPARED FOR MAKING SINTERED PC LAYERS. SEMI-
TRANSPARENT BLACK FILMS DEPOSITED ON TOP OF THE EL
LAYER SHOWED MUCH HIGHER LIGHT REFLECTION THAN THOSE
ON GLASS SUBSTRATES. SMOOTHENING OF THE EL
SURFACE WITH A THICK PLASTIC COATING IS PLANNED TO
ELIMINATE THIS EFFECT. THE EVAPORATION TECHNIQUE
FOR MAKING OPAQUE BLACK FILMS WAS IMPROVED, BUT
FURTHER WORK IS NEEDED TO ELIMINATE THE HEATING OF
THE SUBSTRATE AND TO HAVE MORE UNIFORM FILMS FOR
LARGER AREAS. WHITE EL CELLS WERE MADE BY MIXING
BLUE AND YELLOW EL POWDERS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 725 11/7 7/4 13/8
DELAWARE UNIV NEWARK DEPT OF PHYSICS

EVAPORATED AND RECRYSTALLIZED CDS LAYERS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

JUL 66 63P BOER, K. W. I

REPT. NO. TR-11,

CONTRACT: NONR-4336(UO)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (CADMIUM COMPOUNDS, SULFIDES),
(FILMS, PHOTOELECTRIC MATERIALS), VAPOR PLATING,
VACUUM APPARATUS, RECRYSTALLIZATION,
PHOTOCONDUCTIVITY, COPPER, DOPING,
DEFECTS (MATERIALS), HEAT TREATMENT
IDENTIFIERS: CADMIUM SULFIDE

(U)

(U)

HEAT TREATMENTS OF EVAPORATED CDS LAYERS IN NITROGEN CONTAINING HC AND TRACES OF OXYGEN, AND PROVIDING A TRANSPORT OF CDS AND COPPER ARE REPORTED. RECRYSTALLIZATION OF AREAS UP TO SEVERAL SQ MM ARE OBSERVED. AT 25C, THE TREATED LAYERS SHOW MOBILITIES OF 140 TO 230 SQ CM/VS, PHOTOCONDUCTIVITIES OF 0.001 TO 0.2/OHMS/CM AT 750 FT-C (2600K WHITE LIGHT) WITH LIGHT-TO-DARK-CURRENT RATIOS OF 10 TO THE 8TH POWER - 10 TO THE 9TH POWER AND RESPONSE TIME (DECAY) OF 300 MICROSIC TO 1.2 MS AT 100 FT-C. THE LEVEL DISTRIBUTION AND CAPTURE CROSS SECTION FOR ELECTRONS IS INVESTIGATED USING SPECTRAL DISTRIBUTION, LIGHT INTENSITY, AND TEMPERATURE DEPENDENCE OF PHOTOCONDUCTIVITY, THERMALLY STIMULATED CURRENT AND RESPONSE TIME ANALYSES. LEVELS AT 0.23, 0.43, 0.67, 1.05 AND 2.05 EV ARE OBSERVED AND THE LETTER THREE ATTRIBUTED TO CU-CENTERS. COMPARED TO OTHER LAYERS AND SINGLE CRYSTALS, THESE LAYERS SHOW A DENSITY OF <10 TO THE 12TH POWER/CU CM OF LEVELS ATTRIBUTED TO SULFUR VACANCIES IN THE RANGE BETWEEN 0.3 AND 0.65 EV AND A NOT DETECTABLE AMOUNT OF INTRINSIC DEFECTS ACTING AS QUENCHING CENTERS AT 0.9 AND 1.35 EV. THIS IS EXPLAINED BY A CU-ENHANCED RECRYSTALLIZATION IN A CDS-SUPPLYING ATMOSPHERE AT TEMPERATURES (620 TO 650C) BELOW THE TEMPERATURES OTHERWISE USED FOR CRYSTAL GROWTH, AND THEREBY EFFICIENT ANNEALING OF INTRINSIC DEFECTS.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 856 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

SURFACE PINNED LAYER-LIKE FIELD INHOMOGENEITIES IN
CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.
JUL 66 IUP BOER, K. W. IVOSS, PETER I
REPT. NO. TR-11,
CONTRACT: DA-31-124-ARO(D)-173,
MONITOR: AROD 4461:12

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, *ELECTRIC FIELDS),
(*CADMIUM COMPOUNDS, *SULFIDES), CRYSTALS,
SURFACE PROPERTIES, PHOTOGRAPHIC ANALYSIS,
CARRIERS(SEMICONDUCTORS) (U)
IDENTIFIERS: CADMIUM SULFIDE, NEGATIVE DIFFERENTIAL
CONDUCTIVITY, FRANZ-KELDYSH EFFECT (U)

IN A CDS PLATELET A SLOW-MOVING HIGH ELECTRIC
FIELD DOMAIN WHICH CHANGES IT WIDTH APPRECIABLY IN
TIME WAS OBSERVED USING THE FRANZ-KELDYSH EFFECT.
PHOTOGRAPHS AND A CURRENT-VERSUS-TIME CURVE ARE
PRESENTED, WHICH SHOW THAT THE CHANGING HIGH FIELD
DOMAIN IS ACTUALLY THE PROJECTION OF A NARROW HIGH
FIELD LAYER SPREAD IN THE BULK OF THE CRYSTAL, WHOSE
EDGES MOVE AT THE CRYSTAL SURFACES WITH DIFFERENT
VELOCITIES. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 857 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

THE INFLUENCE OF OXYGEN IN THE ULTRAHIGH VACUUM RANGE
ON ELECTRICAL PROPERTIES OF CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.
JUL 66 17P BOER, K. W. ISCHUBERT, R. I
REPT. NO. TR-8,
CONTRACT: DA-31-124-ARO(D)-173,
MONITOR: AROU 4461:13

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, *VACUUM), (*CADMIUM
COMPOUNDS, *SULFIDES), (*OXYGEN, ADSORPTION),
SINGLE CRYSTALS, ELECTRICAL PROPERTIES,
PHOTOCONDUCTIVITY, VAPOR PRESSURE, MASS SPECTRUM,
IMPURITIES, HYDROGEN, CARBON DIOXIDE (U)
IDENTIFIERS: CADMIUM SULFIDE, DESORPTION (U)

MEASUREMENT OF ADSORPTION AND DESORPTION OF OXYGEN
IN THE RANGE BETWEEN 2×10 TO THE -12 POWER AND $5 \times$
 10 TO THE -6 POWER TORR AND CORRESPONDING INFLUENCES
ON PHOTOCONDUCTANCE ON CDS SINGLE CRYSTALS ARE
REPORTED. PARTIAL PRESSURES WERE MEASURED WITH A
SENSITIVE MASS SPECTROMETER LOCATED DIRECTLY IN FRONT
OF THE CRYSTAL. A TYPICAL DESORPTION CURVE IS
GIVEN FOR AMU 16. EFFECTS OF OTHER GASES
PREDOMINANT IN THE VACUUM SYSTEM SUCH AS HYDROGEN AND
CARBON DIOXIDE WERE ALSO STUDIED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-637 919 2U/12
STANFORD UNIV CALIF DEPT OF MATERIALS SCIENCE

ELECTRIC FIELD EFFECTS IN TRAPPING PROCESSES. (U)

JAN 66 8P DUSSEL, GUSTAVO A. IBUBE,
RICHARD H. I
MONITOR: AROU 4119:10

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED
PHYSICS V37 N7 P2797-2804 JUN 1966.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCATORS, *ELECTRIC FIELDS),
(*CARRIERS(SEMICONDUCATORS), ELECTRIC FIELDS),
CADMIUM COMPOUNDS, SULFIDES, SELENIDES,
PHOTOCONDUCTIVITY, POLARIZATION, HEATING,
ELECTROCHEMISTRY, IONIZATION,
TUNNELING(ELECTRONICS), PROBABILITY (U)
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,
HEAT EFFECT (U)

THE EFFECTS OF MODERATE ELECTRIC FIELDS (\leq OR \approx
3,000 V/CM) ON THE TRAPPING PROCESSES IN
PHOTOSENSITIVE CDS-CDSE SINGLE CRYSTALS WERE
INVESTIGATED USING PHOTOELECTRONIC TECHNIQUES.
POSSIBLE MECHANISMS SUCH AS INJECTION OF ELECTRONS,
EXTRACTION OF HOLES, DIELECTRIC POLARIZATION DUE TO
INHOMOGENEITIES, JOULE HEATING, ELECTROCHEMICAL
EFFECTS, IMPACT IONIZATION, FIELD-ASSISTED TUNNELING,
AND FIELD-ASSOCIATED CHANGES IN THE CAPTURE CROSS
SECTIONS AND/OR THERMAL EMISSION PROBABILITIES OF
TRAPS WERE CONSIDERED. EVIDENCE IS PRESENTED FOR
THE REALITY OF FIELD-ASSOCIATED CHANGES IN TRAPPING
PARAMETERS IN THE ABSENCE OF ALL THE OTHER POSSIBLE
EFFECTS. RESULTS ARE CONSISTENT WITH A FIELD
EMPTYING OF COULOMB-ATTRACTIVE TRAPS BY A DECREASE
IN THE TRAP DEPTH AND A DECREASE IN THE CAPTURE CROSS
SECTION OF TRAPS. THE CONCLUSIONS MAY BE RELEVANT
TO THE INTERPRETATION OF SPACE-CHARGE-LIMITED CURRENT
DATA AND TO MECHANISMS CAPABLE OF LEADING TO IMPROVE
PHOTOCONDUCTOR SPEED FOR LOW INTENSITY EXCITATION.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-638 016 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

GAS DESORPTION FROM VIRGINAL CDS CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.
66 8P BOER, K. W. ;
REPT. NO. TR-10,
CONTRACT: DA-31-124-ARO(D)-173,
MONITOR: AROD 4461:14

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEMICONDUCTORS, PURIFICATION),
(*CADMIUM COMPOUNDS, *SULFIDES), MASS SPECTRUM,
HEAT OF ACTIVATION, SURFACE PROPERTIES,
PHOTOCONDUCTIVITY, CHEMISORPTION (U)
IDENTIFIERS: CADMIUM SULFIDE, DESORPTION (U)

CDS SINGLE CRYSTALS ARE HEATED LINEARLY IN TIME
WHILE THE DESORPTION OF GAS IS MONITORED CONTINUOUSLY
ON A MASS SPECTROMETRIC LOCATED DIRECTLY IN FRONT OF
THE CRYSTAL. A DESORPTION CURVE OF CDS FOR AMU
16 IS GIVEN FOR A TEMPERATURE RANGE OF -180C TO +
225C. FOUR SITES (OR LAYERS) ARE SEEN TO
DESORB WITH CERTAIN ACTIVATION ENERGIES. CHANGES IN
SURFACE STRUCTURE ARE SUGGESTED SINCE THE PROCESS IS
NOT REPRODUCIBLE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-639 345 20/2 7/4
BROWN UNIV PROVIDENCE R I

STUDY OF SURFACE PROPERTIES OF ATOMICALLY-CLEAN
METALS AND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: REPT. NO. 9, 1 JAN-30 JUN 66
(FINAL).

SEP 66 58P FARNSWORTH, H. E. CAMPBELL, B. D.
ONCHI, M. I.
CONTRACT: DA-28-043-AMC-00299(E),
PROJ: DA-200-14501-B11B,
MONITOR: ECOM 00299-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-630 863.

DESCRIPTORS: (*SEMICONDUCTORS, SURFACE PROPERTIES),
(*NICKEL, ADSORPTION), OXYGEN, CADMIUM COMPOUNDS,
SULFIDES, ZINC COMPOUNDS, NITROGEN COMPOUNDS,
HEAT OF ACTIVATION, ELECTRON DIFFRACTION ANALYSIS,
MASS SPECTROSCOPY, WORK FUNCTIONS (U)
IDENTIFIERS: CADMIUM SULFIDE, ZINC OXIDE (U)

ACTIVATION ENERGIES WERE MEASURED FOR THE
ADSORPTION AND DESORPTION OF OXYGEN ON CADMIUM
SULFIDE SURFACES. ON THE BASIS OF THESE AND OTHER
RESULTS IT IS SUGGESTED THAT THERE ARE TWO TYPES OF
OXYGEN ADSORPTION. ONE TYPE PRODUCES CHARGED
SURFACE STATES, THE OTHER LEADS TO A DIPOLE LAYER.
PRELIMINARY OBSERVATIONS WERE MADE ON A ZINC OXIDE
CRYSTAL. NO PHOTOENHANCED UPTAKE OF OXYGEN WAS
NOTED AND NO CHANGES IN SURFACE PHOTOVOLTAGE WERE
OBTAINED. (U)

UNCLASSIFIED

DDC REPORT BIB IOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-639 395 20/2
WISCONSIN UNIV MADISON

CYCLOTRON RESONANCE EXPERIMENTS.

(U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT., 1 APR 63-31
MAR 66.

APR 66 IYP DEXTER, RICHARD N. PEERCY,
PAUL S. HUPPE, FRANCIS F. IRADOFF, PHILIP L. I
VEAL, BOYD I

CONTRACT: AF 33(657)-11515,

PROJ: AF-7885,

MONITOR: ARL 66-U078

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CYCLOTRON RESONANCE PHENOMENA,
SEMICONDUCTORS), (*SEMICONDUCTORS, TRANSPORT
PROPERTIES), (*METALLOIDS, TRANSPORT PROPERTIES),
TIN, TELLURIUM, ANTIMONY, INDIUM ALLOYS,
ANTIMONY ALLOYS, CADMIUM COMPOUNDS, SULFIDES,
MERCURY COMPOUNDS, TELLURIDES,
CARRIERS (SEMICONDUCTORS), MICROWAVES,
PROPAGATION, OSCILLATION, MODULATION, BAND
THEORY OF SOLIDS

(U)

IDENTIFIERS: CADMIUM SULFIDE, DEHAAS-
VANALPHEN EFFECT, FERMI SURFACES, HELICONS,
INDIUM ANTIMONIDE, MERCURIC TELLURIDE

(U)

VARIOUS EXPERIMENTS INCLUDING CYCLOTRON RESONANCE,
HELICON PROPAGATION AND DE HAAS - VAN ALPHEN
EFFECT WERE CONDUCTED FOR PURPOSES OF STUDYING
TRANSPORT PROPERTIES OF SEVERAL SEMICONDUCTORS AND
SEMIMETALS. THESE MATERIALS INCLUDE ALPHA-SN,
TE, INSB, SB, CDS AND HGTE. IN
MOST CASES IT WAS POSSIBLE TO OBTAIN NEW INFORMATION
ON EFFECTIVE MASSES, CARRIER DENSITIES OR SCATTERING
TIMES. INSTRUMENTATION WHICH WAS CONSTRUCTED TO
PERMIT THE USE OF LARGE UNIAXIAL STRESS IN CYCLOTRON
RESONANCE AND DE HAAS - VAN ALPHEN EXPERIMENTS IS
DESCRIBED ALONG WITH A DISCUSSION OF THE MORE
SUCCESSFUL RESEARCH AREAS. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-639 667 9/5 20/12
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

TUNED INTEGRATED CIRCUITS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1, 1 APR-1 JUL
66,

SEP 66 72P NEWELL, W. E. IZALAKIS, M. I
MCAVOY, B. R. I
REPT. NO. 66-9F1-NEWSC-R1,
CONTRACT: DA-28-043-AMC-02045(E),
PROJ: DA-1E6-22001-A-440,
TASK: 03.
MONITOR: ECOM 02045-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TUNING DEVICES, *INTEGRATED
CIRCUITS), SEMICONDUCTOR DEVICES,
MICROMINIATURIZATION(ELECTRONICS), CADMIUM
COMPOUNDS, SULFIDES, PIEZOELECTRIC CRYSTALS

(U)

THE PURPOSE OF THE CONTRACT IS TO INVESTIGATE
TUNING DEVICES AND PHYSICAL PHENOMENA WHICH COULD
LEAD TO STABLE FREQUENCY SELECTIVE SILICON INTEGRATED
CIRCUITS OVER THE RANGE FROM 150 KHZ TO 150 MHZ.
THIS FIRST QUARTERLY REPORT INCLUDES THE
DESCRIPTION OF THE METHOD FOR PRODUCING
STOICHIOMETRIC, WELL-ORIENTED AND INSULATING THICK
FILMS OF CDS BY VACUUM CO-EVAPORATION, DISCUSSES
THE STRUCTURAL HEXAGONALITY OF THE PRODUCED CDS
FILMS AND DESCRIBES THE EXPERIMENTAL ANALYSIS OF
PIEZOELECTRIC RESONANCES.

(U)

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-641 002 14/2 9/1
LINCOLN LAB MASS INST OF TECH LEXINGTON

COMPARATIVE DATA ON CDS TRANSDUCERS FROM 14 MC/S TO
70 GC/S. (U)

DEC 65 JP WEBER, ROBERT ;
REPT. NO. JA-2731,
CONTRACT: AF 19(628)-5167,
MONITOR: ESD TR-66-234

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE IEEE
V54 N2 P333-4 FEB 1966.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CADMIUM COMPOUNDS, SULFIDES),
(*TRANSDUCERS, SEMICONDUCTING FILMS),
PERFORMANCE(ENGINEERING), ELECTRON BOMBARDMENT,
HIGH FREQUENCY, VERY HIGH FREQUENCY, VAPOR
PLATING, ACOUSTICS, ULTRAHIGH FREQUENCY, MICROWAVE
FREQUENCY, PIEZOELECTRIC TRANSDUCERS (U)

THE LETTER REPORTS THE RESULTS OF USING A
STRAIGHTFORWARD ELECTRON-BOMBARDMENT TECHNIQUE AS
OPPOSED TO OTHER TECHNIQUES FOR THE REPRODUCIBLE,
INDIRECT-VAPOR DEPOSITION OF INSULATING PIEZOELECTRIC
CADMIUM SULFIDE FILM TRANSDUCERS ONTO METALLIC,
NONMETALLIC, AND SEMICONDUCTING MATERIALS.
PRELIMINARY COMPARATIVE DATA ARE PRESENTED
CONCERNING THE PERFORMANCE OF THESE TRANSDUCERS
COMPARED TO AT LEAST ONE OTHER POSSIBLE METHOD OF
ACOUSTIC EXCITATION COMMONLY USED IN THE SAME
SITUATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-641 40U 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

INJECTION CAUSED P-N JUNCTION IN CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
OCT 66 25P BOER, K. W. INARD, J. J. I
REPT. NO. TR-15
CONTRACT: NONR-4336(00)

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, ELECTRICAL
PROPERTIES); (*CADMIUM COMPOUNDS, SULFIDES);
CARRIERS (SEMICONDUCTORS); PHOTOCONDUCTIVITY;
INFRARED RADIATION, VOLTAGE (U)
IDENTIFIERS: CADMIUM SULFIDE (U)

IT IS OBSERVED USING THE FRANZ-KELDYSH EFFECT
THAT CERTAIN 'VERY PURE' CDS CRYSTALS SHOW A HIGH
FIELD LAYER CLOSE TO, BUT WELL SEPARATED FROM, A HOLE
INJECTING ANODE (AU). THIS LAYER IS IDENTIFIED
AS A P-N JUNCTION CAUSED BY HOLE INJECTION.
INVERSION OF A IR QUENCHING SPECTRUM INTO A
SIMILAR IR EXCITATION SPECTRUM IS OBSERVED AT AN
APPLIED VOLTAGE WHERE THIS HIGH FIELD LAYER BECOMES
'VISIBLE', AND EXPLAINED AS CAUSED BY A CURRENT
CONTROLLING P-TYPE REGION IN CDS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-641 456 9/1 20/12
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND
DEVELOPMENT CENTER

NEW SOLID-STATE DEVICE CONCEPTS,

(U)

SEP 66 SIP AVEN. M. GARWACKI, W. HALL,
R. B. RICHARDSON, J. R. WOODBURY, H. H. I
REPT. NO. SCIENTIFIC-6
CONTRACT: AF 19(628)-4976
PROJ: AF-4608
TASK: 460805
MONITOR: AFRL 66-657

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTOR DEVICES, SOLID STATE
PHYSICS), ELECTROLUMINESCENCE, SEMICONDUCTORS,
CADMIUM ALLOYS, CADMIUM COMPOUNDS, SELENIUM
ALLOYS, SULFIDES, ZINC ALLOYS, SILICON, MASKING,
DIFFUSION, SOLUBILITY, PHOTOCONDUCTIVITY,
OXIDATION, SEMICONDUCTING FILMS,
DIODES (SEMICONDUCTOR), OXIDES
IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS

(U)

(M)

THE DIFFUSION OF SE IN CDSE IS FOUND TO BE
SIMILAR TO THAT IN CDS. NA DIFFUSES RAPIDLY IN
CDS, INDICATING AN INTERSTITIAL DIFFUSION
MECHANISM. ENHANCED NA SOLUBILITY IN DONOR-DOPED
MATERIAL INDICATES, IN ADDITION, A SUBSTITUTIONAL
FORM. IN CL-DOPED CDS IT FORMS A RATHER
STABLE NA-CL COMPLEX 'MOLECULE.' A METHOD OF
MEASURING THE DIFFUSION PROFILE OF CL USING
RADIOACTIVE NA IS INDICATED. MEASUREMENTS SHOW
CONSIDERABLE OVERLAP BETWEEN THE PHOTOCONDUCTIVITY
EXCITATION BANDS IN P- AND N-TYPE
ZNSE(X)TE(1-X) AND THE ELECTROLUMINESCENT
EMISSION BAND OF THE DIODES, THUS CONFIRMING THE
TURN-ON MECHANISM POSTULATED EARLIER. REDUCTION OF
THE CONTACT RESISTANCE TO THE P-TYPE SIDE OF THE
ZNSE(X)TE(1-X) DIODES HAS MADE IT
POSSIBLE TO TURN THEM ON AT 77K WITHOUT AN EXTERNAL
LIGHT PULSE. THE ELECTROCHEMICAL PHENOMENA TAKING
PLACE DURING THE OXIDATION OF SILICON ARE DISCUSSED.
WITH THIN-FILM GAAS DIODES PREPARED UNDER MORE
CAREFULLY CONTROLLED EVAPORATION CONDITIONS, IT HAS
BEEN FOUND THAT ONLY FILMS DEPOSITED ON SUBSTRATES
BETWEEN 350 AND 450C HAVE OPTICAL PROPERTIES
APPROACHING THOSE OF BULK GAAS.

(U)

188

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-641 711 9/5
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL
ENGINEERING

MONOCHROMATIC ILLUMINATION OF CADMIUM-SULFIDE
OSCILLATOR,

(U)

APR 65 3P WHITE, R. M. ;
CONTRACT: AF-AFOSR-139-64
PROJ: AF-4751
MONITOR: AFOSR 66-0043

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE IEEE
V53 N7 P745-6 JUL 1965.

DESCRIPTORS: (CRYSTAL OSCILLATORS, ILLUMINATION),
(CADMIUM COMPOUNDS, SULFIDES), MONOCHROMATIC
LIGHT, OSCILLATION, INTENSITY,
RESISTANCE (ELECTRICAL), SEMICONDUCTORS, SINGLE
CRYSTALS, ELECTRIC CURRENTS

(U)

THE PERIOD, WAVEFORM, AND AMPLITUDE OF CURRENT
OSCILLATIONS IN A UNIFORMLY ILLUMINATED CADMIUM-
SULFIDE OSCILLATOR HAVE BEEN FOUND TO DEPEND STRONGLY
UPON THE WAVE-LENGTH AND INTENSITY OF THE LIGHT USED.
THE OBSERVATIONS DESCRIBED HERE SHOW THAT A GIVEN
FEATURE OF THE OSCILLATION (E.G., A PARTICULAR
WAVESHAPE) IS NOT ASSOCIATED SOLELY WITH A SINGLE
WAVELENGTH, BUT RATHER THAT THE WAVE-LENGTH AT WHICH
THE FEATURE OCCURS DEPENDS UPON THE LIGHT INTENSITY.
THE OBSERVATIONS STRONGLY SUGGEST THAT THE
WAVELENGTH AND INTENSITY OF ILLUMINATION ARE NOT
PRIMARY PARAMETERS, BUT RATHER, BY THEIR EFFECTS UPON
RESISTIVITY OF THE COS, THEY AFFECT THE
OSCILLATIONS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-642 201 2075
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

ELECTRON-BEAM PUMPED LASERS OF CDSE AND CDS, (U)

JAN 66 SP HURWITZ, CHARLES E. I
REPT. NO. JA-2757
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-66-235

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN APPLIED PHYSICS
LETTERS V8 N5 P121-4 MAR 1966.

DESCRIPTORS: (*LASERS, *SEMICONDUCTOR DEVICES),
(*PUMPING(OPTICAL), *ELECTRON BEAMS), CADMIUM
COMPOUNDS, SELENIDES, SULFIDES, EXCITATION,
EMISSIVITY, POWER, SINGLE CRYSTALS (U)
IDENTIFIERS: CADMIUM SELENIDE, CADMIUM SULFIDE,
SEMICONDUCTOR LASERS (U)

LASER ACTION WAS OBTAINED IN SINGLE CRYSTAL
PLATELETS OF CDS AND CDSE EXCITED BY A 20-
75KEV ELECTRON BEAM. THE LASER EMISSION IS
CENTERED AT 4910 AND 4950A IN CDS AND AT 6840
AND 6910A IN CDSE, FOR TEMPERATURES OF 4.2 AND
77K, RESPECTIVELY. PEAK OUTPUT POWERS OF 16W
WITH A CORRESPONDING POWER EFFICIENCY OF 8% IN
CDSE AND 10W WITH AN EFFICIENCY OF 0.7% IN
CDS WERE OBTAINED AT 4.2K. CORRESPONDING VALUE
OF POWER AND EFFICIENCY AT 77K WERE SOMEWHAT LOWER.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-642 217 14/2
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

ELECTRON BOMBARDMENT TECHNIQUE FOR DEPOSITION OF CDS
FILM TRANSDUCERS, (U)

FEB 66 3P WEBER, ROBERT I
REPT. NO. JA-2762
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-66-422

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN REVIEW OF SCIENTIFIC
INSTRUMENTS V37 N7 P955-6 JUL 1966.

DESCRIPTORS: (*TRANSDUCERS, FILMS),
(*PIEZOELECTRIC TRANSDUCERS, PREPARATION),
(*CADMIUM COMPOUNDS, *VAPOR PLATING), (*SULFIDES,
VAPOR PLATING), ELECTROACOUSTIC TRANSDUCERS,
DEPOSITION, ELECTRON BOMBARDMENT, DIELECTRICS,
ACOUSTIC PROPERTIES, PHONONS (U)
IDENTIFIERS: CADMIUM SULFIDE, THIN FILMS (U)

A SIMPLE ELECTRON BOMBARDMENT TECHNIQUE FOR THE
REPRODUCIBLE, INDIRECT VAPOR DEPOSITION OF INSULATING
PIEZOELECTRIC CADMIUM SULFIDE FILM TRANSDUCERS IS
DESCRIBED IN DETAIL. BY THIS TECHNIQUE, HIGH
RESISTIVITY FILMS RANGING IN THICKNESS FROM 0.1 TO 62
MICRONS WERE DEPOSITED ONTO INSULATORS,
SEMICONDUCTORS AND METALS. THESE FILM TRANSDUCERS
WERE ACOUSTICALLY ACTIVE FROM 70 GC TO 14 MC.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-642 450 20/12 20/2
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF
II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 6, 15
JUL-14 OCT 66,
OCT 66 32P FAHRIG, R. H. BROWN, L. W. ;
WEBB, G. N. ;
CONTRACT: AF 33(615)-2947

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-634 591.

DESCRIPTORS: (*SINGLE CRYSTALS, *SEMICONDUCTORS),
(*CRYSTAL GROWTH, SINGLE CRYSTALS),
SYNTHESIS(CHEMISTRY), PURIFICATION, CADMIUM,
SULFUR, CADMIUM COMPOUNDS, SULFIDES, ZINC
ALLOYS, SELENIUM ALLOYS, ZINC COMPOUNDS, CADMIUM
ALLOYS, INTERMETALLIC COMPOUNDS (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM SELENIDE,
ZINC SULFIDE, ZINC SELENIDE (U)

COMPOUNDS SYNTHESIZED WERE CDS, ZNS, CDSE
AND ZNSE. THE PURITY OF THE CDS REMAINED AT
A LEVEL OF ABOUT 6 - 9%. ANALYSIS OF THE ZINC
COMPOUNDS INDICATES SOMEWHAT LOWER PURITY AND EFFORTS
TO IMPROVE THIS SITUATION WERE INITIATED.
CRYSTALLIZATION OF CDS, CDSE, AND ZNS WAS
ACCOMPLISHED FROM THE VAPOR PHASE. (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-642 524 9/1 13/8
PHILCO BLUE BELL PA APPLIED RESEARCH LAB

METAL BASE TRANSISTOR II. (U)

DESCRIPTIVE NOTE: REPT. NO. 4 (FINAL) | JUL 64-30
JUN 65;

JUL 66 71P KANE, WALTER IHERSHINGER,
LINCOLN I

REPT. NO. A051-F
CONTRACT: DA-28-U43-AMC-00161(E)
PROJ: DA-1P6-22001-A-056
TASK: 1P6-22001-A-05602
MONITOR: ECOM 00161-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-621 362.

DESCRIPTORS: (*TRANSISTORS, *FILMS), METAL FILMS,
SEMICONDUCTING FILMS, DIODES(SEMICONDUCTOR),
RESISTANCE(ELECTRICAL), GAIN, THICKNESS, GOLD,
MANUFACTURING METHODS, SULFIDES, VAPOR PLATING,
ELECTRICAL CONDUCTANCE, SUBSTRATES, ZINC
COMPOUNDS, CADMIUM COMPOUNDS, AGING(MATERIALS) (U)
IDENTIFIERS: THIN FILMS, THIN FILMS (U)
ELECTRONICS (U)

THE MEAN-FREE-PATH OF ELECTRONS IN SEVERAL METAL
FILMS WAS DETERMINED AND FOUND TO BE INDEPENDENT OF
DEPOSITION RATE AND SUBSTRATE TEMPERATURE. THE
MINIMUM THICKNESS FOR CONTINUITY OF SUCH FILMS WAS
ALSO FOUND TO BE INDEPENDENT OF SUBSTRATE
TEMPERATURES, AND VARIES WITH DEPOSITION RATE ONLY
FOR LOW RATES. VALUES OF MEAN-FREE-PATH AND
MINIMUM THICKNESS ARE GIVEN. IT IS INDICATED THAT
THE VERY LOW VALUES OF $T_{SUB MIN}/HOT-ELECTRON$ MEAN-
FREE-PATH NECESSARY FOR A HIGH-GAIN METAL-BASE
TRANSISTOR ARE NOT LIKELY TO BE OBTAINED. THE
CHARACTERISTICS OF THE TRIODES FABRICATED DURING THIS
PROGRAM HAVE BEEN ANALYZED, AND IT HAS BEEN CONCLUDED
THAT THE IMPORTANT GAIN MECHANISM IS THE CONTROL OF
CURRENT FLOW THROUGH A GRID-LIKE STRUCTURE, FORMED BY
A PARTIALLY AGGLOMERATED BASE FILM. THE CONTROL OF
COMPOSITION GRADIENT IN ZNCDs FILMS IS SEEN TO
PERMIT FABRICATION OF THIN-FILM SCHOTTKY DIODES
HAVING PREDICTABLE BARRIER HEIGHTS, YIELDING A METHOD
OF CONTROLLING DIODE CHARACTERISTICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-642 933 9/1
WESTINGHOUSE ELECTRIC CORP ELMIRA N Y ELECTRONIC TUBE
DIV

SOLID STATE IMAGE INTENSIFIERS. (U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL ENGINEERING REPT. NO.
4, 1-31 JUL 66,
AUG 66 6P FOWLIS, D. C. ; NOVICE, M. A. ;
SZEPESI, Z. ;
CONTRACT: N61339-66-C0064
PROJ: 7270-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-637 171.

DESCRIPTORS: (*IMAGE INTENSIFIERS(ELECTRONICS),
SOLID STATE PHYSICS), CADMIUM COMPOUNDS, SULFIDES,
SINTERING, FILMS, OPTICAL COATINGS, GERMANIUM,
MAGNESIUM COMPOUNDS, FLUORIDES, CHROMIUM,
SILICON COMPOUNDS, MONOXIDES,
RESISTANCE(ELECTRICAL), LIGHT TRANSMISSION,
DISPLAY SYSTEMS, LASERS, SCANNING, CADMIUM
ALLOYS, SELENIUM ALLOYS, PHOSPHORESCENT MATERIALS (U)
IDENTIFIERS: CADMIUM SULFIDE, CADMIUM (U)
SELENIDE (U)

SERIES OF EXPERIMENTS WERE CARRIED OUT FOR
DECREASING IN DARK CURRENTS IN SINTERED CDSE
LAYERS. A BATCH OF CDS POWDER WITH 1% ZNS
WAS PREPARED AND IS BEING EVALUATED. CR-SiO
FILMS WERE DEPOSITED AND IMAGE INTENSIFIER PANELS
ARE BEING BUILT ON THEM. IMAGE INTENSIFIER PANELS
WERE BUILT WITH INSULATING OPTICAL BLACK FILMS
BETWEEN THE PC AND EL LAYERS. A COMBINATION
DISPLAY SYSTEM BY PROJECTING A LASER SCANNED IMAGE ON
THE PC-EL IMAGE INTENSIFIER WAS DEMONSTRATED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-643 519 9/5
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

TUNED INTEGRATED CIRCUITS.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT., NO. 2, 1 JUL-30 SEP
66,

DEC 66 37P NEWELL, W. E. IZALAR, S. H. ;
CONTRACT: DA-28-U43-AMC-02045(E)
PROJ: DA-1E6-22001-A-440
TASK: 1E6-22001-A-440 U3
MONITOR: ECOM 02045-2

UNCLASSIFIED REPORT

DESCRIPTORS: (•INTEGRATED CIRCUITS, •TUNING
DEVICES), VAPOR PLATING, VACUUM APPARATUS, CADMIUM
COMPOUNDS, SULFIDES, FILMS, RESONATORS,
PIEZOELECTRIC CRYSTALS, RESONANCE, SILICON,
GOLD, IMPEDANCE MATCHING

(U)

IDENTIFIERS: CADMIUM SULFIDE, THIN FILMS, THIN
FILMS ELECTRONICS

U)

APPARATUS AND IMPROVED PROCEDURES FOR THE VACUUM
CO-EVAPORATION OF THICK CDS FILMS (5 TO 15
MICRONS) ARE DESCRIBED. A CORRELATION BETWEEN
THE THICKNESS OF CDS FILM PIEZORESONATORS, THEIR
RESONANT FREQUENCY AND THE ELECTRODE AREAS, REQUIRED
FOR THE 50 OHM IMPEDANCE MATCHING, WAS WORKED OUT.
FIRST FILM RESONANCES (AS DISTINGUISHED FROM
SUBSTRATE RESONANCES) WITH Q OF ABOUT 15 WERE
OBSERVED IN GOLD-CDS-GOLD PIEZOELECTRIC
STRUCTURES, DEPOSITED ON THIN AND THICK GLASS
SUBSTRATES.

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-643 774 9/1 13/8
RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: FINAL REPT., 1 JUL 64-30 JUN 66,
NOV 66 139P TOPFER, M. L. ;BOWE, J. J. ;
DANIS, A. H. ;ELLIS, S. G. ;FABULA, J. J. ;
CONTRACT: DA-28-043-AMC-00231(E)
PROJ: DA-1P6-22001-AU56
TASK: U2
MONITOR: ECOM 00231-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-639 433.

DESCRIPTORS: (*TRANSISTORS, SEMICONDUCTING FILMS),
MICROSTRUCTURE, CADMIUM COMPOUNDS, SULFIDES,
SEMICONDUCTOR DEVICES, CADMIUM ALLOYS, SELENIUM
ALLOYS, PHOTOELECTRIC EFFECT, MANUFACTURING METHODS,
SILICON COMPOUNDS, OXIDES, CAPACITANCE, VOLTAGE,
SURFACE PROPERTIES, MASKING, (U)
GATES(CIRCUITS) (U)
IDENTIFIERS: THIN FILMS, THIN FILMS (M)
ELECTRONICS (M)

THE REPORT COVERS THE WORK ON THE THIN-FILM
POLYCRYSTALLINE FIELD-EFFECT TRIODE DURING THE PERIOD
OF JULY 1, 1964 TO JUNE 30, 1966. ALL OF THE
WORK ON THE CONTRACT IS REVIEWED. THE FOLLOWING
WORK DONE DURING THE EIGHTH QUARTER IS ALSO COVERED.
THE BEHAVIOR OF THE REVERSIBLE GATE INSTABILITY AT
TEMPERATURES BETWEEN -40C AND +60C IS
DISCUSSED. THE INVESTIGATION WAS CARRIED OUT TO
DETERMINE THE VARIATION OF THE INSTABILITY MECHANISM
WITH TEMPERATURE. THESE INITIAL MEASUREMENTS ARE
TOO PRELIMINARY TO DRAW CONCLUSIONS. THE MASKS FOR
THE FOUR-INPUT NOR/OR GATE CIRCUIT WERE RECEIVED,
AND THE WIRE GRILLE WAS FABRICATED. INITIAL TRIAL
RUNS WITH THESE MASKS TO EVALUATE THE ALIGNMENT WERE
COMPLETED AND PROVED SATISFACTORY. FABRICATION OF
THE INTEGRATED CIRCUIT WAS INITIATED. WORK WAS
INITIATED TO INVESTIGATE THE CONTROLLED DEPOSITION
AND NUCLEATION OF SEMICONDUCTOR FILMS, AND AN
INVESTIGATION OF GATE THRESHOLD SHIFTS WAS CARRIED
OUT, IN ORDER TO GAIN A BETTER UNDERSTANDING OF THE
MECHANISM OF THE TFT INSTABILITY. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-645 262 9/1 9/5
RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 1, 1 JUL-30 SEP
66:

DEC 66 29P TOPFER, M. L. IFABULA, J. J. I
RAPP, A. K. ISCHELHORN, R. L. I
CONTRACT: DA-28-U43-AMC-02432(E)
PROJ: DA-1E6-22001-A440
TASK: 1E6-22001-A440-03
MONITOR: ECOM 02432-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*FIELD EFFECT TRANSISTORS, FILMS),
LIFE EXPECTANCY, MICROSTRUCTURE, CADMIUM SULFIDES,
CADMIUM SELENIDES, SILICON COMPOUNDS, OXIDES,
PHOTOELECTRIC EFFECT, CAPACITANCE, VOLTAGE,
INTERFACES, GATES(CIRCUITS), INTEGRATED
CIRCUITS (U)

IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (M)

LIFE TEST DATA ARE PRESENTED ON THIN-FILM
TRANSISTORS WHICH HAVE BEEN ON LOAD LIFE TEST FOR
OVER 2,000 HOURS. SOME OF THE PROBLEMS ASSOCIATED
WITH THE MASKING TECHNIQUE USED TO FABRICATE THE
FOUR-INPUT NOR/OR GATE CIRCUIT ARE DISCUSSED.
TESTING PROCEDURES TO BE USED TO EVALUATE THE
CIRCUIT ARE DISCUSSED IN DETAIL. SOME OF THE TEST
DATA ON THE INITIAL CIRCUITS FABRICATED ARE
PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-646 041 20/1
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

MULTILAYER ENHANCEMENT OF MICROWAVE PIEZOELECTRIC
CONVERSION IN CDS-SIO LAYERS, (U)

SEP 65 6P DE KLERK, J. IKLEMENS, P. G. ;
KELLY, E. F. ;
REPT. NO. SCIENTIFIC-3 ,65-9F5-108-P2
CONTRACT: AF 19(628)-4372
PROJ: AF-8683
TASK: 868301
MONITOR: AFCHL 67-0017

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN APPLIED PHYSICS
LETTERS V7 N10 P264-5 NOV 15 1965.

DESCRIPTORS: (*PIEZOELECTRIC TRANSDUCERS, FILMS),
CADMIUM SULFIDES, SILICON COMPOUNDS, MONOXIDES,
GAIN, SANDWICH CONSTRUCTION, MICROWAVES, ENERGY
CONVERSION, ULTRASONIC RADIATION, PHONONS (U)

IT WAS FOUND POSSIBLE TO INCREASE THE
ELECTROMAGNETIC CONVERSION EFFICIENCY OF CDS
PIEZOELECTRIC THIN FILM TRANSDUCERS UNDER FREE FIELD
CONDITIONS BY USING A MULTILAYER STRUCTURE OF
ALTERNATE LAYERS OF ACTIVE AND PASSIVE MATERIAL.
UNDER THESE CONDITIONS THE POWER GAIN INCREASES
DIRECTLY AS THE SQUARE OF THE NUMBER OF ACTIVE
LAYERS. 9.5 DB GAIN HAS BEEN ACHIEVED WITH A THREE
ACTIVE LAYER TRANSDUCER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-646 046 20/1
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

MULTILAYER THIN FILM PIEZOELECTRIC TRANSDUCERS, (U)

DEC 65 8P DE KLERK, JOHN I
REPT. NO. SCIENTIFIC-5 ,65-9F5-WAVES-P4
CONTRACT: AF 19(628)-4372
PROJ: AF-8683
TASK: 868301
MONITOR: AFCHL 67-0019

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN IEEE TRANSACTIONS ON
SONICS AND ULTRASONICS VSU-13 N3 P99-103 AUG 1966.
SUPPLEMENTARY NOTE: PRESENTED AT THE MICROWAVE PHYSICS
LAB. ACOUSTICS SYMPOSIUM, BEDFORD, MASS., 28-29
OCT 65.

DESCRIPTORS: (*PIEZOELECTRIC TRANSDUCERS, FILMS),
SANDWICH CONSTRUCTION, ACOUSTICS, VAPOR PLATING,
CADMIUM SULFIDES, ZINC SULFIDES, SILICON
COMPOUNDS, MONOXIDES, ACOUSTIC IMPEDANCE (U)
IDENTIFIERS: THIN FILMS (M)

SINGLE LAYER THIN FILM TRANSDUCERS, WHEN USED IN
DEVICES SUCH AS DELAY LINES, ARE LIMITED TO THEIR
POWER HANDLING CAPABILITIES AND AT VERY HIGH
FREQUENCIES HAVE LARGE CAPACITIES WHICH INTRODUCE
ELECTRICAL MATCHING PROBLEMS. SOME OF THESE
DIFFICULTIES CAN BE OVERCOME BY EMPLOYING MULTILAYER
TRANSDUCERS WHICH HAVE LOWER CAPACITIES AND HIGHER
POWER HANDLING CAPABILITIES THAN SINGLE LAYER
TRANSDUCERS. MULTILAYER TRANSDUCERS, USING
ALTERNATE ACTIVE CDS AND PASSIVE SIO LAMBDA/2
FILMS HAVE BEEN FABRICATED, AND THE INCREASE IN POWER
OUTPUT FOR CONSTANT ELECTRIC FIELD GRADIENT IS FOUND
TO BE PROPORTIONAL TO THE SQUARE OF THE NUMBER OF
ACTIVE LAYERS. THE ACOUSTIC REFLECTION AND
TRANSMISSION COEFFICIENTS AT A BOUNDARY, BETWEEN TWO
MEDIA OF DIFFERENT ACOUSTIC IMPEDANCES, ARE PRESENTED
IN GRAPHICAL FORM. A TABLE GIVING ACOUSTIC
VELOCITIES AND IMPEDANCES OF SEVERAL MATERIALS FOR
DIFFERENT MODES OF PROPAGATION IS INCLUDED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-647 312 20/12 20/3
DELAWARE UNIV NEWARK DEPT OF PHYSICS

STUDY OF LAYER-LIKE FIELD INHOMOGENEITIES IN CDS
USING FRANZ-KELDYSH EFFECT.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUN 67 134P BOER, K. W. I
REPT. NO. TR-16
CONTRACT: NONR-4336(00), DA-31-124-ARO(D)-173

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: MASTER'S THESIS.

DESCRIPTORS: (*FIELD THEORY, *CADMIUM SULFIDES),
SINGLE CRYSTALS, ELECTRICAL CONDUCTANCE,
ELECTROOPTICS, BAND THEORY OF SOLIDS,
SEMICONDUCTORS, CARRIERS(SEMICONDUCTORS),
ELECTRON DENSITY

(U)

SOME EXPERIMENTALLY OBSERVED PROPERTIES OF LAYER-LIKE FIELD INHOMOGENEITIES IN CDS SINGLE CRYSTALS ARE REPORTED. APPARENT DEVIATIONS OF THE RESULTS FROM THE THEORY PROPOSED BY BOER ARE SHOWN TO BE RESOLVABLE BASED ON A FORM OF LAYER FORMATION PROPOSED BY VOSS. THE BEHAVIOR OF MOVING SUBLAYERS, OBSERVED IN MOVING LAYER-LIKE FIELD INHOMOGENEITIES, IS REPORTED. THESE SUBLAYERS ARE FOUND TO CAUSE CURRENT OSCILLATIONS IN A RANGE FROM 2 TO 9 HZ WITH THE FREQUENCY PROPORTIONAL TO THE ELECTRON DENSITY TO THE 1.3 POWER. THE EFFECT OF JOULE HEATING IN THE 'S' SHAPED RANGE ALSO CAUSES THE ABSORPTION EDGE OF THE ENTIRE INTERELECTRODE REGION TO PERIODICALLY SHIFT MORE THAN 100A. THESE PERIODIC TRANSITIONS ARE ATTRIBUTED TO THE REPETITION OF THE INITIATION OF CURRENT CHANNEL FORMATION FOLLOWED BY THE FORMATION OF UNSTABLE LAYER-LIKE FIELD INHOMOGENEITIES. IN ADDITION, A NEW TYPE OF FIELD INHOMOGENEITY IS REPORTED THAT FORMS AS A 'RING' AROUND BUT WELL-SEPARATED FROM THE ANODE IN 'PURE' CDS CRYSTALS. THE PROPERTIES THAT DISTINGUISH THIS FIELD INHOMOGENEITY FROM THOSE ALREADY OBSERVED ARE GIVEN. THE BEHAVIOR INDICATES THAT THE CRYSTAL CURRENT IS RECOMBINATION LIMITED AND THAT THE HIGH FIELD ANODE 'RING' ACTS AS A P-N JUNCTION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-647 649 9/1 20/6
MATSUSHITA RESEARCH INST TOKYO INC KAWASAKI (JAPAN)

STUDIES OF INFRARED IMAGE CONVERTER (SOLID-STATE TYPE
AND VACUUM TYPE). (U)

DESCRIPTIVE NOTE: PROGRESS REPT.,
DEC 66 157P MIYAJI, KOH-ICHI I
CONTRACT: DA-92-557-FEC-38337

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ORIGINAL CONTAINS COLOR, AVAILABLE IN
BLACK AND WHITE AFTER ORIGINAL COPIES ARE EXHAUSTED.

DESCRIPTORS: (*IMAGE CONVERTERS, *INFRARED
EQUIPMENT), JAPAN, INFRARED PHOTOCONDUCTORS,
SOLID STATE PHYSICS, PHOSPHORESCENT MATERIALS,
QUENCHING (INHIBITION), INFRARED OPTICAL
MATERIALS, INFRARED IMAGES, PHOTOCATHODES,
PHOTODIODES, CADMIUM SELENIDES, CADMIUM SULFIDES,
CADMIUM ALLOYS, TELLURIUM ALLOYS, DOPING (U)

THEORETICAL AND EXPERIMENTAL STUDIES WERE PERFORMED
IN AN EFFORT TO OBTAIN AN INFRARED IMAGE CONVERTER.
THE PROGRAM WAS DIVIDED INTO THREE PARTS. PART
I WAS CONCERNED WITH THE PHYSICS AND MATERIAL
RESEARCH IN TERMS OF THE IMAGE CONVERSION. EFFORTS
WERE DEVOTED TO A STUDY ON THE INFRARED
PHOTOCONDUCTIVE MATERIALS WITH HIGH SENSITIVITY IN
THE NEAR INFRARED REGION, AND ON THE PHOTOCONDUCTOR
WHICH SHOWS GOOD PHOTOCONDUCTIVE QUENCHING
PROPERTIES. SOME ANALYSIS OF QUENCHING MECHANISM
WAS ALSO DONE. PART II COVERED ALL KIND OF THE
SOLID STATE INFRARED IMAGE CONVERTERS SUITABLE TO THE
INFRARED REGION. EFFORT OF THIS INTERVAL EFFORTS
WERE CONCENTRATED TO THREE PROBLEMS: THE
PHOTOCONDUCTOR QUENCHING SYSTEM, DIRECT RECEIVER OF
THE INFRARED IMAGE, AND THE HIGHLY SENSITIVE IMAGE
CONVERTER SYSTEM. PART III WAS ANOTHER APPROACH
TO THE INFRARED IMAGE CONVERTER. POSSIBILITY OF A
NEW TYPE PHOTOCATHODE SUITABLE TO THE INFRARED REGION
WAS STUDIED. FOR THIS PURPOSE P-SI-AL DIODE
WAS TAKEN UP, AND PHOTOINDUCED HOT ELECTRON
EMISSION WAS EXPERIMENTALLY OBSERVED. SOME
IMPROVEMENT OF EMISSION WAS OBTAINED. FURTHER, THE
ANALYSIS OF EMISSION AND SOME NEW PROPOSALS WERE
DESCRIBED. (AUTHOR) (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-647 699 20/12 20/1 9/1
FORSVARLTS FORSKNING SINSTITUTT KJELLER (NORWAY)

RESEARCH ON THE THEORY AND DESIGN OF ACTIVE NETWORKS.

(U)

DESCRIPTIVE NOTE: ANNUAL SUMMARY REPT. NO. 4, 1 JUL 64-30 JUN 65,

AUG 65 45P BLOTEKJER, K. ; FOSSUM, H. J.
; RANNESTAD, A. ; SVAAASAND, L. O. ;
REPT. NO. INTERN RAPPORT-E-60
CONTRACT: AF 61(US2)-484
MONITOR: AFCHL 66-13

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-609 434.

DESCRIPTORS: (=ACOUSTICS, *PIEZOELECTRIC CRYSTALS), (=NETWORKS, DESIGN), ULTRASONIC RADIATION, AMPLIFIERS, ELECTRONS, MOBILITY, SEMICONDUCTOR DEVICES, CADMIUM SULFIDES, NORWAY

(U)

THE REPORT IS CONCERNED WITH AN EXPERIMENTAL INVESTIGATION OF INTERACTIONS BETWEEN ACOUSTIC WAVES AND CONDUCTION ELECTRONS IN THE PIEZOELECTRIC SEMICONDUCTOR CdS. AN ACOUSTIC AMPLIFIER HAS BEEN BUILT AND TESTED. NET GAIN OF 20 DB AT 60 MHZ HAS BEEN OBSERVED. OBSERVATIONS OF GAIN, ATTENUATION AND PHASE VELOCITY AGREE WITHIN A FACTOR OF TWO WITH THE ORIGINAL THEORY OF WHITE. SATURATION IS OBSERVED WHEN THE RF CHARGE DENSITY APPROACHES THE TOTAL CHARGE DENSITY. THE CRYSTAL BECOMES INSTABLE AND CURRENT SATURATION OCCURS WHEN THE SOUND TRIP GAIN EXCEEDS UNITY. THE CURRENT SATURATION HAS BEEN EMPLOYED TO MEASURE DRIFT MOBILITY IN THE TEMPERATURE RANGE FROM 184 TO 438 DEGREES KELVIN. THE TEMPERATURE DEPENDENCE CAN BE EXPLAINED BY A COMBINATION OF SCATTERING FROM LATTICE VIBRATION AND TRAPPING IN TWO IMPURITY LEVELS. AN ADVANTAGE OF THE METHOD IS THE FACT THAT ALL EXPERIMENTAL ERRORS ACT IN THE SAME DIRECTION, AND AN ABSOLUTE LOWER BOUND FOR THE MOBILITY IS OBTAINED. DOUBLE CURRENT SATURATION WAS OBSERVED IN SOME SAMPLES. THESE ARE PROBABLY DUE TO OSCILLATIONS IN TWO DIFFERENT ACOUSTIC MODES, THE PRINCIPAL MODE OF THE CUT AND A MIXED MODE PROPAGATING OBLIQUELY TO THE END PLANES OF THE SAMPLE. COHERENT CURRENT OSCILLATIONS OF 30 MHZ WERE OBSERVED. THEY APPEAR TO BE RELATED TO THE DOUBLE SATURATION, BUT THEIR ORIGIN IS NOT KNOWN. (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-648 055 20/6 20/12
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

ELECTRON BEAM PUMPED SEMICONDUCTOR LASERS. (U)

DESCRIPTIVE NOTE: MEETING SPEECH,
JUL 66 3P HURWITZ, C. E. ;
REPT. NO. MS-1726
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-67-157

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN NFREM RECORD P194-5
1966.

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, LASERS),
(*LASERS, PUMPING(ELECTRON.)),
(*PUMPING(ELECTRONICS), *ELECTRON BEAMS),
EMISSIVITY, LIGHT, ULTRAVIOLET RADIATION,
INFRARED RADIATION, CADMIUM SELENIDES, CADMIUM
SULFIDES, ZINC SULFIDES, SOLID SOLUTIONS,
CARRIERS(SEMICONDUCTORS), INJECTION (U)

SEMICONDUCTOR LASERS WITH EMISSION WAVELENGTHS
RANGING FROM 8.5 MICRONS IN THE INFRARED TO 3250 A
IN THE ULTRAVIOLET WERE OBTAINED BY ELECTRON BEAM
EXCITATION. IN THE VISIBLE AND ULTRAVIOLET, LASERS
WITH SUBSTANTIAL OUTPUT POWER AND HIGH EFFICIENCY
WERE ACHIEVED UTILIZING CDSE, CDS AND ZNS
AND THEIR MIXED ALLOYS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-648 169 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

CHANGE OF ELECTRICAL CONDUCTIVITY OF CDS SINGLE
CRYSTALS DURING HEAT TREATMENTS IN SULFUR VAPOR
BETWEEN 500 AND 700C. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
67 13P BOER, K. W. ;
REPT. NO. TR-17
CONTRACT: NONR-4336(UO), NSG-573

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, HEAT TREATMENT),
(*CADMIUM SULFIDES, ELECTRICAL CONDUCTANCE),
SULFUR, VAPORS, VAPOR PRESSURE, SINGLE CRYSTALS,
CRYSTAL LATTICE DEFECTS, BAND THEORY OF SOLIDS,
IONIZATION (U)

THE ELECTRICAL CONDUCTIVITY OF CDS SINGLE
CRYSTALS WAS MEASURED, USING A FOUR-ELECTRODE METHOD,
AS A FUNCTION OF THE S VAPOR PRESSURE IN THE RANGE
FROM 10 TO 1000 TORR IN A DOUBLE FURNACE ALLOWING
FOR INDEPENDENT VARIATION OF THE CRYSTAL TEMPERATURE
AND S-VAPOR PRESSURE. IN AGREEMENT WITH EARLIER
MEASUREMENTS, THE CURRENT WAS OBSERVED TO DECREASE
WITH INCREASING S-VAPOR PRESSURE FOLLOWING A POWER
LAW σ VARIES AS $P^{-1/M}$. THE EXPONENT $1/M$
DEPENDS ON THE CRYSTAL TEMPERATURE AND IS ABOUT $1/24$
FOR $500C < T < 520C$, $1/4$ FOR $530C < T$
 $< 630C$, AND ABOUT $1/12$ FOR $640C < T < 700C$.

A SIMPLE MODEL USING S VACANCIES, CD
INTERSTITIALS AND CD VACANCIES IS USED TO EXPLAIN
THE OBSERVED BEHAVIOR. DOUBLY IONIZED S
VACANCIES ARE ASSUMED TO BE PREDOMINANT IN THE LOWEST
TEMPERATURE RANGE, SINGLE IONIZED FRENKEL DEFECTS
IN THE INTERMEDIATE TEMPERATURE RANGE, AND DOUBLY
IONIZED CD INTERSTITIALS IN THE HIGHEST TEMPERATURE
RANGE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-648 782 20/1 20/12
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

THIN-FILM PIEZOELECTRIC TRANSDUCERS USED AS
GENERATORS AND DETECTORS OF MICROWAVE PHONONS, WITH
SOME ATTENUATION MEASUREMENTS IN SiO₂, (U)

FEB 66 IIP DE KLERK, J. I
REPT. NO. SCIENTIFIC-6, 65-9F5-WAVES-PJ
CONTRACT: AF 19(628)-4372
PROJ: AF-8683
TASK: 868301
MONITOR: AFCL 67-0079

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED
PHYSICS V37 N12 P4522-8 NOV 1966.

DESCRIPTORS: (*PIEZOELECTRIC TRANSDUCERS, FILMS),
(*PHONONS, PIEZOELECTRIC TRANSDUCERS), MICROWAVE
FREQUENCY, GENERATORS, DETECTORS, QUARTZ,
ALUMINA, ZINC SULFIDES, CADMIUM SULFIDES,
SILICON DIOXIDE, ATTENUATION, ENERGY CONVERSION,
ULTRASONIC RADIATION (U)
IDENTIFIERS: THIN FILMS, THIN FILMS (U)
ELECTRONICS (U)

THE MANNER IN WHICH THIN-FILM PIEZOELECTRIC
TRANSDUCERS ARE USED IS DETERMINED BY THEIR INTENDED
APPLICATION. ATTENUATION MEASUREMENT TRANSDUCERS
SHOULD BE CAPABLE OF INDEPENDENT GENERATION OF EACH
OF THE THREE PURE ACOUSTIC MODES AND SHOULD EXHIBIT
LOW ELECTROMECHANICAL CONVERSION EFFICIENCY, WHEREAS
DEVICE TRANSDUCERS SHOULD EXHIBIT MAXIMUM POSSIBLE
ELECTROMECHANICAL CONVERSION EFFICIENCY.
MULTILAYER TRANSDUCERS OFFER INCREASED POWER
HANDLING CAPABILITIES AND HIGHER ELECTRICAL
IMPEDANCES THAN SINGLE-LAYER TRANSDUCERS AT HIGH
FREQUENCIES. AN ANOMALOUS BEHAVIOR OF QUARTZ IN
THE PRESENCE OF CDS IS DISCUSSED. ATTENUATION
MEASUREMENTS OF THE L, T₁, AND T₂ MODES ALONG
THE X₁ AXIS OF SYNTHETIC QUARTZ ARE PRESENTED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. /ZZZHT

AD-649 242 20/12 20/1
BROWN UNIV PROVIDENCE R I METALS RESEARCH LAB

PHYSICAL RESEARCH ON FUNDAMENTAL PROPERTIES OF II-VI
COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
NOV 66 75P ELBAUM, CHARLES ; LORD, ARTHUR
; TRUELL, ROHN ;
CONTRACT: AF 33(615)-2946
PROJ: AF-7885
TASK: 788503
MONITOR: AHL 66-U225

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON PROJECT RESEARCH IN
SOLID STATE PHYSICS.

DESCRIPTORS: (SEMICONDUCTORS, ACOUSTIC
PROPERTIES), CADMIUM SULFIDES, ZINC SULFIDES,
ULTRASONIC RADIATION, ATTENUATION, DISTORTION,
FILMS, SEMICONDUCTING FILMS, PIEZOELECTRIC
TRANSDUCERS, VAPOR PLATING, VACUUM APPARATUS,
CRYOGENICS, MICROSTRUCTURE (U)
IDENTIFIERS: THIN FILMS, THIN FILMS (U)
ELECTRONICS

IT IS WELL KNOWN THAT CADMIUM SULFIDE CAN ACT AS A
VERY NONLINEAR ACOUSTIC CONDUCTOR UNDER THE
APPROPRIATE CONDITIONS OF ACOUSTIC FREQUENCY,
SPECIMEN CONDUCTIVITY AND APPLIED DC ELECTRIC FIELD.
DIRECT DISTORTION OF THE ACOUSTIC WAVEFORM WAS
OBSERVED, AT 20 MC/SEC, AS A FUNCTION OF
CONDUCTIVITY AND APPLIED ELECTRIC FIELD. THE
MAXIMUM DISTORTION APPEARS TO OCCUR AT THE VALUE OF
ELECTRIC FIELD WHERE THE ACOUSTIC VELOCITY (SHEAR
WAVES WERE USED) EQUALS THE CHARGE CARRIER DRIFT
VELOCITY. ULTRASONIC ATTENUATION MEASUREMENTS HAVE
BEEN MADE AT 12, 30 AND 46 MC/SEC AND FROM ROOM
TEMPERATURE TO 1.8K ON A CADMIUM SULFIDE SPECIMEN.
THE SPECIMEN HAD A DARK ROOM TEMPERATURE
CONDUCTIVITY OF ABOUT 10 TO THE MINUS 2ND POWER/
(OHM-CM). A VERY LARGE ATTENUATION PEAK WAS
OBSERVED IN THE NEIGHBORHOOD OF 15 - 20K.
CONDUCTIVITY MEASUREMENTS, MADE CONCURRENTLY WITH
THE ATTENUATION MEASUREMENTS, SHOWED THAT THE PEAK
WAS ALMOST SURELY CAUSED BY THE RELAXATION ASSOCIATED
WITH SPACE CHARGE BUNCHING. THE ATTENUATION DATA
DID NOT SEEM TO SHOW THE PROPER FREQUENCY DEPENDENCE
ABOVE THE PEAK TEMPERATURE, BUT THIS ISSUE IS CLOUDED
BECAUSE THERE WAS CONSIDERABLE UNCERTAINTY. (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-650 482 20/12
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED
PALO ALTO RESEARCH LAB

ELASTIC WAVE AND INFRARED LIGHT INTERACTIONS WITH A
MOVING HIGH-FIELD DOMAIN IN A PIEZOELECTRIC
SEMICONDUCTOR. (U)

OCT 66 JP TSAI, C. S. ;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN APPLIED PHYSICS
LETTERS V9 N11 P400-2 DEC 1 1966.

DESCRIPTORS: (SEMICONDUCTORS, PROPAGATION),
MECHANICAL WAVES, INFRARED RADIATION,
INTERACTIONS, PIEZOELECTRIC CRYSTALS, ACOUSTIC
IMPEDANCE, CADMIUM SULFIDES, ZINC COMPOUNDS,
OXIDES, GALLIUM ARSENIDES, DOPPLER EFFECT (U)

A DOUBLE-DOPPLER-EFFECT EXPERIMENT FOR ELASTIC
WAVES OR INFRARED LIGHT, USING THE MOVING HIGH-FIELD
DOMAIN IN A PIEZOELECTRIC SEMICONDUCTOR AS THE MOVING
BOUNDARY, IS PROPOSED. A POSSIBLE EXPERIMENTAL
CONFIGURATION FOR THE ELASTIC WAVE CASE IS DESCRIBED
AND THE PARAMETERS RELEVANT TO THE EXPERIMENT ARE
EVALUATED FOR THREE POTENTIAL PIEZOELECTRIC
SEMICONDUCTORS. THE MOST IMPORTANT PARAMETER IS
THE CHANGE OF ACOUSTIC IMPEDANCE ACROSS THE
BOUNDARIES OF THE HIGH-FIELD DOMAIN. THE
POSSIBILITY OF EMPLOYING THE PROPOSED EXPERIMENTS AS
THE MEANS FOR PROBING THE ELASTIC AND OPTICAL
PROPERTIES OF THE HIGH-FIELD DOMAIN IS ALSO
DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-650 244 20/12 20/10 20/6
NEW YORK UNIV N Y DEPT OF PHYSICS

THEORY OF ENHANCED RAMAN SCATTERING AND VIRTUAL
QUASIPARTICLES IN CRYSTALS, (U)

JUL 66 JP BIRMAN, JOSEPH L. ; GANGULY,
ACHINTYA K. ;
CONTRACT: AF 33(615)-1746, DA-ARU(D)-31-124-
6792
MONITOR: AR00 4054:16

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PHYSICAL REVIEW
LETTERS V17 N12 P647-9 SEP 19 1966.

DESCRIPTORS: (*CRYSTALS, *RAMAN SPECTROSCOPY),
(*CADMIUM SULFIDES, RAMAN SPECTROSCOPY),
(*EXCITONS, RAMAN SPECTROSCOPY),
CARRIERS(SEMICONDUCTORS), TRANSPORT PROPERTIES,
PHOTONS, HAMILTONIAN, SCATTERING, INTENSITY,
BAND THEORY OF SOLIDS (U)
IDENTIFIERS: QUASIPARTICLES, RAMAN SCATTERING (U)

THE PAPER IS TO PROVIDE AN EXPLANATION FOR THE
ENHANCED RAMAN-SCATTERING CROSS SECTIONS IN CDS
RECENTLY REPORTED BY LEITE AND PORTU AND TO POINT
OUT THE LIKELY GENERALITY OF THE PHENOMENON INVOLVED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#651 003 20/12
STANFORD UNIV CALIF MICROWAVE LAB

CURRENT INSTABILITIES IN PIEZOELECTRIC
SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 67 20/P HAYDL, W. H. I
REPT. NO. ML-1517
CONTRACT: NONR-225(48)

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, PIEZOELECTRIC
CRYSTALS), ELECTRIC CURRENTS,
CARRIERS(SEMICONDUCTORS), ACOUSTICS, CADMIUM
SULFIDES, OSCILLATION, STABILITY, THEORY,
INTERACTIONS

(U)

THE REPORT DESCRIBES THE DISCOVERY OF 'SQUARE-WAVE'
TYPE CURRENT OSCILLATIONS AND THE TRAVELING HIGH
ELECTRIC FIELD DOMAINS IN CADMIUM SULFIDE.
NUMEROUS EXPERIMENTS WERE PERFORMED TO DETERMINE
THE BEHAVIOR OF THE TRAVELING DOMAIN, THE OSCILLATION
CONDITIONS AND IMPORTANT PARAMETERS. EXPERIMENTAL
RESULTS LEAD TO THE CONCLUSION THAT BOTH CURRENT
SATURATION AND CURRENT OSCILLATIONS AS OBSERVED ARE
DUE TO AMPLIFICATION OF THE SHEAR WAVE COMPONENTS OF
THERMAL ACOUSTIC NOISE. A SIMPLE LINEAR THEORY
WHICH PREDICTS THE OCCURRENCE OF CURRENT OSCILLATIONS
IN PIEZOELECTRIC SEMICONDUCTORS HAS BEEN DEVELOPED.
THE SATURATION OF THE SAMPLE CURRENT IS ALSO
TREATED THEORETICALLY. GOOD AGREEMENT WITH
EXPERIMENTAL RESULTS IS OBTAINED WITH BOTH THEORIES.
THE EFFECT OF THE CURRENT SATURATION AND THE
OSCILLATIONS ON THE AMPLIFICATION OF AN ACOUSTIC
SIGNAL IS DISCUSSED. THEORY INDICATES THAT THE
MAXIMUM POSSIBLE ACOUSTIC GAIN IS OF THE ORDER OF 75-
100 DB. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-651 140 20/12 20/2
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF
II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT., NO. 7, 15
OCT 66-14 JAN 67,
67 31P FARRIG, R. H. BROWN, L.
W. WEBB, G. N. I
CONTRACT: AF 33(615)-2947

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-642 450.

DESCRIPTORS: (*SEMICONDUCTORS, PREPARATION),
(*CRYSTAL GROWTH, SEMICONDUCTORS), (*SINGLE
CRYSTALS, PURIFICATION), (*CADMIUM COMPOUNDS,
CRYSTAL GROWTH), (*ZINC COMPOUNDS, CRYSTAL
GROWTH), IMPURITIES, MASS SPECTROSCOPY, SOLID
SOLUTIONS, CADMIUM SULFIDES, ZINC SULFIDES,
SELENIDES, ABSORPTION SPECTRUM, EMISSIVITY,
DOPING, OPTICAL PROPERTIES, CRYSTAL LATTICE
DEFECTS (U)

IDENTIFIERS: ZINC SELENIDE (U)

CADMIUM SULFIDE AND ZINC SELENIDE WERE SYNTHESIZED.
IMPURITIES PRESENT IN THESE AND IN ZINC SULFIDE
WERE DETERMINED BY MASS AND EMISSION SPECTROGRAPHY
AND BY THE ATOMIC ABSORPTION METHOD. PURITIES OF
THE ZINC COMPOUNDS ARE GENERALLY LOWER THAN THAT OF
THE CDS. THE GROWTH OF CRYSTALS OF II-VI
COMPOUNDS FROM THE MELT WAS CONTINUED. A NUMBER OF
CUSTOM DOPED CRYSTALS OF ZNS, ZNSE, AND
MIXTURES OF THE TWO WERE GROWN. THE LIGHT
TRANSMISSION CHARACTERISTICS OF A ZNSE SPECIMEN
WERE DETERMINED FROM A SPECTROPHOTOMETRIC PLOT.
THE CRYSTAL SLICE USED FOR A WINDOW IN THIS
EXPERIMENT, EXHIBITED A PATTERN OF INTERESTING
IMPERFECTIONS FROM WHICH SOME OF THE CRYSTAL GROWTH
CONDITIONS MIGHT BE DEDUCED. CADMIUM SULFIDE
CRYSTALS WERE GROWN ROUTINELY BY THE METHOD OF VAPOR
PHASE DEPOSITION. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-651 614 9/1
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

SINGLE CRYSTAL CADMIUM SULFIDE AND CADMIUM SELENIDE
INSULATED-GATE FIELD-EFFECT TRIODES. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAR 67 105P BOMBER, THOMAS M. ; RUNYAN,
KENNETH R. ;
REPT. NO. GE/EE/67A-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*FIELD EFFECT TRANSISTORS, GAIN),
(*SEMICONDUCTING FILMS, *TRIODES), (*CADMIUM
SELENIDES, TRIODES), (*CADMIUM SULFIDES,
TRIODES), SINGLE CRYSTALS, VAPOR PLATING,
MASKING, RESISTANCE(ELECTRICAL), HALL EFFECT,
CARRIERS(SEMICONDUCTORS), THERMAL STABILITY,
AGING(MATERIALS), ELECTRIC CONNECTORS (U)

INSULATED-GATE FIELD-EFFECT TRIODES WERE FABRICATED
ON SINGLE CRYSTAL CADMIUM SULFIDE AND CADMIUM
SELENIDE. BOTH BULK CRYSTALS AND PLATELETS WERE
USED FOR SINGLE CRYSTAL SAMPLES. CHROMIUM AND
ALUMINUM WERE FOUND TO MAKE LOW IMPEDANCE CONTACTS TO
CADMIUM SULFIDE AND CADMIUM SELENIDE. THE
CALCULATED EFFECTIVE DRIFT MOBILITIES OF THE
FABRICATED SINGLE CRYSTAL IGFET'S WERE THREE TO
FOUR TIMES GREATER THAN THE HIGHEST REPORTED VALUE OF
POLYCRYSTALLINE CADMIUM SULFIDE AND CADMIUM SELENIDE
IGFET'S. THE CHARACTERISTICS OF THE FABRICATED
DEVICES WERE UNSTABLE WITH RESPECT TO TIME AND
TEMPERATURE. THIS INSTABILITY WAS PARTIALLY
ATTRIBUTED TO THE INSTABILITY OF THE EVAPORATED
SILICON MONOXIDE LAYER. AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-651 816 9/1
RADIO CORP OF AMERICA SUMERVILLE N J DEFENSE
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 2, 1 OCT-31 DEC
66,

MAY 67 35P TOPFER, M. L. ; DANIS, A.
H. ; RAPP, A. K. ; SCHELHORN, R. L. ;
CONTRACT: DA-28-043-AMC-02432(E)
PROJ: DA-1E6-22001-A440
TASK: 1E6-22001-A440-03
UNITOR: ECOM 02432-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-634 088.

DESCRIPTORS: (*FILMS, *TRANSISTORS), (*TRIODES,
FILMS), PHOTOELECTRIC EFFECT,
MICROMINIATURIZATION(ELECTRONICS), CADMIUM
SULFIDES, SILICON DIOXIDE, CADMIUM SELENIDES,
SILICON COMPOUNDS, CAPACITANCE, SURFACE
PROPERTIES, VOLTAGE, TESTS, FIELD EFFECT
TRANSISTORS (U)

IDENTIFIERS: THIN FILMS, THIN FILMS
ELECTRONICS (U)

DURING THIS REPORT PERIOD, A CHANGE IN THE CIRCUIT
TO BE WORKED ON WAS MADE. THE PROBLEMS ASSOCIATED
WITH THE FOUR-INPUT NOR/OR GATE CIRCUIT DESCRIBED
IN THE FIRST QUARTERLY REPORT HAVE PERSISTED,
WHICH HAS LED TO THE TEMPORARY ABANDONMENT OF THIS
CIRCUIT. IN ITS PLACE, WORK ON A COMPLEMENTARY
THREE-INPUT NAND GATE CIRCUIT WAS INITIATED.
MUCH BETTER RESULTS WERE ACHIEVED WITH THIS
CIRCUIT. TWENTY-FOUR OF THESE CIRCUITS WERE
DELIVERED TO FORT MONMOUTH FOR EVALUATION.
LIFE TEST DATA ON THIN-FILM TRANSISTORS THAT HAVE
RECENTLY BEEN PUT ON LIFE IS PRESENTED. TEST DATA
ON THE DELIVERED CIRCUITS IS PRESENTED ALSO.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-652 611 20/12 20/3
DELAWARE UNIV NEWARK DEPT OF PHYSICS

PRODUCTION AND ANNEALING OF INTRINSIC DEFECTS IN X-
RAY IRRADIATED CDS SINGLE CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
67 15P BOER, K. W. O'CONNELL, J.
C. I
REPT. NO. TR-18, TR-13
CONTRACT: NONR-4336(UO), NSG-573

UNCLASSIFIED REPORT

DESCRIPTORS: (*CADMIUM SULFIDES; RADIATION
DAMAGE), (*CRYSTAL LATTICE DEFECTS, CADMIUM
SULFIDES), X RAYS, ANNEALING, EXPERIMENTAL DATA,
VACUUM, PHOTOCONDUCTIVITY, BAND THEORY OF SOLIDS,
SEMICONDUCTORS (U)

X-RAYS (300 KEV) HAVE BEEN USED TO PRODUCE
CHANGES IN THE DEFECT STRUCTURE OF (1) *PURE*
SINGLE-CRYSTAL PLATELETS OF CDS AND (2)
PLATELETS WHICH HAVE BEEN PRE-HEAT TREATED IN THE
VAPOR OF ONE OF ITS COMPONENTS. THE CHANGES WERE
STUDIED BY MEANS OF THE SPECTRAL DISTRIBUTION OF
PHOTOCURRENT AND I.S.C. CURVES. ALL
MEASUREMENTS WERE MADE IN ULTRAHIGH VACUUM (10 TO
THE -10TH POWER TORR). THE DAMAGE PRODUCED
ANNEALED AT TEMPERATURES BETWEEN 100 AND 150C.
THE REPRODUCIBLE DAMAGE-ANNEALING CYCLE HAS BEEN
EXPLAINED IN TERMS OF INTRINSIC DEFECTS PRODUCED IN
THE SULFUR SUBLATTICE. DAMAGE-ANNEALING CYCLES FOR
CRYSTALS PRE-HEAT TREATED IN CD OR S VAPOR
(STOICHIOMETRY SHIFT) PROVIDE ADDITIONAL
CONFIRMATION FOR THE PROPOSED MODEL.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-653 248 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

UNIFORMLY PROPAGATING SOLUTIONS OF TRANSPORT AND
POISSON EQUATIONS FOR PERIODIC FIELD DOMAINS, (U)

AUG 66 12P BOER, K. W. DUSSEL, G. A.

CONTRACT: DA-31-124-ARO(D)-173
PROJ: 20014501B11B
MONITOR: AKOD 4461:17

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW,
V154 N2 P292-301, 10 FEB 1967.

DESCRIPTORS: (*SEMICONDUCTORS, TRANSPORT
PROPERTIES), (*CARRIERS(SEMICONDUCTORS),
PROPAGATION), DIFFERENTIAL EQUATIONS, NUMERICAL
ANALYSIS, CRYSTAL LATTICES, DIFFUSION,
ELECTROMAGNETIC FIELDS, CADMIUM SULFIDES, GALLIUM
ARSENIDES (U)
IDENTIFIERS: DOMAINS(CRYSTALLOGRAPHY), GUNN
EFFECT (U)

TIME-DEPENDENT SOLUTIONS OF THE POISSON AND
TRANSPORT EQUATIONS CONTAINING DRIFT AND DIFFUSION
FOR THE CASE OF FIELD DOMAINS PROPAGATING UNDEFORMED
AND WITH CONSTANT VELOCITY THROUGH A CRYSTAL ARE
DISCUSSED IN TERMS OF AN ANALYSIS OF THEIR
PROJECTIONS IN THE N-E PLANE, WHERE N IS THE
CARRIER CONCENTRATION AND E THE MAGNITUDE OF THE
ELECTRIC FIELD. TWO PRINCIPAL MODELS ARE
DISCUSSED: ONE FOR A TRAP-CONTROLLED CRYSTAL
(CDS TYPE), AND THE OTHER FOR A TRAP-FREE
CRYSTAL (GAAS TYPE, GUNN EFFECT) FOR FIELD-
DEPENDENT RECOMBINATION OR FIELD-DEPENDENT MOBILITY.
IT IS FOUND THAT, IN ADDITION TO THE 'TRIANGULAR'
DOMAINS, PERIODIC PROPAGATING SOLUTIONS CAN EXIST.
CONDITIONS ON THE VALUES OF THE DOMAIN VELOCITY AND
THE CURRENT ARE DERIVED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-653 364 20/5 20/12
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

HIGH POWER AND EFFICIENCY IN CDS ELECTRON BEAM PUMPED
LASERS, (U)

NOV 66 SP HURWITZ, C. E. ;
REPT. NO. JA-2932
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-67-261

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN APPLIED PHYSICS
LETTERS V9 N12 P420-2 DEC 15 1966.

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, LASERS),
(*CADMIUM SULFIDES, *LASERS),
PUMPING(ELECTRONICS), ELECTRON BEAMS, CRYSTAL
GROWTH, EMISSIVITY, INFRARED RADIATION, POWER,
EFFICIENCY, CRYSTAL STRUCTURE (U)
IDENTIFIERS: SEMICONDUCTOR LASERS (U)

ELECTRON BEAM EXCITATION OF CDS CRYSTALS GROWN
IN AN ATMOSPHERE OF EXCESS CD RESULTED IN LASER
EMISSION NEAR 4900 Å WITH 350 W OF PEAK OUTPUT
POWER AND 26.5% OVERALL (35% INTERNAL) POWER
EFFICIENCY AT TEMPERATURES AS HIGH AS 110K.
LASER ACTION WAS OBSERVED, ALTHOUGH AT CONSIDERABLY
REDUCED LEVELS OF POWER AND EFFICIENCY, AT
TEMPERATURES UP TO 250K. THE HIGH PERFORMANCE OF
THE LASERS APPEARS TO BE DUE TO INCREASED CRYSTAL
UNIFORMITY AND TO THE INTRODUCTION OR ENHANCEMENT OF
HIGHLY EFFICIENT RADIATIVE TRANSITIONS, BOTH OF WHICH
RESULT FROM THE CD-RICH GROWTH CONDITIONS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-654 003 20/12 20/1
FORSVARETS FORSKNING SINSTITUTT KJELLER (NORWAY)

ACOUSTOELECTRIC OSCILLATIONS, CURRENT SATURATION AND
ELECTRON DRIFT MOBILITY IN CADMIUM SULPHIDE CRYSTALS. (U)

NOV 66 2/P HANNESRAU, ANDREAS I
REPT. NO. SCIENTIFIC-1, INTERN RAPPORT E-90
CONTRACT: AF 61(US2)-484, AF 61(US2)-958
PROJ: AF-4600
TASK: 460003
MONITOR: AFRL 67-U285

UNCLASSIFIED REPORT

DESCRIPTORS: (•CADMIUM SULFIDES, ELECTRICAL
PROPERTIES), (•ACOUSTIC PROPERTIES, CADMIUM
SULFIDES), SEMICONDUCTORS, MOBILITY, ELECTRIC
CURRENTS, SOLID STATE PHYSICS, PIEZOELECTRIC
CRYSTALS (U)
IDENTIFIERS: ACOUSTOELECTRIC EFFECT (U)

INTERACTION BETWEEN ACOUSTIC WAVES AND CONDUCTION
ELECTRONS IN THE PIEZOELECTRIC SEMICONDUCTOR CdS
IS CONSIDERED. A SHORT THEORETICAL DISCUSSION OF
ACOUSTIC AMPLIFICATION, CURRENT SATURATION AND THE
TEMPERATURE DEPENDENCE OF ELECTRON DRIFT MOBILITY IS
GIVEN. CURRENT SATURATION DUE TO ACOUSTIC
OSCILLATIONS IN CdS IS OBSERVED, BOTH IN A
TRANSVERSE MODE AND IN A LONGITUDINAL MODE. A
METHOD FOR DETERMINING THE THRESHOLD FIELD FOR
OSCILLATION, UTILIZING THE BUILD UP TIME FOR CURRENT
SATURATION UNDER APPLIED PULSED DC ELECTRIC FIELD, IS
DISCUSSED. THE THRESHOLD FIELD IS USED TO
DETERMINE THE ELECTRON DRIFT MOBILITY FOR
PHOTOCONDUCTING CdS IN THE TEMPERATURE RANGE FROM
20° DEGREES K TO 430 DEGREES K. THE
TEMPERATURE DEPENDENCE OF THE MOBILITY CAN BE
DESCRIBED AS A COMBINATION OF SCATTERING FROM LATTICE
VIBRATION AND TRAPPING BY TWO IMPURITY LEVELS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-654 009 2U/12
ILLINOIS UNIV URBANA DEPT OF ELECTRICAL ENGINEERING

JUNCTION EFFECTS IN COMPOUND SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: STATUS REPT.,
APR 67 14P HOLONYAK, N. , JR.; BLOUKE,
M. M.; STREETMAN, B. G.; CRAWFORD, M. G. ;
STILLMAN, G. E. ;
REPT. NO. 8
CONTRACT: AF 19(028)-4337
PROJ: AF-4608
TASK: 460805
MONITOR: AFCHL 67-U292

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, *GALLIUM
ARSENIDES), PHOSPHIDES, LASERS, STABILITY,
LUMINESCENCE, SILICON, EXCITATION, CADMIUM
SELENIDES, CADMIUM SULFIDES, SELENIUM,
SPECTRA (VISIBLE + ULTRAVIOLET), DOPING,
OSCILLATION (U)

THE EFFECT OF DONOR IMPURITY STATES NEAR THE
INDIRECT <100> CONDUCTION BAND MINIMA ON THE
DIRECT-INDIRECT TRANSITION IN Ga(AsP) IS
DISCUSSED. ULTRATHIN PLATELET LASERS OF CdSe
AND CdSes), INCLUDING VISIBLE SPECTRUM
CONTINUOUS (CW) OPERATION, ARE DESCRIBED.
INSTABILITIES AND SELF-OSCILLATION PHENOMENA IN
BULK SAMPLES OF Si COMPENSATED WITH DEEP LEVELS
(Au, Co, ETC.) ARE DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

ADP655 559 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

NEW KIND OF FIELD INSTABILITY IN CDS IN THE RANGE OF
NEGATIVE DIFFERENTIAL RESISTIVITY, (U)

MAR 67 7P BOER, K. W. ;
REPT. NO. TR-15, TR-19
CONTRACT: DA-31-124-AR0(D)-173, NONR-4336(00)

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN SOLID STATE
COMMUNICATIONS V5 P467-9 1967.

DESCRIPTORS: (•CADMIUM SULFIDES, TRANSPORT
PROPERTIES), CARRIERS(SEMICONDUCTORS),
RESISTANCE(ELECTRICAL), ELECTRIC FIELDS,
OSCILLATION, STABILITY, ANOMALIES,
PHOTOCONDUCTIVITY (U)
IDENTIFIERS: SEMICONDUCTOR JUNCTIONS (U)

SUBDOMAINS ARE OBSERVED, WHICH OCCUR WITHIN THE
HIGH FIELD DOMAIN OF CDS AND MOVE FROM THE ANODE
TO THE CATHODE EDGE OF THE MAIN DOMAIN, INDICATING A
P-TYPE TRANSPORT MECHANISM AND CAUSING HIGHER
FREQUENCY OSCILLATIONS SUPERIMPOSED ON THE CURRENT
OSCILLATIONS DUE TO MAIN DOMAIN CREATION AND
ANNIHILATION. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZMT

AU-656 151 20/12
AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
OHIO

PHONON COUPLING IN EDGE EMISSION AND
PHOTOCONDUCTIVITY OF CDSE, CDS, AND CD(SE SUB X S SUB
1-X). (U)

JUL 66 12P LANGER, D. W. (PARK, Y. S.
LEWEMA, R. N. I
REPT. NO. ARL-67-0032
PROJ: AF-7885
TASK: 788502

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW
V152 N2 P788-96 DEC 9 1966.

DESCRIPTORS: (*SEMICONDUCTORS, *PHONONS),
(*CADMIUM SELENIDES, TRANSPORT PROPERTIES),
(*CADMIUM SULFIDES, TRANSPORT PROPERTIES),
CONTINUOUS SPECTRUM, EMISSIVITY,
PHOTOCONDUCTIVITY, CRYSTAL LATTICES, CRYSTAL
LATTICE DEFECTS, BAND THEORY OF SOLIDS,
CARRIERS(SEMICONDUCTORS) (U)
IDENTIFIERS: CADMIUM SULFOSELENIDES (U)

IN MIXTURES OF CD(SE SUB X S SUB 1-X) TWO
LONGITUDINAL OPTICAL (LO) PHONONS (AND THEIR
ADDITIVE COMBINATIONS) COUPLE TO THE EDGE EMISSION
CENTERS AND TO THE CONDUCTION ELECTRONS. THE
PHONON FREQUENCIES AS A FUNCTION OF THE CDSE/
CDS RATIO--WHICH ARE OBSERVED IN THE EDGE
EMISSION SPECTRA--AGREE WELL WITH THE
EIGENFREQUENCIES CALCULATED FOR A LINEAR CHAIN OF
CD-SE-CD-S-CD-...ATOMS. THE SPECTRAL
RESPONSE OF THE PHOTOCONDUCTIVITY OF PURE CDS AND
CDSE SHOWS OSCILLATIONS AT THE HIGH-ENERGY SIDE
OF THE ABSORPTION EDGE. THE ENERGY SEPARATION
BETWEEN SUCCESSIVE PHOTOCURRENT MAXIMA OR MINIMA
CORRESPONDS APPROXIMATELY TO THE LO PHONON ENERGY
OF EACH CRYSTAL LATTICE. THE MINIMA ARE EXPLAINED
BY A SHORTENED ELECTRON LIFETIME AT THE RESPECTIVE
ENERGIES, BECAUSE ELECTRONS HAVING SUCH ENERGIES MAY
EASILY DROP TO A RECOMBINATION CENTER (EXCITON OR
IMPURITY NEAR BAND EDGE) BY THE EMISSION OF ONE OR
SEVERAL LO PHONONS. IT IS SHOWN THAT IN MIXED
CRYSTALS THE TWO LO PHONONS (AND THEIR
COMBINATIONS) SHORTEN THE LIFETIME OF THE
CONDUCTION ELECTRONS. THUS, WHEN EXCITATION OCCURS
VIA THE CONDUCTION BAND, THE RECOMBINATION CENTER
WILL BE POPULATED FASTER IN MIXED CRYSTALS. (U)

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/ZZZMT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-656 745 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

SLOW MOVING FIELD DOMAINS IN CDS IN THE RANGE OF
NEGATIVE DIFFERENTIAL CONDUCTIVITY. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 67 14P BOER, K. W. ;
REPT. NO. TR-16
CONTRACT: DA-31-124-ARO(U)-173
MONITOR: AR00 4461:19-P

UNCLASSIFIED REPORT

DESCRIPTORS: (+CADMIUM SULFIDES, TRANSPORT
PROPERTIES), CARRIERS (SEMICONDUCTORS),
POLARIZATION, ELECTRIC FIELDS, DIFFERENTIAL
EQUATIONS, ELECTRICAL CONDUCTANCE (U)
IDENTIFIERS: DOMAINS (CRYSTALLOGRAPHY),
NEGATIVE DIFFERENTIAL CONDUCTIVITY (U)

TIME PERIODIC SOLUTIONS OF POISSON AND TRANSPORT
EQUATIONS IN THE RANGE OF NEGATIVE DIFFERENTIAL
CONDUCTIVITY DUE TO FIELD QUENCHING WERE CALCULATED
BY MACHINE COMPUTATION USING PARAMETERS AS OBTAINED
FOR CADMIUM SULFIDE AND SHOW THE POSSIBILITY THAT THE
HOLE CONCENTRATION INCREASES ABOVE THE ELECTRON
CONCENTRATION IN THE HIGH FIELD DOMAIN. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#656 954 20/12 9/1
SIMON FRASER UNIV BURNABY (BRITISH COLUMBIA) DEPT OF
PHYSICS

CONTROL OF THE SURFACE POTENTIAL OF EVAPORATED CDS
LAYERS. (U)

FEB 67 2P HAERING, R. R. JOHANLON,
J. P. ;

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE
IEEE IP MAY 1967.

DESCRIPTORS: (*SEMICONDUCTING FILMS, SURFACE
PROPERTIES), (*CADMIUM SULFIDES, SURFACE
PROPERTIES), VOLTAGE, CONTROL, ELECTRICAL
CONDUCTANCE, CARRIERS (SEMICONDUCTORS),
DIELECTRIC FILMS, CALCIUM FLUORIDES, SILICON
DIOXIDE, CANADA (U)

A SIMPLE METHOD IS DESCRIBED FOR CONTROLLING THE
SURFACE POTENTIAL OF SEMICONDUCTING FILMS WHICH ARE
COVERED WITH EVAPORATED INSULATING LAYERS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#657 045 20/12 20/2
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH
LABS

RESEARCH IN PURIFICATION AND SINGLE GROWTH OF II-VI
COMPOUNDS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. 15 APR 65-14 APR 67,
APR 67 61P FAHRIG, RICHARD H. IWEBB,
GEORGE N. BROWN, LLOYD W. I
CONTRACT: AF 33(615)-2947
PROJ: AF-7885
MONITOR: ARL 67-0070

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, PREPARATION),
(*CRYSTAL GROWTH, SEMICONDUCTORS), CADMIUM,
PURIFICATION, IMPURITIES, SPECTROSCOPY, CADMIUM
SULFIDES, CRYSTALLIZATION, ZINC SULFIDES, CADMIUM
SELENIDES, CADMIUM COMPOUNDS, ZINC COMPOUNDS,
SELENIDES, TELLURIDES, OXIDES, DOPING,
FURNACES (U)
IDENTIFIERS: CADMIUM TELLURIDE, ZINC OXIDE, ZINC
SELENIDE, ZINC TELLURIDE (U)

A PROCESS FOR THE PURIFICATION OF CADMIUM METAL BY
MULTIPLE TREATMENT STEPS IS DESCRIBED. IMPURITIES
IN CADMIUM, AS DETERMINED BY EMISSION SPECTROGRAPHIC,
MASS SPECTROGRAPHIC, AND ATOMIC ABSORPTION ARE GIVEN
IN TABULAR FORM. THE PREPARATION OF VARIOUS PURE
SEMICONDUCTOR MATERIALS OF THE GROUP II-VI
COMPOUND TYPE IS DISCUSSED AND TABLES OF ANALYTICAL
DATA FOR EACH ARE INCLUDED. THE LEVEL OF IMPURITY
CONCENTRATION IN SYNTHESIZED CADMIUM SULFIDE WAS
SIGNIFICANTLY LOWERED. LESS THAN 1 PART PER
MILLION (ATOMIC) TOTAL IMPURITIES WAS FOUND BY
THE MASS SPECTROGRAPH IN TWO BATCHES OF CDS.
THE GROWTH OF CRYSTALS OF PURE II-VI COMPOUNDS
AND MIXTURES OF COMPOUNDS FROM THE MELT IS REPORTED.
INCLUDED ARE DATA CONCERNING DOPING OF MELT GROWN
CRYSTALS WITH VARIOUS ELEMENTAL DOPANTS, AND, IN THE
CASE OF SOME COMPOUND SEMICONDUCTORS, THE MAXIMUM
DOPING LEVELS POSSIBLE BY THIS METHOD. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-657 274 20/12
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

STATISTICAL CONSIDERATIONS IN MOSFET
CALCULATIONS. (U)

DESCRIPTIVE NOTE: REVISED ED.,
DEC 66 IV KAMINS, T. I. MULLER, R.
S. I.
CONTRACT: DA-31-124-ARO(D)-385
PROJ: DA-20014501B118
MONITOR: AROD 5537:3

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN SOLID-STATE
ELECTRONICS V10 P423-31 1967.

SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT RECEIVED 25
OCT 66.

DESCRIPTORS: (*FIELD EFFECT TRANSISTORS, STATISTICAL
MECHANICS), (*SEMICONDUCTORS, ELECTRICAL
CONDUCTANCE), CARRIERS(SEMICONDUCTORS),
CADMIUM SULFIDES, SILICON, FILMS, TRANSPORT
PROPERTIES, APPROXIMATION(MATHEMATICS),
PERFORMANCE(ENGINEERING), SURFACE PROPERTIES,
QUANTUM STATISTICS (U)
IDENTIFIERS: MAXWELL-BOLTZMANN STATISTICS,
FERMI-DIRAC STATISTICS (U)

THE USE OF STATISTICS IN THE CALCULATION OF THE
PERFORMANCE OF MOS FIELD-EFFECT DEVICES IS
CONSIDERED. SINCE MOSFET'S FREQUENTLY OPERATE
WITH DEGENERATE FREE-CARRIER CONCENTRATIONS AT THEIR
SURFACES, THE PROPER FORMULATION OF THE DEPENDENCE OF
SOURCE-DRAIN CONDUCTANCE IN TERMS OF FERMI-DIRAC
STATISTICS IS DISCUSSED. EXACT CALCULATIONS ARE
COMPARED WITH RESULTS BASED ON APPROXIMATIONS THAT
EMPLOY MAXWELL-BOLTZMANN STATISTICS. COMPUTER
SOLUTIONS FOR BOTH THE ACCURATE AND THE APPROXIMATE
STATISTICAL FORMULATIONS ARE GIVEN. THE RESULTS
ARE INTERPRETED IN TERMS OF PRESENT TECHNOLOGIES FOR
SILICON MOS STRUCTURES AND DEPOSITED CDS THIN-
FILM TRANSISTORS. INEQUALITIES ARE DERIVED WHICH
PERMIT AN EVALUATION OF THE ACCURACY OF MAXWELL-
BOLTZMANN STATISTICS FOR CALCULATION OF SOURCE-
DRAIN CONDUCTANCE FOR AN UNSPECIFIED SEMICONDUCTOR.
IT IS SHOWN THAT THIS APPROXIMATE PROCEDURE
SUFFICES FOR PRACTICAL DEVICES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-659 777 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

CHARACTERISTIC FIELD INHOMOGENEITIES IN HOMOGENEOUS
DIELECTRICS IN THE PRE-BREAKDOWN RANGE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,
JUL 67 7P BOER, K. W. I
CONTRACT: DA-31-124-ARO(D)-173
PROJ: DA-20014501B11B
MONITOR: AROD 4461:20-P

UNCLASSIFIED REPORT

DESCRIPTORS: (•CADMIUM SULFIDES; TRANSPORT
PROPERTIES), FIELD THEORY, SEMICONDUCTORS,
SINGLE CRYSTALS, DIELECTRICS,
CARRIERS(SEMICONDUCTORS), ELECTRICAL PROPERTIES,
ELECTRIC FIELDS (U)

FIELD INSTABILITIES IN CADMIUM SULFIDE SINGLE
CRYSTALS, CAUSED BY FIELD QUENCHING, AND RELATED
EFFECTS WERE INVESTIGATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-659 788 9/1 9/5
RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE
MICROELECTRONICS

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUL 66-30 JUN 67;
OCT 67 28P TOPFER, M. L. IDANIS, A.

H. TRAPP, A. K. ;

REPT. NO. 4

CONTRACT: DA-28-U43-AMC-U2432(E)

PROJ: DA-1E6-22001-A-440

TASK: 1E6-22001-A-440-03

MONITOR: ECOM 02432-F

UNCLASSIFIED REPORT

DESCRIPTORS: (•FIELD EFFECT TRANSISTORS, FILMS),
CADMIUM SULFIDES, TELLURIUM, SEMICONDUCTORS,
GATES(CIRCUITS), MASKING, MANUFACTURING
METHODS, TESTS, INTEGRATED CIRCUITS (U)

THE REPORT INCLUDES DATA COVERING ALL WORK DONE ON THIS CONTRACT. THE LAST HALF OF THE PROGRAM PHASED INTO THE DEVELOPMENT OF COMPLEMENTARY THIN-FILM TRANSISTOR CIRCUITS, USING TELLURIUM FOR THE P-TYPE AND CADMIUM SELENIDE FOR THE N-TYPE SEMICONDUCTORS. THE CIRCUIT USED WAS A THREE-INPUT NAND GATE. TO INCREASE YIELD AND TO IMPROVE CIRCUIT OPERATION AND STABILITY, A NEW MASK WAS INTRODUCED INTO THE FABRICATION PROCEDURE. SINCE THIS MASK DEFINED THE SOURCE-DRAIN LANDS AND GAP IN ONE EVAPORATION INSTEAD OF TWO, THE PREVIOUS SIZE AND ALIGNMENT PROBLEMS WERE ELIMINATED. THE AMOUNT OF PENUMBRA WAS APPRECIABLY REDUCED BECAUSE OF SMALLER WIRE DIAMETER. FASTER SWITCHING WAS OBTAINED, AND CIRCUIT EVALUATION DATA GAVE EVIDENCE THAT MANY OF THE LAST CIRCUITS FABRICATED APPROACHED IDEAL PERFORMANCE.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-660 142 20/12
LOUVAIN UNIV (BELGIUM)

PHOTOMAGNETOELECTRIC EFFECT OF CDS SINGLE CRYSTALS
AND OF BISMUTH ROLLED FOILS. THERMOMAGNETOELECTRIC
EFFECT OF CONTACTS BI-CU, GE-CU AND SI-CU. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE SEP-30 DEC 61,
DEC 61 BIP LUYCK, A. ; LONTIE, G. ; ISSI,
J. P. ; COUPMANS, P. ;
REPI. NO. TN-2
CONTRACT: AF 61(US2)-166

UNCLASSIFIED REPORT

DESCRIPTORS: (*CADMIUM SULFIDES, TRANSPORT
PROPERTIES), (*BISMUTH, TRANSPORT PROPERTIES),
SINGLE CRYSTALS, FOILS, PHOTOCONDUCTIVITY,
SEMICONDUCTORS, CARRIERS(SEMICONDUCTORS),
GERMANIUM, MAGNETIC FIELDS, OPTICAL PROPERTIES,
SEEBECK EFFECT, TEMPERATURE, COPPER, SILICON (U)
IDENTIFIERS: CONTACTS(ELECTRICAL), (U)
MAGNETORESISTIVE EFFECT

CONTENTS: PHOTOMAGNETOELECTRIC EFFECT OF
CDS SINGLE CRYSTALS: (A) IRRADIATION OF
CDS SINGLE CRYSTALS WITH WHITE LIGHT; (B)
IRRADIATION OF CDS WITH COLORED LIGHT. PMR;
(C) INVESTIGATION FOR A PMR INDEPENDENT ON
THE SIGN OF THE MAGNETIC FIELD. MEASUREMENTS IN
THE PERIOD OF POST-IRRADIATION IN THE DARK; (D)
PMR OF CDS WITH WEAK COLORED IRRADIATION;
(E) INVESTIGATION FOR A PME EFFECT ON CDS
CRYSTALS. MAGNETORESISTANCE ON BI -
REPRODUCTION OF CLASSICAL EXPERIMENTS AND NEW
FEATURES. PHOTOMAGNETORESISTANCE AND
PHOTOMAGNETOVOLTAIC EFFECTS ON ROLLED BI FOILS.
THERMOMAGNETOELECTRIC EFFECT ON BI-CU CONTACTS
AND CU-GE OR CU-SI CONTACTS. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-660 760 20/12 20/2
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

RECOVERY OF ROCKSALT STRUCTURE CDS TO ROOM
PRESSURE.

(U)

DESCRIPTIVE NOTE: REVISED ED.,
NOV 66 7P GALE, K. A. IKULP, B. A. I
REPT. NO. ARL 67-0177
PROJ: AF-7885

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: J. PHYS. CHEM. SOLIDS, V28
P1233-5 1967. REVISION OF MANUSCRIPT RECEIVED 2 AUG
66.

DESCRIPTORS: (*CADMIUM SULFIDES, *CRYSTAL
STRUCTURE), (*SEMICONDUCTORS, PHASE STUDIES),
SINGLE CRYSTALS, CRYSTAL LATTICES, CRYOGENICS,
ANNEALING, ABSORPTION SPECTRUM

(U)

THE HIGH PRESSURE PHASE OF CDS WAS RECOVERED TO
ROOM PRESSURE AT 77K. THE STARTING MATERIAL WAS
SINGLE CRYSTAL CDS, AND THE RECOVERED MATERIAL
VARIED FROM POWDER TO SINGLE CRYSTAL NaCl
STRUCTURE CDS. THE ANNEALING TEMPERATURE OF
THE REVERSE TRANSFORMATION OF THE NaCl PHASE WAS
MEASURED AS WAS THE ANNEALING TEMPERATURE OF THE
ZINC BLEND TO WURTZITE PHASE TRANSFORMATION. EG OF
THE HIGH PRESSURE PHASE IS 2.04 PLUS OR MINUS 0.02
EV. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-660 874 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. 8 MAY 66-7 MAY 67,
JUL 67 61P SHIOZAWA, L. R. IJOST, J.

M. I

CONTRACT: AF 33(615)-2708

PROJ: AF-7885

MONITOR: ARL 67-0149

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, CRYSTALLOGRAPHY),
(*CADMIUM SULFIDES, CRYSTALLOGRAPHY), (*CADMIUM
SELENIDES, CRYSTALLOGRAPHY), (*TELLURIDES,
CRYSTALLOGRAPHY), ZINC COMPOUNDS, CRYSTAL
LATTICE DEFECTS, PHASE STUDIES, IMPURITIES,
COPPER, SOLUBILITY, SOLID SOLUTIONS, CRYSTAL
GROWTH, ADDITIVES, SULFUR (U)
IDENTIFIERS: ZINC TELLURIDE (U)

THE MAIN GOAL OF THE RESEARCH EFFORT DESCRIBED IN
THE REPORT WAS TO ACHIEVE SUBSTANTIAL IMPROVEMENTS IN
THE QUALITY OF CDS AND RELATED CRYSTALS SUCH AS
CUSE AND ZNTE. TWO ASPECTS REGARDING
COMPOSITIONAL CHANGES IN THE II-VI COMPOUNDS ARE
PRESENTED: (1) AN INVESTIGATION WAS MADE OF
POINT-DEFECT EQUILIBRIA BOTH FOR COMPLETE EQUILIBRIUM
AND UNDER IDEALLY QUENCHED CONDITIONS, WITH ATTENTION
AT THIS TIME TO ZNTE, AND (2) THE IMPORTANCE
OF KINETICS IS EMPHASIZED, PARTICULARLY IN REGARD TO
THE LENGTH OF TIME REQUIRED TO ATTAIN COMPLETE
EQUILIBRIUM IN A CRYSTAL. A NEW, PROMISING
PROCEDURE IS ALSO DISCUSSED FOR CONTROLLING THE
COMPOSITION OF THE SOLID IN CRYSTAL GROWTH BY USE OF
AN EFFUSION ORIFICE DURING PREPARATION OF THE
SUPPLY. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-661 192 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

STATIONARY HIGH FIELD DOMAINS IN THE RANGE OF
NEGATIVE DIFFERENTIAL CONDUCTIVITY IN CDS SINGLE
CRYSTALS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JCT 67 29P BOER, KARL W. IVOSS, PETER I
REPT. NO. TR-21
CONTRACT: NONR-4336(00)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-661 191.

DESCRIPTORS: (CADMIUM SULFIDES, TRANSPORT
PROPERTIES), ELECTRIC FIELDS, SINGLE CRYSTALS,
CARRIERS (SEMICONDUCTORS), CONDUCTIVITY, WORK
FUNCTIONS, STABILITY, ELECTRON DENSITY (U)

IN CDS CRYSTALS WITH AN N-SHAPED NEGATIVE
DIFFERENTIAL CONDUCTIVITY RANGE STATIONARY HIGH FIELD
DOMAINS ADJACENT TO THE ELECTRODES ARE OBSERVED.
WITH INCREASING APPLIED VOLTAGE THESE STEPLIKE
DOMAINS INCREASE IN WIDTH STAYING ATTACHED TO THE
CATHODE UNTIL THEY FILL THE ENTIRE CRYSTAL, THEN A
STILL HIGHER FIELD DOMAIN IS FORMED AT THE ANODE AND
INCREASES IN WIDTH. THESE DOMAINS CAN BE EXPLAINED
WITHIN AN EARLIER PUBLISHED THEORY AND ALLOW THE
DETERMINATION OF ELECTRON DENSITIES AT THE CATHODE-
CDS BOUNDARY, AND IN THE FIELD QUENCHED REGION.
THE ANALYSIS OF THESE STATIONARY DOMAINS PRESENTS A
NEW TOOL FOR WORK FUNCTION (METAL SEMICONDUCTOR)
INVESTIGATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-661 557 20/12 10/2 20/3
CLEVITE CORP CLEVELAND OHIO

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT
IN HIGH-EFFICIENCY CDS THIN-FILM SOLAR CELLS. (U)

DESCRIPTIVE NOTE: INTERIM REPT. 1 JUN 66-31 MAY 67,
SEP 67 94P SHIOZAWA, L. R. SULLIVAN,
GEORGE A. AUGUSTINE, FRANK I
CONTRACT: AF 33(615)-5224
PROJ: AF-7885
MONITOR: ARL 67-0190

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS, CADMIUM SULFIDES),
(*CADMIUM SULFIDES, FILMS), TRANSPORT
PROPERTIES, CARRIERS (SEMICONDUCTORS), SULFIDES,
COPPER COMPOUNDS, PHOTOCONDUCTIVITY,
SEMICONDUCTORS, OPTICAL PROPERTIES, BAND THEORY OF
SOLIDS, MODELS (SIMULATIONS), SINGLE CRYSTALS,
ELECTRICAL PROPERTIES (U)
IDENTIFIERS: PHOTOVOLTAIC EFFECT (U)

DURING THE FIRST YEAR OF THIS PROJECT 'MODEL
1066,' AN EXPLANATION OF THE MECHANISM RESPONSIBLE
FOR THE PHOTOVOLTAIC EFFECT IN THIN-FILM CDS
SOLAR CELLS WAS DEVELOPED. EMPHASIS HAS SINCE BEEN
PLACED ON CRITICAL EXPERIMENTS DESIGNED TO TEST THIS
MODEL, AND TO ESTABLISH CELL PARAMETERS ESSENTIAL TO
FURTHER REFINEMENT OF THE MODEL. EXPERIMENTS WHICH
HAVE BEEN CARRIED OUT INCLUDE MEASUREMENTS OF THE
THICKNESS OF THE CU₂S LAYER, EXAMINATION OF THE
GRAIN STRUCTURE OF THE CDS LAYER, MEASUREMENTS OF
OPTICAL ABSORPTION IN AND EXAMINATION OF THE
CRYSTALLOGRAPHY AND STOICHIOMETRY OF THE CU₂S
LAYER, DIFFUSION AND SOLUBILITY MEASUREMENTS FOR CU
IN CDS, AND MEASUREMENTS OF JUNCTION CAPACITANCE,
CURRENT-VOLTAGE CHARACTERISTICS AND SPECTRAL RESPONSE
OF CDS SOLAR CELLS. IN ADDITION, A UNIQUE
EVAPORATION SYSTEM HAS BEEN DEVELOPED AND IS BEING
USED SUCCESSFULLY. FINDINGS OF THESE
INVESTIGATIONS HAVE ALL BEEN IN GENERAL AGREEMENT
WITH 'MODEL 1066,' WHICH INVOLVES LIGHT ABSORPTION
BY HOLE-ELECTRON PAIR GENERATION IN THE P-TYPE
CU₂S LAYER, FOLLOWED BY DIFFUSION OF THE MINORITY
ELECTRONS INTO A COPPER-COMPENSATED DARK-INSULATING
CDS LAYER, AND COLLECTION OF THESE AT AN I-N
CDS HOMOJUNCTION. (U)

230

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/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-661 882 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

EFFECT OF STRESS ON CDS SINGLE CRYSTALS, (U)

NOV 66 8P KULP, B. A. IGALE, K. A. I
REPT. NO. ARL-67-0143
PROJ: AF-7885

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PHYSICAL REVIEW V156 N3
P877-JD APR 15 1967.

DESCRIPTORS: (*SEMICONDUCTORS, CADMIUM SULFIDES),
(*CADMIUM SULFIDES, STRESSES), LUMINESCENCE,
HYDROSTATIC PRESSURE, TEMPERATURE, ABSORPTION,
ELECTRICAL CONDUCTANCE, BAND THEORY OF SOLIDS,
PHOTOCONDUCTIVITY (U)

THE ELECTRICAL AND LUMINESCENCE PROPERTIES OF
CDS CRYSTALS, WHICH SHOW THE PHENOMENON OF
STORAGE, WERE STUDIED AS A FUNCTION OF HYDROSTATIC
PRESSURE AND UNIAXIAL STRESS. IN THE EXCITED
STATE, UNIAXIAL STRESS APPLIED PARALLEL TO THE C AXIS
RESULTED IN AN IRREVERSIBLE INCREASE OF SIX ORDERS OF
MAGNITUDE IN THE RESISTANCE. UNIAXIAL STRESS
APPLIED PERPENDICULAR TO THE C AXIS AND HYDROSTATIC
PRESSURE HAD NO EFFECT ON THE RESISTANCE. WHILE
UNIAXIAL STRESS WAS BEING APPLIED TO THE CRYSTAL IN
THE LOW-RESISTIVITY STATE, LUMINESCENCE WAS OBSERVED.
THE INTEGRATED INTENSITY WAS INDEPENDENT OF THE
RATE OF APPLICATION OF THE STRESS OVER A RANGE OF TEN
TO ONE, AND THE LUMINESCENCE CONSISTED OF THE
CHARACTERISTIC GREEN-EDGE EMISSION AND A RED
LUMINESCENCE CENTERING AT ABOUT 6600A. AT ROOM
TEMPERATURE, THE DECAY CONSTANT OF THE PHOTOCURRENT
INCREASED WITH HYDROSTATIC PRESSURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-661 907 20/6 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

COHERENT AND NONCOHERENT LIGHT EMISSION IN II-VI
COMPOUNDS, (U)

66 15P REYNOLDS, DONALD C. ;
REPT. NO. ARL-67-0174
PROJ: AF-7885
TASK: 7885U4

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN THE PHYSICAL REVIEW
V157 N3 P515-7 1967.

DESCRIPTORS: (SEMICONDUCTOR DEVICES, LASERS),
SEMICONDUCTORS, EMISSIVITY, COHERENT RADIATION,
ZINC SULFIDES, CADMIUM SULFIDES, CADMIUM
SELENIDES, ZINC COMPOUNDS, CADMIUM COMPOUNDS,
TELLURIDES, MERCURY ALLOYS, ELECTRON TRANSITIONS,
CRYSTAL GROWTH, TRANSPORT PROPERTIES, REVIEWS (U)
IDENTIFIERS: CADMIUM MERCURY TELLURIDES, CADMIUM
SULFOSSELENIDES, CADMIUM TELLURIDE, ZINC OXIDE (U)

RECENT EXPERIMENTS WITH II-VI COMPOUNDS HAVE
SHOWN THAT THEY HAVE CONSIDERABLE POTENTIAL FOR LASER
APPLICATIONS OVER A BROAD REGION OF THE OPTICAL
SPECTRUM. IT MAY BE POSSIBLE TO COVER THE SPECTRUM
CONTINUOUSLY FROM 3200A (ZNS) TO THE FAR
INFRARED (CDHG:TE) SINCE HGTE IS A
SEMIMETAL. LASER ACTION HAS BEEN OBSERVED IN
ZNS, ZNO, CDS, CDSE, CDS:SE,
CUTE, AND SOME OF THE CDHG:TE ALLOYS. OF
PARTICULAR INTEREST ARE THOSE LASERS OPERATING IN THE
VISIBLE AND NEAR ULTRAVIOLET REGIONS OF THE SPECTRUM
WHERE DETECTORS OF HIGH SENSITIVITY ARE AVAILABLE.
THE LASING TRANSITIONS IN II-VI COMPOUNDS ARE
BOUND EXCITON TRANSITIONS SOME OF WHICH HAVE BEEN
IDENTIFIED IN AUXILIARY EXPERIMENTS. HIGH
EFFICIENCIES AND LOW THRESHOLDS FOR LASING HAVE BEEN
ACHIEVED ALMOST EXCLUSIVELY IN PLATELET-TYPE
CRYSTALS. THE GREATER CRYSTALLINE QUALITY
EXHIBITED BY THE PLATELET-TYPE MATERIAL IS SHOWN TO
RESULT FROM THE CRYSTAL GROWTH HABIT. PHONON
SCATTERING OF CONDUCTION ELECTRONS TO THE GROUND-
STATE EXCITON IS DISCUSSED IN RELATION TO LOW
THRESHOLDS AND HIGH EFFICIENCIES FOR LASING OBSERVED
IN THE CDS:SE SOLID SOLUTIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-662 534 9/1 14/2
WESTINGHOUSE RESEARCH LABS PITTSBURGH PA

FABRICATION OF VAPOR-DEPOSITED THIN FILM
PIEZOELECTRIC TRANSDUCERS FOR THE STUDY OF PHONON
BEHAVIOR IN DIELECTRIC MATERIALS AT MICROWAVE
FREQUENCIES. (U)

DESCRIPTIVE NOTE: INTERIM REPT.:
NOV 67 3JP DE KLERK, JOHN I
REPT. NO. SCIENTIFIC-7
CONTRACT: AF 19(628)-4372
PROJ: AF-5635
TASK: 563503
MONITOR: AFCL 67-U627

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PHYSICAL ACOUSTICS
V4A P195-223 1966.
SUPPLEMENTARY NOTE: SEE ALSO AD-648 782.

DESCRIPTORS: (PIEZOELECTRIC TRANSDUCERS, FILMS),
VAPOR PLATING, MICROWAVE FREQUENCY, DIELECTRIC
PROPERTIES, CADMIUM SULFIDES, ZINC SULFIDES,
QUARTZ, BALANCES, ACOUSTICS, PHONONS,
DIELECTRICS (U)

A METHOD OF FABRICATING STOICHIOMETRIC CDS AND
ZNS THIN FILM PIEZOELECTRIC TRANSDUCERS IS
DESCRIBED, TOGETHER WITH A QUARTZ CRYSTAL
MICROBALANCE METHOD OF FILM THICKNESS MEASUREMENT,
MICROWAVE ACOUSTIC ATTENUATION MEASUREMENT ON
AL₂O₃, MgO AND TiO₂ AS A FUNCTION OF
TEMPERATURE WHILE USING CDS THIN FILM
TRANSDUCERS, ARE INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-663 779 9/1
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

ELECTRICAL PERFORMANCE OF METAL-INSULATOR-
PIEZOELECTRIC SEMICONDUCTOR TRANSDUCERS. (U)

DESCRIPTIVE NOTE: REVISED ED.,
NOV 66 IUP FIEBIGER, J. R. MULLER, R.
S. I
CONTRACT: AF-AFOSR-139-66
PROJ: AF-4751
MONITOR: AFOSR 68-0081

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED
PHYSICS V38 N4 P1948-55 15 MAR 1967.
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 1
JUL 66.

DESCRIPTORS: (PIEZOELECTRIC TRANSDUCERS,
SEMICONDUCTOR DEVICES), FILMS, TRANSISTORS,
SEMICONDUCTORS, CADMIUM SULFIDES, SEMICONDUCTING
FILMS, CADMIUM SELENIDES,
PERFORMANCE (ENGINEERING) (U)
IDENTIFIERS: METAL OXIDES SEMICONDUCTORS (U)

THE THEORY UNDERLYING THE OPERATION OF METAL-
INSULATOR-PIEZOELECTRIC (MIPS) ELECTROMECHANICAL
TRANSDUCERS IS VERIFIED EXPERIMENTALLY FOR TIME-
VARYING LOADS ON DEVICES MADE FROM CDS
PIEZOELECTRIC FILM MATERIALS. EXPERIMENTAL
TRANSDUCERS EXHIBIT SENSITIVITIES OF THE SAME ORDER
AS THOSE OBSERVED UNDER STATIC LOADING WITHIN TIMES
SHORTER THAN ONE MICROSECOND AFTER THE APPLICATION OF
MECHANICAL STRESS. THE FREQUENCY LIMITATIONS FOR
THE TRANSDUCER APPEAR TO BE DETERMINED BY THE
ELECTRICAL PROPERTIES OF THE MOS STRUCTURE. THE
MIPS EFFECT IS DEMONSTRATED EXPERIMENTALLY IN
CDS TRANSDUCERS. TRANSDUCERS FABRICATED ON A
FLEXIBLE POLYIMIDE FILM ARE DESCRIBED, AND A
MICROPHONE EMBODYING THIS CONSTRUCTION IS DISCUSSED.
TRANSDUCERS MADE WITH CDS FILMS HAVE PROPERTIES
WHICH ARE MORE REPRODUCIBLE THAN ARE OBTAINED FROM
TRANSDUCERS USING CDS FILMS. X-RAY STUDIES
SHOW THIS RESULT TO BE LINKED TO CRYSTAL STRUCTURE IN
THE SEMICONDUCTOR LAYERS. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-664 581 20/12
ECOLE NORMALE SUPERIEURE PARIS (FRANCE) LABORATOIRE DE
PHYSIQUE

BAND STRUCTURE AND DISPERSION RELATIONS IN II-VI
COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 OCT 63-30 SEP 67,
OCT 67 6P BALKANSKI, M. I
CONTRACT: AF 61(052)-757
MONITOR: ARL 67-0285

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, TRANSPORT
PROPERTIES), BAND THEORY OF SOLIDS, CRYSTAL
LATTICES, PHONONS, DISPERSION RELATIONS, CADMIUM
SULFIDES, ZINC SULFIDES, MAGNETO-OPTIC EFFECT,
FRANCE (U)

A BRIEF SUMMARY IS GIVEN OF STUDIES INVOLVING
LATTICE DYNAMICS AND PHONON INTERACTIONS IN WURTZITE
AND ZINC BLENDE II-IV SEMICONDUCTOR COMPOUNDS.
A LIST OF RESULTANT PUBLICATIONS IS INCLUDED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-664 582 20/12
ECOLE NORMALE SUPERIEURE PARIS (FRANCE) LABORATOIRE DE
PHYSIQUE

BAND PARAMETERS DETERMINATION FROM FARADAY ROTATION
MEASUREMENTS, (U)

JUL 67 44P BALKANSKI, M. TAMZALLAG, S. I
REPT. NO. SCIENTIFIC-3
CONTRACT: AF 61(US2)-75;
PROJ: AF-7885
MONITOR: ARL 67-U284

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, MAGNETO-OPTIC
EFFECT), (*MAGNETO-OPTIC EFFECT, *BAND THEORY OF
SOLIDS), CARRIERS(SEMICONDUCTORS), CADMIUM
SULFIDES, INDIUM ANTIMONIDES, GALLIUM ARSENIDES,
CADMIUM SELENIDES, TRANSPORT PROPERTIES, FRANCE (U)

IT IS THE PURPOSE OF THE REVIEW TO SUMMARIZE SOME
OF THE RECENT THEORETICAL AND EXPERIMENTAL WORK ON
FREE-CARRIERS AND INTERBAND FARADAY ROTATION, AND
TO EXAMINE THE DIFFICULTIES ENCOUNTERED AND THE
RESULTS OBTAINED SINCE THE FORMULATION OF THE EFFECT
IN SEMICONDUCTORS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-665 025 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

FIELD ENHANCED IONIZATION OF TRAPS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
FEB 68 19P BOER, K. W. ;
REPT. NO. TR-22
CONTRACT: NONR-4336(UU)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO TECHNICAL REPORT 21, AD-661
192.

DESCRIPTORS: (•CADMIUM SULFIDES, ELECTRIC FIELDS),
(•CARRIERS(SEMICONDUCTORS), INTERACTIONS),
ELECTRON DENSITY, IONIZATION, EXCITATION, BAND
THEORY OF SOLIDS, SPACE CHARGES, TRANSPORT
PROPERTIES, EXPERIMENTAL DATA, ELECTRICAL
CONDUCTANCE (U)
IDENTIFIERS: MINORITY CARRIERS, CARRIER
RECOMBINATION (U)

STATIONARY STEPLIKE HIGH-FIELD DOMAINS IN THE RANGE
OF NEGATIVE DIFFERENTIAL CONDUCTIVITY PROVIDE THE
POSSIBILITY TO DETERMINE EXPERIMENTALLY THE CARRIER
DENSITY AS A FUNCTION OF THE ELECTRIC FIELD.
MEASUREMENTS DONE WITH CDS SHOW THAT THE
ELECTRON DENSITY DECREASES BY ABOUT 2 ORDERS OF
MAGNITUDE WITH INCREASING FIELD BETWEEN 30 AND 70
KV/CM. IT CAN BE SHOWN THAT THIS IS CAUSED BY
FIELD QUENCHING, I.E., FIELD EXCITATION OF MINORITY
CARRIERS FROM HOLE TRAPS AND THEREBY ENHANCED
RECOMBINATION. THIS FIELD EXCITATION OF HOLES,
HOWEVER, CANNOT BE DESCRIBED QUANTITATIVELY BY ANY
CLASSICAL FIELD EXCITATION MECHANISM, I.E., BY IMPACT
IONIZATION OR BY TUNNEL EFFECT. THESE MECHANISMS
WOULD NEED A CONSIDERABLY HIGHER FIELD THAN OBSERVED
FOR CAUSING THE MEASURED EFFECT. AGREEMENT BETWEEN
EXPERIMENT AND THEORY CAN BE REACHED BY FIELD
ENHANCED IONIZATION OF COULOMB-ATTRACTIVE CENTERS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-665 876 7/4 20/2
GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND
DEVELOPMENT CENTER

CRYSTAL CHEMISTRY OF NEW HIGH-PRESSURE PHASES. (U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. (FINAL) 1 JAN 64-
31 DEC 67.

JAN 68 67P KASPER, JOHN S. I
REPT. NO. S-68-1017
CONTRACT: AF 49(638)-1361
PROJ: AF-9710
TASK: 9710U3
MONITOR: AFOSR 68-U342

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN VARIOUS JOURNALS.

DESCRIPTORS: (*PHASE STUDIES, *HIGH-PRESSURE
RESEARCH), (*CRYSTAL STRUCTURE, HIGH-PRESSURE
RESEARCH), INDIUM ANTIMONIDES, CADMIUM SULFIDES,
CADMIUM COMPOUNDS, MERCURY COMPOUNDS, GALLIUM
COMPOUNDS, INDIUM COMPOUNDS, COPPER COMPOUNDS,
IRON COMPOUNDS, SILVER COMPOUNDS, ZINC COMPOUNDS,
TIN COMPOUNDS, GOLD COMPOUNDS, ANTIMONY ALLOYS,
SELENIDES, SULFIDES, TELLURIDES, IODIDES,
GERMANIUM, SILICON, DIAMONDS, POLYETHYLENE
PLASTICS, SEMICONDUCTORS, X-RAY DIFFRACTION
ANALYSIS, COLOR PHOTOGRAPHY, STABILITY (U)

THE MAIN OBJECTIVE OF THIS 4-YEAR RESEARCH PROGRAM
HAS BEEN TO LEARN THE NATURE OF HIGH-PRESSURE PHASES
AND THEREBY CONTRIBUTE TOWARD A BETTER UNDERSTANDING
OF CRYSTAL CHEMISTRY AND STRUCTURAL PRINCIPLES
UNDERLYING THE SOLID STATE. MUCH PROGRESS HAS BEEN
MADE IN THE STUDY AND CHARACTERIZATION OF A WIDE
VARIETY OF CHEMICAL COMPOUNDS AT HIGH PRESSURE.
IMPROVEMENTS IN EXPERIMENTAL TECHNIQUES HAVE
CONTRIBUTED GREATLY TOWARD THIS PROGRESS.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-666 401 20/2 20/12 5/1
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVED II-VI CRYSTALS.

(U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 8 JUN-
7 SEP 65,

DEC 65 42P SHIOZAWA, L. R. JUST, J.

M. I

CONTRACT: AF 33(615)-2708

PROJ: 303240

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, CRYSTAL GROWTH),
(CADMIUM SULFIDES, PREPARATION), POWDERS,
SINTERING, DEGASIFICATION, SUBLIMATION,
ELECTRICAL PROPERTIES, PHOTOCONDUCTIVITY,
THERMOELECTRICITY, BIREFRINGENCE, CRYSTAL LATTICE
DEFECTS, ZINC COMPOUNDS, TELLURIDES, OPTICAL
PROPERTIES, ACOUSTIC PROPERTIES
IDENTIFIERS: ZINC TELLURIDE

(U)

(U)

OUTGASSING STUDIES MADE ON CDS POWDER, THE ORIGINAL SOURCE MATERIAL FOR CRYSTAL GROWTH, INDICATED THAT GASES EVOLVED DURING SINTERING RESULT CHIEFLY FROM PHASE CHANGES AND CHEMICAL REACTIONS OF IMPURITIES. CONTINUED RE-EXAMINATION OF THE STANDARD SINTERING PROCESS FOR PURIFYING CDS SOURCE MATERIAL RESULTED IN SMALL BUT IMPORTANT IMPROVEMENTS, SUCH AS LOWERING THE SUBLIMATION RATE TO REDUCE CONTAMINATION BY 'CARRY-OVER' AND INCREASING THE MAXIMUM TEMPERATURE TO IMPROVE OUTGASSING. A STUDY OF THE PRESENT CRYSTAL GROWTH METHODS SHOWS THAT SEED GROWTH UNDER ARGON AT AN ACCEPTABLE LOW GROWTH RATE SEEMS TO HOLD THE BEST PROMISE FOR HIGHER-QUALITY CRYSTALS. A PRELIMINARY EVALUATION OF CDS CRYSTALS BY THERMALLY-STIMULATED CURRENT MEASUREMENTS REVEALED A RELATIVELY SIMPLE CURVE WITH ONLY TWO SUBSTANTIAL PEAKS. OPTICAL EVALUATION OF CDS CRYSTALS CONTINUED BY EXAMINATION FOR STRAIN AND DISLOCATIONS. THE RELATIONSHIP OF PHOTONSENSITIVITY OF CDS, IMPORTANT FOR SOUND AMPLIFIERS, AND SULFUR-VAPOR TREATMENT HAS BEEN EXPLAINED, SUBJECT TO FURTHER VERIFICATION. MEASUREMENTS OF THE ELECTRO-OPTIC EFFECT IN ZNTE WERE MADE, AND IT IS RECOMMENDED FOR CONSIDERATION FOR OPTICAL MODULATORS.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 402 20/2 20/12 9/1
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 3, 8 SEP-
7 DEC 65,

MAR 66 38P SHIOZAWA, L. K. IJOST, J.

M. I

CONTRACT: AF 33(615)-2708

PROJ: AF-30240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-666 401.

DESCRIPTORS: (*SEMICONDUCTORS, *CRYSTAL GROWTH),
(*CADMIUM SULFIDES, PREPARATION), POWDERS,
SINTERING, DEGASIFICATION, IMPURITIES, SULFATES,
SILICON DIOXIDE, EPITAXIAL GROWTH, X-RAY
SPECTROSCOPY, CADMIUM SELENIDES, VAPOR PRESSURE,
CRYSTAL LATTICE DEFECTS, ELECTRICAL PROPERTIES,
ACOUSTIC PROPERTIES, SULFUR (U)

THE RESULTS OF THE OUTGASSING STUDY CDS POWDER
SHOWS THAT MOST OF THE GASES EVOLVED DURING VACUUM
SINTERING ARE DUE TO THE PRESENCE OF ABOUT 0.1 MOLE
% HYDRATED CDSO₄. IT WAS FOUND THAT A
REDUCED AMOUNT OF SiO₂ INCLUSIONS RESULTS IF
EPITAXIAL CRYSTAL GROWTH OF CDS IS CARRIED OUT IN
AN UNSEALED TUBE UNDER 1 ATM AR. X-RAY
FLUORESCENCE MEASUREMENTS SHOW THAT CDSE CRYSTALS
GROWN IN THIS LABORATORY CONTAIN ABOUT 2 MOLE % S,
WHICH CAN BE REDUCED BY A SE-VAPOR TREATMENT.
ANALYSIS OF THE SOLID-VAPOR EQUILIBRIA FOR CDS-
CDSE MIXED CRYSTALS SHOWS A VARIATION OF K_P
WITH COMPOSITION, WITH A PRONOUNCED MINIMUM AT 0.57
MOLE FRACTION CDS. OF EXTREME IMPORTANCE IN
DETERMINING THE ELECTRICAL PROPERTIES OF II-VI
SEMICONDUCTORS ARE NATIVE POINT DEFECTS. A
THEORETICAL ANALYSIS OF THEIR EQUILIBRIA SHOWS A
COMPLEX INTERDEPENDENCE OF THE VARIOUS DEFECTS AND A
NECESSITY FOR EXPERIMENTALLY DETERMINING THE VARIOUS
EQUILIBRIUM CONSTANTS. A VERIFICATION OF THE
DEPENDENCE OF ACOUSTIC AMPLIFICATION PROPERTIES ON
S PRESSURE WAS MADE, WITH OPTIMUM CURRENT
OSCILLATIONS OCCURRING WHEN A MINIMAL S PRESSURE OF
ABOUT 0.2 ATM AT 650C IS USED. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 403 20/2 20/12 9/1
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS SUMMARY REPT. NO. 4,
8 MAR 65-7 MAY 66;

AUG 66 36P SHIOZAWA, L. N. IJO, J.

M. 1

CONTRACT: AF 33(615)-2708

PROJ: 303240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-666 402.

DESCRIPTORS: (*SEMICONDUCTORS, *CRYSTAL GROWTH),
(*CADMIUM SULFIDES, PREPARATION), POWDERS,
SINTERING, SUBLIMATION, NUCLEATION, EPITAXIAL
GROWTH, MICROSTRUCTURE, OPTICAL PROPERTIES,
ELECTRICAL PROPERTIES, PHOTOCONDUCTIVITY,
THERMOELECTRICITY, CRYSTAL LATTICE DEFECTS, ZINC
COMPOUNDS, TELLURIDES (U)
IDENTIFIERS: ZINC TELLURIDE (U)

THE PROGRAM FOR PURIFICATION OF THE ORIGINAL SOURCE MATERIAL FOR CRYSTAL GROWTH CONSISTS OF (1) SINTERING UNDER VACUUM AT 900C FOR 1 HR FOLLOWED BY FURTHER SINTERING UNDER APPROX. 1 ATM AR AT 1200C FOR AN ADDITIONAL HOUR AND (2) ONE OR MORE VACUUM FRACTIONAL SUBLIMATIONS AT 1100C. IN CRYSTAL GROWTH, DEPENDENCE FOR HIGH QUALITY CRYSTALS IS MAINLY ON THE OPEN-TUBE, SPONTANEOUS-NUCLEATION METHOD AT 1200C AND UNDER APPROX. 1 ATM AR. THE ADVANTAGES OF EPITAXIAL CRYSTAL GROWTH UNDER VACUUM HAVE NOT YET BEEN COMPLETELY REALIZED. A COMBINATION OF THE ADVANTAGES OF BOTH METHODS HAS GIVEN ENCOURAGING RESULTS. SOME WORK ON THE USE OF SMALL SEEDS HAS SHOWN THAT CONDITIONS FOR PROMOTING EPITAXIAL GROWTH ARE VERY CRITICAL. MECHANICAL AND CHEMICAL POLISHING TECHNIQUES ARE GIVEN IN DETAIL FOR THE PREPARATION OF CRYSTAL SPECIMENS FOR MICROSCOPIC EXAMINATION; CRYSTALS ARE BEING EVALUATED OPTICALLY USING NONCOHERENT AND COHERENT LIGHT, AND ELECTRICALLY BY PHOTOCONDUCTIVITY, THERMALLY-STIMULATED CURRENTS, AND CURRENT SATURATION AND OSCILLATIONS. A THEORETICAL ANALYSIS OF NATIVE POINT DEFECT EQUILIBRIA WAS MADE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 404 20/2 20/12 9/1
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 5, 8 MAY-
7 AUG 66,

OCT 66 22P SHIOZAWA, L. N. IJOST, J.

M. I

CONTRACT: AF 33(615)-2708
PROJ: 303241

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-666 403.

DESCRIPTORS: (*SEMICONDUCTORS; *CRYSTAL GROWTH),
(*CADMIUM SULFIDES, PREPARATION), ZINC
COMPOUNDS, TELLURIDES, CRYSTAL LATTICE DEFECTS,
DISTRIBUTION, CARRIERS (SEMICONDUCTORS),
STABILITY (U)

IDENTIFIERS: ZINC TELLURIDE (U)

ANALYSIS OF THE DATA OF VARIOUS PHENOMENA OBSERVED
IN ZNTE HAS GIVEN THE BASIS FOR A SOLID ZNTE
STABILITY FIELD WITH ZN VACANCY CONCENTRATIONS
CONSIDERABLY HIGHER THAN PREVIOUSLY PROPOSED. THE
ESSENTIAL MECHANISM OF THE FORMATION OF VOIDS IN
ZNTE WAS SHOWN TO BE, IN PART, THE STOICHIOMETRIC
COPRECIPITATION OF ZN AND TE VACANCIES, BUT
MAINLY, THE STOICHIOMETRIC COPRECIPITATION OF ZN
VACANCIES AND TE ATOMS. CONTRARY TO THE PREVIOUS
ASSUMPTION OF SHALLOW S VACANCIES IN CDS, WHICH
HAD RESULTED IN INCONSISTENCIES IN THE INTERPRETATION
OF EXPERIMENTAL DATA, FURTHER EVIDENCE INDICATES THAT
S VACANCIES ARE MODERATELY DEEP. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 405 20/2 20/12 9/1
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 6: 8 AUG-
7 NOV 66,
FEB 67 27P SHIOZAWA, L. R. IJOST, J.
M. ;
CONTRACT: AF 33(615)-2708

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-666 404.

DESCRIPTORS: (*SEMICONDUCTORS, *CRYSTAL GROWTH),
(*CADMIUM SULFIDES, PREPARATION), CRYSTAL
LATTICE DEFECTS, CARRIERS(SEMICONDUCTORS),
SULFUR, VAPORS, PHASE STUDIES, THERMAL
PROPERTIES, ZINC COMPOUNDS, TELLURIDES (U)
IDENTIFIERS: ZINC TELLURIDES (U)

SULFUR COMPENSATION OF EXCESS DONORS IN CDS
TO OBTAIN UNIFORM, HIGH-RESISTIVITY CRYSTALS WITHOUT
APPRECIABLE OVERCOMPENSATION MAY REQUIRE A COMPOSITE
HEAT-TREATING PROCEDURE, SINCE AN ACCEPTABLE SHORT
HEAT-TREATING TIME WITH THE REQUIRED HIGH S
PRESSURE IS NOT COMPATIBLE WITH UNIFORM CRYSTAL
PROPERTIES. THE ELECTRONEUTRALITY EQUATION IS PUT
INTO A GENERAL, SOLVABLE FORM BY EVALUATION OF THE
VARIOUS EQUILIBRIUM CONSTANTS DEFINING THE FORMATION
AND RELATIONSHIP OF ALL OF THE PROBABLE NATIVE AND
FOREIGN CENTERS OCCURRING IN II-VI COMPOUNDS.
BY USE OF A COMPUTER, THE TEMPERATURE DEPENDENCE OF
THE CONCENTRATION FOR THESE VARIOUS CENTERS ARE
READILY CALCULATED AND THE STABILITY FIELD OF THE
SOLID IS THEN DEFINED. INITIAL APPLICATION OF THIS
PROCEDURE IS TO ZNTE. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 406 20/12 20/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 7, 8 NOV
66-7 FEB 67,

APR 67 ZUP SHIOZAWA, L. N. IJOSE, J.

M. I

CONTRACT: AF 33(615)-2708

PROJ: 303241

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO PROGRESS REPT. NO. 6, AD-
666 405.

DESCRIPTORS: (*SEMICONDUCTORS, CRYSTALLOGRAPHY),
(*CADMIUM SULFIDES, CRYSTALLUGRAPHY), (*CADMIUM
SELENIDES, CRYSTALLOGRAPHY), TELLURIDES, ZINC
COMPOUNDS, CRYSTAL LATTICE DEFECTS, PHASE STUDIES,
IMPURITIES, COLORS, DIFFUSION, CRYSTAL GROWTH,
CARRIERS(SEMICONDUCTORS), FREE ENERGY (U)
IDENTIFIERS: ZINC TELLURIDE (U)

SOLUTION OF THE ELECTRONEUTRALITY EQUATION FOR
ZnTe CONTAINING VARIOUS CONCENTRATIONS OF A
FOREIGN DONOR SHOWS CORRESPONDING LARGE CHANGES IN
THE CONCENTRATIONS OF THE VACANCIES. THE IDEAL
QUENCHING OF II-VI COMPOUNDS TO ROOM TEMPERATURE
FROM HIGHER EQUILIBRATION TEMPERATURES HAS BEEN
STUDIED USING A NEW COMPUTER PROGRAM. SPECIFIC
RESULTS FOR ZnTe HAVE BEEN COMPUTED AND ARE
PRESENTED IN GRAPHICAL FORM. THE STANDARD FREE
ENERGIES OF REACTION INVOLVING THE VARIOUS SPECIES
FOR ZnTe HAVE BEEN CALCULATED FROM THE
EQUILIBRIUM CONSTANTS. EQUILIBRATION OF ZnTe
HAS BEEN STUDIED AND WAS FOUND TO REQUIRE LONGER
TIMES THAN WAS ORIGINALLY BELIEVED. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 439 10/2 20/12
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

FABRICATION OF CADMIUM SULFIDE THIN FILM SOLAR CELLS
FOR SPACE VEHICLE TESTING. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 SEP 65-15 AUG 67;
DEC 67 48P NASTELIN, H. E. IHJETANEN;
J. R. ISHIRLAND, F. A. I
REPT. NO. 30J280
CONTRACT: AF 33(615)-3253
PROJ: AF-7885
MONITOR: ARL 67-U282

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS,
PERFORMANCE(ENGINEERING)), (*SEMICONDUCTING
FILMS, CADMIUM SULFIDES), (*SPACECRAFT COMPONENTS,
SOLAR CELLS), FLIGHT TESTING, EFFICIENCY,
STABILITY, DOPING, LIGHT TRANSMISSION, BALLOONS,
BAND THEORY OF SOLIDS, MANUFACTURING METHODS,
COPPER COMPOUNDS, SULFIDES (U)

FIVE SERIES OF FLIGHT PANELS FOR SATELLITE AND
BALLOON FLIGHT TESTING WERE PREPARED. PANELS AR-
1 THROUGH 6 WERE DELIVERED TO APL IN SEPTEMBER OF
1965. PANELS AR-8 THROUGH 10, OF SIMILAR
FABRICATION, WERE DELIVERED IN MARCH OF 1966.
PANELS ARX-701-1 THROUGH 4 WERE DELIVERED IN
APRIL OF 1967 FOR INCLUSION IN THE OVI-13
SATELLITE EXPERIMENT. THREE BALLOON FLIGHT
MODULES, AFAPL-CDS-1, -2, AND -3, WERE
DELIVERED TO APL IN MAY OF 1966, AND THREE
ADDITIONAL BALLOON FLIGHT MODULES, AFAPL-CDS-
005, 006, 007, WERE DELIVERED IN MAY OF 1967, BOTH
FOR JPL BALLOON FLIGHT EXPERIMENTS. WORK WAS
PERFORMED ON INCREASING THE EFFICIENCY AND STABILITY
OF CDS THIN FILM SOLAR CELLS. MOST OF THE WORK
WAS CONCERNED WITH IMPROVEMENTS IN THE FORMATION OF
THE BARRIER LAYER AND INCLUDED TREATMENTS OF THE
CDS FILM PRIOR TO THE FORMATION OF THE BARRIER
LAYER, VARIATIONS IN THE BARRIER FORMATION PROCESS,
AND TREATMENTS OF THE FILM AND BARRIER AFTER
FORMATION OF THE BARRIER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-666 452 20/12
NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT KJELLER

ACOUSTOELECTRIC EFFECTS IN SOLIDS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. NO. 4, 1 APR 66-31
MAR 67,

JUN 67 7P HANNESTAD, ANDREAS :

CONTRACT: AF 61(U52)-958

PROJ: AF-4600

TASK: 460003

MONITOR: AFCRL 67-U636

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, ELECTRICAL
PROPERTIES), PHOTOCONDUCTIVITY, ELECTRIC FIELDS,
MOBILITY, BAND THEORY OF SOLIDS, ELECTROOPTICS,
CARRIERS (SEMICONDUCTORS), CADMIUM SULFIDES,
ZINC COMPOUNDS, GALLIUM ARSENIDES, OXIDES (U)
IDENTIFIERS: ACOUSTIC WAVES, ACOUSTOELECTRIC
EFFECT, PULSED OPERATION, THRESHOLD (U)

THE REPORT GIVES A BRIEF SUMMARY OF THE
INVESTIGATIONS UNDERTAKEN IN THE PERIOD 1 APRIL
1966 - 31 MARCH 1967, AND IS CONCERNED WITH THE
ACOUSTOELECTRIC EFFECTS IN SOLIDS. PARTICULAR
EMPHASIS HAS BEEN PLACED ON ACOUSTOELECTRIC
SATURATION AND CURRENT OSCILLATIONS IN CDS AND
ZNO AND ELECTRICAL FIELD DISTRIBUTION IN CDS.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 022 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

CONVERGENCE STUDY OF A SELF-CONSISTANT
ORTHOGONALIZED-PLANE-WAVE BAND CALCULATION FOR
HEXAGONAL CDS. (U)

FEB 68 8P EUWEMA, R. N. COLLINS, T.
C. SHANKLAND, D. G. DEWITT, J. S. I
PROJ: AF-7d85
TASK: 788500
MONITOR: ARL 68-0007

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN THE PHYSICAL
REVIEW, V162 N3 P710-15 15 OCT 67.

DESCRIPTORS: (*SEMICONDUCTORS, *BAND THEORY OF
SOLIDS), (*CADMIUM SULFIDES, BAND THEORY OF
SOLIDS), SOLID STATE PHYSICS, BRILLOUIN ZONES,
MATHEMATICAL MODELS, WAVE FUNCTIONS,
APPROXIMATION (MATHEMATICS), CONVERGENCE (U)

THE ELECTRONIC BAND STRUCTURE OF HEXAGONAL CDS
IS CALCULATED BY MEANS OF A SELF-CONSISTENT
ORTHOGONALIZED-PLANE-WAVE MODEL, USING SLATER'S
APPROXIMATION FOR THE EXCHANGE TERM. IN ORDER TO
DETERMINE THE NUMBER OF PLANE WAVES TO BE USED IN THE
FOURIER EXPANSION OF THE VALENCE STATES, A
CONVERGENCE STUDY IS DISCUSSED FOR THE STARTING MODEL
AND FOR THE FINAL SELF-CONSISTENT MODEL. IT IS
CONCLUDED THAT THE STARTING MODEL IS UNSATISFACTOR.
FROM A CONVERGENCE STANDPOINT, WHILE THE SELF-
CONSISTENT MODEL HAS SUFFICIENTLY WELL CONVERGED FOR
245 PLANE WAVES. THE RESULTING BAND STRUCTURE IS
PRESENTED FOR THE HIGH SYMMETRY POINTS OF THE
BRILLOUIN ZONE. THE SPIN-ORBIT SPLITTING OF THE
TOP VALENCE BAND AND THE EFFECTIVE MASS ALONG THE C
AXIS OF THE ZONE ARE CALCULATED FROM THIS BAND
STRUCTURE. THE RESULTS ARE THEN COMPARED WITH
EXPERIMENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 094 20/12
TEXAS INSTRUMENTS INC DALLAS

RARE EARTH IMPURITIES IN II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: SCIENTIFIC INTERIM REPT.,
DEC 67 12P WATTS, R. KENT HULTON,
WILLIAM C. I
CONTRACT: F44620-67-C-0073
PROJ: AF-9763
TASK: 9763U2
MONITOR: AFOSR 69-U542

UNCLASSIFIED REPORT
AVAILABILITY: PUBLISHED IN PROCEEDINGS II-VI
SEMICONDUCTING COMPOUNDS INTERNATIONAL CONFERENCE,
N. Y. P1390-9 1967.

DESCRIPTORS: (*SEMICONDUCTORS, *CRYSTAL LATTICE
DEFECTS), (*RARE EARTH ELEMENTS, ELECTRON SPIN
RESONANCE), ZINC SULFIDES, ZINC COMPOUNDS,
CADMIUM COMPOUNDS, SELENIDES, TELLURIDES,
CADMIUM SELENIDES, CADMIUM SULFIDES, IMPURITIES,
ERBIUM, DYSPROSIUM, NEODYMIUM, YTTERBIUM,
THULIUM, IONS, CRYSTAL LATTICES (U)
IDENTIFIERS: CADMIUM TELLURIDE, ZINC SELENIDE,
ZINC TELLURIDE (U)

THE RARE EARTH IMPURITIES ER(3+), DY(3+),
ND(3+), YB(3+), AND TM(2+) WERE
OBSERVED BY ELECTRON SPIN TO OCCUPY SEVERAL DIFFERENT
SITES IN II-VI COMPOUNDS. THE ELECTRON SPIN
RESONANCE (ESR) OF RARE EARTH IMPURITIES IN THE
ZINC AND CADMIUM CHALCOGENIDES WAS STUDIED TO
DETERMINE THE ATOMIC ENVIRONMENT OF THE RARE EARTH
ION. THIS IS ACCOMPLISHED BY COMPARISON OF THE LOW
TEMPERATURE ESR EXPERIMENTAL RESULTS WITH THE G
FACTOR CALCULATED FOR EACH OF THE GAMMA-1 LEVELS OF
THE CRYSTAL FIELD-SPLIT GROUND STATE, THUS
DISTINGUISHING WHICH GAMMA-1 IS LOWEST; THEN,
ASSUMING A POINT CHARGE MODEL FOR THE CRYSTAL,
DETERMINING THE POSSIBLE SITES FOR WHICH THIS GAMMA-1
IS LOWEST. THE DISADVANTAGES OF THE POINT CHARGE
MODEL ARE WELL KNOWN; NEVERTHELESS, THE RESULTS OF
THE MODEL ARE FOUND TO BE FAIRLY ACCURATE IN THE FEW
CASES WHERE INDEPENDENT CHECKS EXIST. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 233 20/12 20/2 20/6 20/3
NAVAL WEAPONS CENTER CORONA LABS CALIF

SEMICONDUCTING THIN FILMS: AN ANNOTATED
BIBLIOGRAPHY, 1967 SUPPLEMENT, (U)

MAR 68 157P TURNBULL, W. R. ;
REPT. NO. NOLC-745
TASK: A31533212/2111/RO08-U3-02

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTING FILMS,
*BIBLIOGRAPHIES), REVIEWS, SOLID STATE PHYSICS,
PHYSICAL PROPERTIES, CRYSTAL GROWTH,
ELECTROLUMINESCENCE, BAND THEORY OF SOLIDS,
LASERS, GERMANIUM, SILICON, BORON, ARSENIDES,
PHOSPHIDES, SELENIDES, TELLURIDES, SULFIDES,
INDIUM ANTIMONIDES, CADMIUM SELENIDES, GALLIUM
ARSENIDES, CADMIUM SULFIDES, ZINC SULFIDES,
SILICON CARBIDES, ALUMINUM COMPOUNDS, CADMIUM
COMPOUNDS, GALLIUM COMPOUNDS, GERMANIUM COMPOUNDS,
INDIUM COMPOUNDS, MERCURY COMPOUNDS, TIN
COMPOUNDS, ZINC COMPOUNDS (U)
IDENTIFIERS: HETEROJUNCTIONS,
JUNCTIONS(SEMICONDUCTORS), THIN FILMS, THIN
FILMS ELECTRONICS (U)

THE 1967 SUPPLEMENT TO NOLC REPORT 712,
SEMICONDUCTING THIN FILMS, AN ANNOTATED
BIBLIOGRAPHY (1956-1966) (AD-655 10U)
CONTINUES THE COMPREHENSIVE BIBLIOGRAPHIC SURVEY ON
THE PREPARATION, PROPERTIES, APPLICATIONS, AND THEORY
OF SEMICONDUCTING THIN FILMS. IT IS COMPRISED OF
485 REFERENCES, THE MAJORITY OF WHICH WERE PUBLISHED
IN 1967, FROM ENGLISH AND FOREIGN LANGUAGE
PERIODICAL LITERATURE. THE ABSTRACTS ARE ARRANGED
BY AUTHOR UNDER THE FOLLOWING CLASSES: (1)
ELEMENTAL, (2) GROUP III-V, (3)
GROUP II-VI, (4) GROUP IV-VI, (5)
GROUP IV-IV, AND (6) MISCELLANEOUS
COMPOUNDS. ALL OF THE MATERIALS ARE INDEXED WITH
THE EXCEPTION OF THE MISCELLANEOUS COMPOUNDS
(GROUPS I-V, I-VI, AND I-VII).
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 519 10/2
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

PRESENT STATUS OF CADMIUM SULFIDE THIN FILM SOLAR
CELLS.

(U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,
DEC 67 4UP STANLEY, A. G. I
REPT. NO. TN-1967-52
CONTRACT: AF 19(628)-5167
PROJ: AF-649L
MONITOR: ESD TR-67-574

UNCLASSIFIED REPORT

DESCRIPTORS: (SOLAR CELLS, CADMIUM SULFIDES),
FILMS, ELECTRICAL PROPERTIES, DEGRADATION,
THERMAL PROPERTIES, INFRARED SPECTROSCOPY,
STRESSES, FAILURE (MECHANICS), CHARGED
PARTICLES, SPECTRA (VISIBLE + ULTRAVIOLET),
CONDUCTIVITY, TENSILE PROPERTIES, MEASUREMENT
IDENTIFIERS: THIN FILMS

(U)

(U)

CADMIUM SULFIDE THIN FILM SOLAR CELLS, ESPECIALLY
SELECTED FOR STABILITY UNDER AMBIENT CONDITIONS,
EXPERIENCED SEVERE DEGRADATION IN THEIR I-V
CHARACTERISTICS WHEN SUBJECTED TO THERMAL CYCLING IN
VACUUM. A NUMBER OF DIAGNOSTIC TECHNIQUES WERE
APPLIED TO DETERMINE THE FAILURE MECHANISM. THESE
INCLUDED CROSS-SECTIONING, INFRARED MEASUREMENTS,
MECHANICAL STRESS TESTS AND THE MEASUREMENT OF SERIES
AND SHUNT RESISTANCE. DIFFERENT TYPES OF FAILURE
MODES ARE DISCUSSED. THE RESULTS OF RADIATION
EXPERIMENTS ARE SUMMARIZED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-667 576 20/2 20/12 9/1
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1: 8 MAR-
8 JUN 65,

AUG 65 29P SHIOZAWA, L. R. JOSE, J.

M. 1

CONTRACT: AF 33(615)-2708

PROJ: 303240

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, CRYSTAL GROWTH),
(CADMIUM SULFIDES, PREPARATION), PURIFICATION,
SINTERING, DEGASIFICATION, VACUUM APPARATUS,
POWDERS, PHOTOCONDUCTIVITY, THERMOELECTRICITY,
ACOUSTIC PROPERTIES, EPITAXIAL GROWTH, CRYSTAL
LATTICE DEFECTS (U)

EMPHASIS WAS PLACED ON THE CONSTRUCTION OF
EQUIPMENT NEEDED FOR IMPROVING AND EVALUATING THE
QUALITY OF CDS AND RELATED CRYSTALS. A
PROCEDURE FOR CLEANING FUSED-QUARTZ TUBES USED FOR
PURIFICATION AND CRYSTAL GROWTH HAS BEEN DEVELOPED.
WHICH, ALONG WITH BETTER PURIFICATION METHODS,
PROMISES TO RESULT IN IMPROVEMENT IN CRYSTAL QUALITY.
A VACUUM APPARATUS HAS BEEN ASSEMBLED FOR STUDYING
THE OUTGASSING CHARACTERISTICS OF CDS POWDERS
DURING SINTERING. BY PROPER USE OF LIQUID NITROGEN
TRAPS, PRESSURES BELOW 0.000005 TORR WERE ACHIEVED
WITH A SMALL MECHANICAL PUMP RATED AT 0.0001 TORR
ULTIMATE PRESSURE. A NEW FURNACE FOR CONTINUING
WORK ON SEED GROWTH HAS BEEN BUILT AND A MODERATELY-
SUCCESSFUL RUN HAS BEEN COMPLETED. ALTHOUGH
CONSIDERABLE RELIANCE IS STILL PLACED ON MICROSCOPIC
OBSERVATIONS AND ELECTRICAL MEASUREMENTS FOR JUDGING
CRYSTAL QUALITY, MEASUREMENTS OF PHOTOCONDUCTIVITY,
THERMALLY-STIMULATED CURRENTS, AND ACOUSTIC PHENOMENA
WILL BE EMPHASIZED NOW THAT THE NECESSARY EQUIPMENT
HAS BEEN COMPLETED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-668 503 20/12 20/3
NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT KJELLER

ACOUSTOELECTRIC EFFECTS IN SOLIDS.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. (FINAL), 1 APR
66-30 SEP 67,

UCT 67 1JP RANNESTAD, ANDREAS :

REPT. NO. NDRE-E-113

CONTRACT: AF 61(US2)-958

PROJ: AF-4600

TASK: 460003

MONITOR: AFCL 68-0136

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, ELECTRICAL
PROPERTIES), (•PIEZOELECTRIC CRYSTALS,
SEMICONDUCTORS), CADMIUM SULFIDES, ZINC
COMPOUNDS, OXIDES, MOBILITY, ELECTRIC FIELDS,
ELECTRIC CURRENTS, ELECTROOPTICS, OSCILLATION,
CARRIERS(SEMICONDUCTORS), CRYSTAL LATTICES,
PHOTOELECTRIC MATERIALS, NORWAY
IDENTIFIERS: •ACOUSTOELECTRIC EFFECT, ACOUSTIC
WAVES

(U)

(U)

THE REPORT GIVES A SUMMARY OF THE INVESTIGATIONS
UNDERTAKEN DURING THE CONTRACT PERIOD, AND IS
CONCERNED WITH THE ELECTROACOUSTIC AND ELECTROOPTIC
INTERACTION IN PIEZOELECTRIC SEMICONDUCTORS.
PARTICULAR EMPHASIS HAS BEEN PLACED ON CURRENT
SATURATION AND ELECTRON DRIFT MOBILITY IN CDS AND
ZNO AND THE ELECTRIC FIELD DISTRIBUTION IN
CDS. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-670 014 20/12
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

STATUS OF DIFFUSION DATA FOR BINARY COMPOUND
SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 68 69P YARBROUGH, DAVID W. ;
R&PT. NO. ECOM-2942
PROJ: DA-1H622001-A-440
TASK: 1H622001-A-440-03

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, DIFFUSION),
(CRYSTAL LATTICE DEFECTS, DIFFUSION), DOPING,
TRANSPORT PROPERTIES, SILICON CARBIDES, GALLIUM
ARSENIDES, INDIUM ANTIMONIDES, ZINC SULFIDES,
CADMIUM SELENIDES, CADMIUM SULFIDES, ALUMINUM
COMPOUNDS, GALLIUM COMPOUNDS, INDIUM COMPOUNDS,
ZINC COMPOUNDS, CADMIUM COMPOUNDS, MERCURY
COMPOUNDS, ANTIMONY ALLOYS, PHOSPHIDES, ARSENIC
ALLOYS, SELENIDES, TELLURIDES, REVIEWS (U)
IDENTIFIERS: ALUMINUM ANTIMONIDE, GALLIUM
PHOSPHIDE, GALLIUM ANTIMONIDE, INDIUM PHOSPHIDE,
INDIUM ARSENIDE, ZINC SELENIDE, CADMIUM
TELLURIDE, MERCURIC SELENIDE (U)

A SURVEY OF THE LITERATURE WAS COMPLETED IN AN
EFFORT TO ESTABLISH THE STATUS OF DIFFUSION DATA IN
III-V COMPOUNDS, II-VI COMPOUNDS, AND
SIC. THIS REPORT WILL BE USEFUL IN PROVIDING A
RELATIVELY COMPLETE REVIEW AND BIBLIOGRAPHY OF
PUBLISHED DIFFUSION DATA. AN EFFORT WAS MADE TO
INDICATE THOSE SPECIES WHICH EXHIBIT NON-FICKIAN
BEHAVIOR. IN MANY CASES, DIFFUSION DATA ARE
CORRELATED IN TERMS OF CONCENTRATION DEPENDENT
DIFFUSION COEFFICIENTS. FOR THOSE SPECIES
INDICATING FICKIAN BEHAVIOR OVER SOME RANGE OF
TEMPERATURE OR CONCENTRATION THE IMPORTANT
TEMPERATURE VARIATION PARAMETERS ARE GIVEN.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-670 611 2U/12
HARVARD UNIV CAMBRIDGE MASS DIV OF ENGINEERING AND
APPLIED PHYSICS

THE EFFECT OF HYDROSTATIC PRESSURE ON THE PROPERTIES
OF SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 SEP 58-31 AUG 67,
MAY 68 44P BROOKS, HARVEY ; PAUL, WILLIAM

REP. NO. HP-23
CONTRACT: NONR-1466(10)
PROJ: NR-017-308

UNCLASSIFIED REPORT

DESCRIPTORS: (=SEMICONDUCTORS, HYDROSTATIC
PRESSURE), GALLIUM ARSENIDES, GERMANIUM,
SILICON, ALKALI METALS, TIN, LEAD COMPOUNDS,
GALLIUM COMPOUNDS, SELENIDES, TELLURIDES,
SULFIDES, PHOSPHIDES, CRYOGENICS, ABSTRACTS,
TUNNELING (ELECTRONICS), LASERS, ELECTRICAL
PROPERTIES, OPTICAL PROPERTIES, BAND THEORY OF
SOLIDS, SEMICONDUCTING FILMS, TRANSPORT PROPERTIES,
CARRIERS (SEMICONDUCTORS) (U)

IDENTIFIERS: GALLIUM ANTIMONIDE, GALLIUM
PHOSPHIDE, FORSTERITE, LEAD SULFIDE, LEAD
SELENIDE, LEAD TELLURIDE, CADMIUM TELLURIDE,
GUNN EFFECT (U)

THE REPORT GIVES A GENERAL DESCRIPTION OF RESEARCH
ON THE EFFECT OF HYDROSTATIC PRESSURE ON THE
PROPERTIES OF SEMICONDUCTORS CARRIED OUT OVER A TEN-
YEAR PERIOD. IT CONTAINS A COMPLETE BIBLIOGRAPHY
OF PUBLICATIONS, A LIST OF GRADUATE STUDENTS AWARDED
THE PH. D. OR REE, AND BRIEF RESUMES OF THEIR
THESES WHICH WERE ISSUED AS EARLIER TECHNICAL
REPORTS IN THE SERIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#671 689 9/1
HARRY DIAMOND LABS WASHINGTON D C

ELECTROACOUSTIC DELAY LINES FOR MICROWAVE
FREQUENCIES, (U)

MAR 68 40P REGGIA,FRANK IMAK,TING H.

REPT. NO. HDL-TR-1382
PROJ: DA-1T014501B31A, HDL-28300

UNCLASSIFIED REPORT

DESCRIPTORS: (•DELAY LINES, MICROWAVE FREQUENCY),
(•MECHANICAL WAVES, PROPAGATION), PIEZOELECTRIC
EFFECT, ELECTROACOUSTIC TRANSDUCERS, CADMIUM
SULFIDES, VAPOR PLATING, VACUUM APPARATUS, SINGLE
CRYSTALS, SEMICONDUCTING FILMS,
PERFORMANCE(ENGINEERING), MANUFACTURING METHODS,
TRANSMISSION LINES (U)

IDENTIFIERS: THIN FILMS, TIME DELAY, ACOUSTIC
WAVES (U)

THE PAPER DESCRIBES TECHNIQUES FOR THE GENERATION
AND PROPAGATION OF ELASTIC WAVES IN THE FREQUENCY
RANGE 1 TO 3 GHZ. THESE TECHNIQUES INCLUDE THE
DESIGN, FABRICATION, AND EVALUATION OF MICROWAVE
ACOUSTIC DELAY LINES CONSISTING OF HIGHLY ORIENTED
ELECTROACOUSTIC CUS TRANSDUCERS VACUUM DEPOSITED
ON SINGLE-CRYSTAL SAPPHIRE PROPAGATING MEDIA.
TYPICAL ELECTRICAL CHARACTERISTICS AT 2 GHZ OF
THESE THIN-FILM (APPROXIMATELY ONE MICRON)
TRANSDUCERS AND DELAY MEDIA COMBINATION, IN BOTH
COAXIAL AND STRIP TRANSMISSION LINES, INCLUDE DELAY
OF 6 MICROSEC, INSERTION LOSS LESS THAN 40 DB,
INPUT VSWR LESS THAN 2.0 OVER A 20-PERCENT
BANDWIDTH AND OPERATING TEMPERATURE FROM -74 TO +
96C. ACOUSTIC PROPAGATION VELOCITY, POWER
HANDLING CAPABILITIES, AND IMPEDANCE MATCHING
TECHNIQUES USED WITH THESE ELECTROACOUSTIC DELAY
LINES ARE ALSO DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-671 98U 9/1 11/7
SIGMATRON INC GULETA CALIF

DEVELOPMENT OF PHOTORESISTIVE ELEMENTS FOR AN ANALOG MULTIPLIER. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 FEB-31 JUL 67,
DEC 67 46P HEINZ, DAVID M. THEBERT,
HENRY J. SHARP, WINSTON N. I
REPT. NO. 2010
CONTRACT: F33615-67-C-1468
PROJ: AF-6114
TASK: 611408
MONITOR: AMRL TH-67-168

UNCLASSIFIED REPORT

DESCRIPTORS: (PHOTOELECTRIC CELLS (SEMICONDUCTOR),
MANUFACTURING METHODS), CADMIUM SULFIDES, VAPOR
PLATING, VACUUM APPARATUS, HEAT TREATMENT,
RECRYSTALLIZATION, PHOTOELECTRIC EFFECT,
ENCAPSULATION, EPOXY PLASTICS, ISOCYANATE
PLASTICS, WIRING DIAGRAMS, SUBSTRATES, VOLTAGE,
FREQUENCY MULTIPLIERS, PHOTOELECTRIC MATERIALS (U)

CADMIUM SULFIDE LAYER PHOTORESISTIVE CELLS HAVING
IMPROVED PROPERTIES AND IMPROVED CELL-TO-CELL
UNIFORMITY HAVE BEEN DEVELOPED FOR USE IN AN ANALOG
MULTIPLIER. EACH PROGRAM OBJECTIVE -- A
TEMPERATURE COEFFICIENT BELOW 0.1 PERCENT PER C
DEG., A VOLTAGE EFFECT COEFFICIENT BELOW 0.02 PERCENT
PER VOLT, AND A RESPONSE TIME OF LESS THAN 10 MSEC. -
- HAS BEEN REALIZED IN AN INDIVIDUAL PHOTOCCELL BUT
ALL OF THESE CHARACTERISTICS HAVE NOT BEEN EMBODIED
IN A SINGLE PHOTOCCELL. THE FABRICATION TECHNIQUES
EMPLOYED ON THIS PROGRAM, INCLUDING VACUUM
DEPOSITION, HEAT TREATMENT, ELECTRODING AND
ENCAPSULATION ARE DESCRIBED. MEASUREMENT
TECHNIQUES FOR EVALUATING TEMPERATURE EFFECT, VOLTAGE
EFFECT, RESPONSE TIME, AND LONG-TERM STABILITY ARE
PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-672 139 9/1
MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL
ENGINEERING

ON THE LIMITING NOISE OF SPACE-CHARGE-LIMITED SOLID
STATE DIODES. (U)

68 YP LIU, S. T. IVAN DER ZIEL, A.
IJATNIEKS, G. U. I
CONTRACT: DA-31-124-ARO(U)-291
PROJ: DA-20014501B31E
MONITOR: AKOD 5117:12

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICA, V38 P279-284
1968.

DESCRIPTORS: (•) DIODES (SEMICONDUCTOR),
NOISE (RADIO), SPACE CHARGES, SEMICONDUCTING
FILMS, CADMIUM SULFIDES, MEASURING
DEVICES (ELECTRICAL + ELECTRONIC), ELECTRICAL
PROPERTIES, SINGLE CRYSTALS (U)
IDENTIFIERS: PULSED OPERATION, SPACE CHARGE
LIMITED DIODES (U)

MEASUREMENTS ON NOISE IN SPACE-CHARGE-LIMITED SOLID
STATE DIODES ARE REPORTED. THE RESULTS SHOW THAT
THE LIMITING NOISE IS TWICE THE THERMAL NOISE OF THE
DIFFERENTIAL CONDUCTANCE OF THE DEVICE IF TRANSIT
TIME EFFECTS ARE UNIMPORTANT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-672 467 20/12
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

SPLITTING OF EXCITON LINES IN WURTZITE-TYPE II-VI
CRYSTALS BY UNIAXIAL STRESS. (U)

MAR 68 7P KOJA, T. ; LANGER, D. W. ;
CONTRACT: AF 33(615)-1915
PROJ: AF-7885
TASK: 788500
MONITOR: ARL 68-U059

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,
V20 N2 P50-53, 8 JAN 68.

DESCRIPTORS: (*SEMICONDUCTORS, BAND THEORY OF
SOLIDS), (*EXCITONS, SEMICONDUCTORS), CADMIUM
SULFIDES, CADMIUM SELENIDES, ZINC COMPOUNDS,
OXIDES, SINGLE CRYSTALS, CRYOGENICS,
CARRIERS(SEMICONDUCTORS), REFLECTION, LINE
SPECTRUM, STRESSES, POLARIZATION (U)
IDENTIFIERS: ZINC OXIDE (U)

USUALLY THE EFFECTS OF UNIAXIAL STRESS ON EXCITON
LINES OF SEMICONDUCTORS ARE CONSIDERED TO BE MAINLY
DETERMINED BY THE CHANGE OF THE ONE-ELECTRON ENERGY
BAND STRUCTURE BY THE EXTERNAL STRESS. ENERGY
SHIFTS AND SPLITTINGS OF EXCITON LINES ARE RELATED TO
THE CHANGE OF ENERGY GAPS, EFFECTIVE MASSES, AND
DEGENERACIES OF THE ENERGY BANDS INVOLVED IN THE
EXCITON STATE, LEADING TO AN INTERPRETATION IN TERMS
OF THE DEFORMATION POTENTIAL THEORY BASED ON THE ONE-
ELECTRON ENERGY BAND SCHEME. IN THIS LETTER,
HOWEVER, WE REPORT STRAIN-INDUCED SPLITTING OF
EXCITON LINES OBSERVED IN THE WURTZITE-TYPE II-VI
CRYSTALS, ZNO, CDS, AND CDSE, WHICH
CANNOT BE ACCOUNTED FOR BY SUCH A SIMPLE DEFORMATION-
POTENTIAL THEORY. THE BASIC FEATURES OF THE
EXPERIMENTAL RESULTS ARE PRESENTED HERE ALONG WITH
BRIEF DISCUSSIONS ON THE POSSIBLE INTERPRETATION OF
THE PHENOMENA. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-673 189 9/1 9/3 5/2
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

SEMICONDUCTOR TECHNOLOGY AND MICROELECTRONICS
(COLLECTION OF ARTICLES).

(U)

AUG 67 197P
REPT. NO. FTD-MT-24-135-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF MONO.
POLUPROVODNIKOVAYA TEKHNIKA I MIKROELEKTRONIKA,
KIEV, 1966 PS-192.

DESCRIPTORS: (SEMICONDUCTOR DEVICES, USSR),
(MICROMINIATURIZATION(ELECTRONICS), REPORTS),
SEMICONDUCTING FILMS, DIODES(SEMICONDUCTOR),
TRANSISTORS, RESISTORS, THERMISTORS,
ELECTROLUMINESCENCE, CIRCUITS, PHOTODIODES,
SPUTTERING, CADMIUM SULFIDES, ELECTRODEPOSITION,
CADMIUM SELENIDES, ELECTRICAL CONDUCTANCE,
CHEMICAL PRECIPITATION, IMPURITIES, REVIEWS
IDENTIFIERS: TRANSLATIONS

(U)

(U)

THE ARTICLE DISCUSSES THE TREND TOWARDS
MICROELECTRONICS, PARTICULARLY OPTOELECTRONIC
DEVICES, SUCH AS PHOTOELECTRICAL FUNCTION CONVERTERS
WHEREBY A LIGHT RAY IS USED AS A CONTROL SIGNAL,
COUPLING ELEMENT, OR CONVERTING LINK. MOST
PROMISING TYPE APPEARS TO BE OF THE
ELECTROLUMINESCENT CATEGORY, WITH ADVANTAGES IN LONG
LIFE AND MICROMINIATURE DIMENSIONS. THE
FUNDAMENTAL ARRANGEMENT OF AN ELECTROLUMINESCENT CELL
IS OUTLINED. POWDER PHOSPHORS ARE COMPARED FOR
SUITABILITY. IT CONCLUDES WITH A DETAILED
DISCUSSION OF ELEMENTARY OPTONS, THEIR
CHARACTERISTICS AND AREAS OF APPLICATION.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-673 810 2U/12
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

THERMALLY AND OPTICALLY STIMULATED PHENOMENA IN
CADMIUM-SULFIDE SINGLE CRYSTALS (TERMICHESKI I
OPTICHESKI STIMULIROVANNYE YAVLENIYA V
MONOKRISTALLAKH SULFIDA KADMIYA), (U)

AUG 67 14P AIDLA, A. IKIRS, YA ;
REPT. NO. FTD-HT-67-199

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF AKADEMIYA NAUK
ESTONSKOI SSR, TALLINN, IZVESTIYA. SERIYA
FIZIKO-MATEMATICHESKIKH I TEKHNICHESKIKH NAUK N3
P354-359 1966.

DESCRIPTORS: (*CADMIUM SULFIDES, EXCITATION),
THERMOELECTRICITY, PHOTOCONDUCTIVITY,
LUMINESCENCE, PUMPING(OPTICAL),
QUENCHING(INHIBITION), SEMICONDUCTORS,
PHOSPHORESCENT MATERIALS, USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

RESULTS ARE REPORTED OF AN INVESTIGATION OF THE
THERMO-LUMINESCENCE, THE THERMALLY STIMULATED
CURRENT, THE OPTICAL FLASH AND OPTICAL QUENCHING OF
THE PHOTOCONDUCTIVITY AND LUMINESCENCE OF A NUMBER OF
CDS SINGLE CRYSTALS. (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-674 697 2U/12
ILLINOIS UNIV URBANA DEPT OF PHYSICS

NONLINEAR PHONON INTERACTION IN PIEZOELECTRIC
SEMICONDUCTORS AND EFFECT ON CURRENT SATURATION. (U)

JAN 68 12P YAMADA, KAZUO I
CONTRACT: AF-AFOSR-328-67
PROJ: AF-9761
TASK: 976101
MONITOR: AFOSR 68-1743

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW, V169 N3
P69U-699, 15 MAY 68.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 7 AUG
67.

DESCRIPTORS: (*SEMICONDUCTORS, *PIEZOELECTRIC
CRYSTALS), (*PHONONS, INTERACTIONS), ELECTRIC
CURRENTS, ELECTRONS, TRANSPORT PROPERTIES, CADMIUM
SULFIDES, SOUND SIGNALS, PLASMA MEDIUM (U)
IDENTIFIERS: *PIEZOELECTRIC SEMICONDUCTORS,
ELECTRON PHONON INTERACTIONS, ACOUSTOELECTRIC
CURRENTS (U)

THE NONLINEAR TRANSPORT PROBLEM FOR THE UNSTABLE
PHONON IN PIEZOELECTRIC SEMICONDUCTORS IS DESCRIBED
IN A PICTURE OF ELECTRON-PHONON INTERACTION; THE
HYDRODYNAMICAL APPROACH IS FOLLOWED FOR THE PURPOSE
OF DISCUSSING THE COLLISION-FREQUENT REGIME OF
ELECTRONS ($q \ll 1$). WITH THE AID OF AN
ITERATION METHOD FOR THE NONLINEAR TERMS WHICH
DESCRIBE THE COUPLING BETWEEN THE ELECTRONS AND THE
PHONONS, THE KINETIC EQUATION FOR PHONON DISTRIBUTION
FUNCTION $n_{\text{sub } \omega}$ IS DERIVED; THE EQUATION INCLUDES
A NONLINEAR COLLISION TERM DUE TO THE THREE-PHONON
PROCESSES COMING FROM THE THIRD ORDER IN ELECTRON-
PHONON INTERACTION. THE STEADY-STATE SOLUTION OF
THIS EQUATION IS DISCUSSED. IT IS FOUND THAT FOR
PHONONS OF EXTREMELY LOW WAVE VECTOR THE THREE-PHONON
PROCESS CAN NOT EFFECTIVELY LIMIT THEIR GROWTH; BUT
IN A RESTRICTED WAVE-VECTOR REGION, THE STEADY-STATE
SOLUTION DUE TO THIS PROCESS IS OBTAINED UNDER A
CERTAIN ASSUMPTION. THE ACOUSTOELECTRIC CURRENT IS
ESTIMATED WITH USE OF THE PHONON DISTRIBUTION
FUNCTION DETERMINED IN THIS REGION. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-675 664 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

STATIONARY ANODE-ADJACENT HIGH-FIELD DOMAINS IN
CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 68 12P BOER, K. W.; VOSS, P. I
REPT. NO. TR-25
CONTRACT: NONR-4336(UU)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYS. STAT. SOL., V28
P355-364 1968.

DESCRIPTORS: (•CADMIUM SULFIDES, SPACE CHARGES),
ELECTRON DENSITY, ELECTRIC FIELDS, TRANSPORT
PROPERTIES, ELECTRICAL CONDUCTANCE, ELECTRODES,
QUENCHING (INHIBITION), VOLTAGE,
SEMICONDUCTORS, DOPING, SILVER, ALUMINUM, BAND
THEORY OF SOLIDS (U)

IDENTIFIERS: HIGH FIELD DOMAINS, SCHOTTKY
BARRIERS (U)

IT IS SHOWN THAT IN N-TYPE MATERIAL WITH NEGATIVE
DIFFERENTIAL CONDUCTIVITY DUE TO FIELD QUENCHING,
STATIONARY CATHODE- OR ANODE-ADJACENT HIGH-FIELD
DOMAINS OCCUR DEPENDENT ON ELECTRON DENSITY AT THE
CATHODE AND APPLIED VOLTAGE. CATHODE-ADJACENT
HIGH-FIELD DOMAINS CAN BE OBSERVED ONLY WITH A
BLOCKING CATHODE. ANODE-ADJACENT HIGH-FIELD
DOMAINS OCCUR WITH A SLIGHTLY BLOCKING CATHODE AT
APPLIED VOLTAGES ABOVE THE RANGE AT WHICH CATHODE-
ADJACENT DOMAINS ARE OBSERVED OR AS THE ONLY DOMAIN
TYPE POSSIBLE WITH AN INJECTING CATHODE. WITH
DIFFERENT CATHODE METALS EVAPORATED ONTO THE SAME
CdS:Ag, Al CRYSTAL THE ELECTRON DENSITY IN THE
CONDUCTION BAND $n(x)$ FOR SPACE CHARGE FREE
CONDITIONS HAS BEEN DETERMINED AS A FUNCTION OF THE
ACTUAL FIELD BETWEEN 0 AND 240 KV/CM.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-675 972 20/12
ILLINOIS UNIV URBANA DEPT OF PHYSICS

CYCLOTRON RESONANCE OF PIEZOELECTRIC POLARONS IN THE
QUANTUM LIMIT. (U)

NOV 67 10P MIYAKE, SATORU J. I
CONTRACT: DA-31-124-ARO(D)-114
PROJ: DA-20014501-B-11-B
MONITOR: AROD 431:88

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW, V170 N3
P726-732, 15 JUN 68.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 26 JUN
67.

DESCRIPTORS: (*CARRIERS(SEMICONDUCTORS),
*CYCLOTRON RESONANCE PHENOMENA), (*PIEZOELECTRIC
CRYSTALS, SEMICONDUCTORS), CADMIUM SULFIDES,
PHONONS, ELECTRONS, GREEN'S FUNCTION,
HAMILTONIAN (U)
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS, LANDAU
LEVELS, ELECTRON PHONON INTERACTIONS, POLARONS,
QUASIPARTICLES (U)

THE SHIFT OF THE CYCLOTRON RESONANCE FREQUENCY OF
ELECTRONS IN PIEZOELECTRIC SEMICONDUCTORS AT FINITE
TEMPERATURE IS CALCULATED FOR THE CASE OF SUCH A
STRONG MAGNETIC FIELD THAT THE ENERGY SEPARATION OF
THE LANDAU LEVELS IS LARGER THAN THERMAL ENERGY.
THE THERMAL GREEN-FUNCTION METHOD IS USED TO
CALCULATE THE ENERGY SHIFTS OF THE TWO LOWEST
LANDAU LEVELS BETWEEN WHICH THE TRANSITION OCCURS;
THE DYSON EQUATION FOR THE ELECTRON SELF-ENERGY
PART IS SOLVED IN AN APPROXIMATE WAY, TAKING INTO
ACCOUNT THE BROADENING AND THE SHIFT OF ELECTRONIC
STATES SELF-CONSISTENTLY. THE SHIFT OBTAINED
AGREES IN SIGN, AND ROUGHLY IN MAGNITUDE, WITH THAT
GIVEN BY A SEMICLASSICAL THEORY, AND WITH THAT
OBSERVED IN CDS BY BAER AND DEXTER.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-676 043 7/2 20/12
BELL AND HOWELL RESEARCH LABS PASADENA CALIF

ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF TRACE
IMPURITIES IN CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 65-31 MAY 68:
JUL 68 104P SOCHA, A. J. WILLARDSON, R.

K. :

CONTRACT: AF 33(615)-2761

PROJ: AF-7885

MONITOR: ARL 68-0132

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, CHEMICAL ANALYSIS),
(CADMIUM SULFIDES, CHEMICAL ANALYSIS), CADMIUM
SELENIDES, ZINC SULFIDES, ZINC COMPOUNDS, CADMIUM
COMPOUNDS, OXIDES, SELENIDES, IMPURITIES, MASS
SPECTROSCOPY, SPECTRUM ANALYZERS (U)

MASS SPECTROGRAPHIC TECHNIQUES WERE DEVELOPED FOR
THE ANALYSIS OF ALL II-VI COMPOUNDS. THE
DETECTION LIMITS FOR MOST IMPURITIES ARE LESS THAN 10
PARTS PER BILLION ATOMIC. COVERED IN DETAIL ARE
NEW TECHNIQUES WHICH SIGNIFICANTLY REDUCED THE TIME
REQUIRED TO PERFORM ANALYSES AS COMPARED TO WORK
PERFORMED UNDER A PRIOR CONTRACT. A TOTAL OF 286
SAMPLES WERE ANALYZED. PRIMARY INTEREST WAS IN THE
ANALYSIS OF ALL FORMS OF CDS, CDSE, ZNS,
ZNSE, AND OTHER II-VI COMPOUNDS. EXTENSIVE
WORK WAS PERFORMED IN THE AREA OF SELECTIVE
IONIZATION OF ATOMS BY THE SPARK SOURCE MASS
SPECTROMETER. STUDIES WERE ALSO MADE COVERING THE
EFFECTS OF RESIDUAL GASES IN THE SOURCE OF THE MASS
SPECTROMETER ON ANALYSES FOR O, C, N, AND H.
AUTOMATIC EXPOSURE EQUIPMENT, MULTIPLE SAMPLE
HOLDERS, AND SPECIAL SAMPLE HOLDERS AND THEIR VALUE
WITH RELATION TO THIS WORK IS DISCUSSED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-676 448 11/6 7/4
FRANKFORD ARSENAL PHILADELPHIA PA PITMAN-DUNN RESEARCH
LABS

THE ANODIC SYNTHESIS OF CDS FILMS, (U)

MAR 65 7P MCNEILL, WILLIAM IGRUSS,
LEONARD L. THUSTED, DORSEY G. I
PROJ: DA-1-T-061102-B-3-A
MONITOR: FA A65-18

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF THE ELECTROCHEMICAL
SOCIETY, V112 N7 P713-715 JUL 65.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 17 DEC
64.

DESCRIPTORS: (*SEMICONDUCTING FILMS, CADMIUM
SULFIDES), (*CADMIUM SULFIDES, SYNTHESIS),
CADMIUM COMPOUNDS, BARRIER COATINGS, FILMS,
DIELECTRIC PROPERTIES, X-RAY DIFFRACTION ANALYSIS,
ANODES (ELECTROLYTIC CELL), ANODIC COATINGS,
THICKNESS, INTERFEROMETERS, SODIUM COMPOUNDS,
SULFIDES, CADMIUM ALLOYS, ETHANOLS (U)
IDENTIFIERS: SODIUM SULFIDES (U)

CD IS SHOWN TO BEHAVE AS A TYPICAL 'VALVE ANODE' IN
SOLUTIONS OF $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$ IN ETHANOL AND BECOMES
COVERED WITH A FILM WHICH ACTS AS AN ELECTRICAL
BARRIER, EXHIBITS INTERFERENCE COLORS, INCREASES IN
THICKNESS AS VOLTAGE IS INCREASED, AND GIVES RISE TO
SPARKING AT VOLTAGES IN EXCESS OF 150 V.
VOLTAGE-TIME CURVES, FILM THICKNESS AND ELECTRICAL
RESISTANCE, AND X-RAY DIFFRACTION ANALYSES SHOWING
THE FILMS TO BE CDS ARE PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-676 649 20/12
PARIS UNIV (FRANCE) LABORATOIRE DE PHYSIQUE DES
SOLIDES

OPTICAL STUDIES OF LATTICE VIBRATION IN II-VI
SEMICONDUCTING COMPOUNDS. (U)

APR 68 58P BALKANSKI, M. I
REPT. NO. SCIENTIFIC-1
CONTRACT: EOOAR-68-0016
PROJ: AF-7885
MONITOR: ARL 68-U184

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, CRYSTAL LATTICES),
(*INFRARED SPECTROSCOPY, SEMICONDUCTORS),
ABSORPTION SPECTRUM, DIELECTRIC PROPERTIES,
CRYSTAL LATTICE DEFECTS, BAND THEORY OF SOLIDS,
BRILLOUIN ZONES, GREEN'S FUNCTION, ZINC COMPOUNDS,
CADMIUM COMPOUNDS, ZINC SULFIDES, CADMIUM
SULFIDES, CADMIUM SELENIDES, OXIDES, SULFIDES,
SELENIDES, TELLURIDES, IMPURITIES, PHONONS,
FRANCE (U)

IDENTIFIERS: *LATTICE VIBRATIONS, RAMAN SPECTRA,
ZINC OXIDE, CADMIUM TELLURIDE, ZINC SELENIDE,
ZINC TELLURIDE (U)

PARALLEL TO THE EXPERIMENTAL INVESTIGATIONS,
THEORETICAL STUDIES HAVE BEEN DEVELOPED AND THE
DISPERSION RELATIONS CALCULATED FOR SOME OF THE II-
VI SEMICONDUCTORS COMPOUNDS. THE PRESENCE OF
FOREIGN ATOMS LEADS TO LOCALIZED OR RESONANT MODES
OF VIBRATION, WHICH HAVE BEEN EXPERIMENTALLY STUDIED
IN MANY II-VI SEMICONDUCTORS COMPOUNDS.

(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-677 026 20/12
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED
PALO ALTO RESEARCH LAB

SELF-CONSISTENT OPW AND EMPIRICALLY-REFINED OPW
BAND MODELS FOR CUBIC ZNS, ZNSE, CDS, AND
CDSE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
68 54P STUKEL, D. J. SEUWEMA, R.
N. COLLINS, T. C. HERMAN, F. KORTUM, R.
L. I
REPT. NO. LMSD-9-87-68-3
CONTRACT: AF 19(628)-5750, AF 33(615)-5072

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, BAND THEORY OF
SOLIDS), ZINC SULFIDES, CADMIUM SULFIDES,
CADMIUM SELENIDES, ZINC COMPOUNDS, SELENIDES,
CRYSTAL STRUCTURE, PERTURBATION THEORY,
SPECTROSCOPY, THESES (U)
IDENTIFIERS: ZINC SELENIDE (U)

FIRST-PRINCIPLES OPW ENERGY BAND CALCULATIONS
HAVE BEEN CARRIED OUT FOR CUBIC ZNS, ZNSE,
CDS, AND CDSE USING A NON-RELATIVISTIC
FORMALISM AND SLATER'S FREE-ELECTRON EXCHANGE
APPROXIMATION. THE CALCULATIONS WERE FIRST CARRIED
OUT IN TERMS OF A PHYSICALLY REALISTIC TRIAL CRYSTAL
POTENTIAL, AND THEN ITERATED TO OBTAIN A SELF-
CONSISTENT SOLUTION. IN SPITE OF THE SIMPLIFIED
TREATMENT OF EXCHANGE EFFECTS, AND THE NEGLECT OF
RELATIVISTIC AND CORRELATION EFFECTS, THE FIRST-
PRINCIPLES SOLUTIONS ARE IN QUALITATIVE AND SEMI-
QUANTITATIVE AGREEMENT WITH EXPERIMENT IN ALL CASES.
IT IS SHOWN BRIEFLY HOW IMPROVED SOLUTIONS CAN BE
OBTAINED BY INTRODUCING SMALL, CAREFULLY CHOSEN
EMPIRICAL CORRECTIONS. THE ADEQUACY OF VARIOUS
ENERGY BAND MODELS WAS TESTED BY CALCULATING THE
OPTICAL SPECTRUM (ACTUALLY EPSILON SUB 2) AND
COMPARING THIS WITH THE EXPERIMENTAL SPECTRUM.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-678 247 20/12
NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT KJELLER

FIELD DISTRIBUTION AND CURRENT SATURATION IN
PHOTOCONDUCTIVE CDS, (U)

AUG 67 6P FOSSUM, H. J. IRNNESTAD, A.

CONTRACT: AF 61(US2)-958
PROJ: AF-4600
TASK: 460003
MONITOR: AFCRL 68-0534

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,
V38 N13 P5177-5182 DEC 67.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 10 JUL
67.

DESCRIPTORS: (*CADMIUM SULFIDES, ELECTRIC FIELDS),
(*PHOTOELECTRIC MATERIALS, CADMIUM SULFIDES),
(*ELECTROOPTICS, CADMIUM SULFIDES),
SEMICONDUCTORS, SINGLE CRYSTALS, COHERENT
RADIATION, PIEZOELECTRIC CRYSTALS, ELECTRIC
CURRENTS, NORWAY (U)
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS,
ACOUSTOELECTRIC EFFECT, CURRENT SATURATION (U)

THE INTERNAL ELECTRIC FIELD DISTRIBUTION HAS BEEN
MEASURED IN PHOTOCONDUCTING CDS SINGLE CRYSTALS
USING THE LINEAR ELECTRO-OPTIC EFFECT. THE
EXPERIMENTAL RESULTS SHOW A NEARLY HOMOGENEOUS FIELD
DISTRIBUTION IN THE CRYSTALS FOR APPLIED FIELDS BELOW
THE THRESHOLD FOR ACOUSTO-ELECTRIC OSCILLATIONS,
WHILE A HIGH FIELD REGION WAS CREATED NEAR THE ANODE
FOR FIELDS ABOVE THE THRESHOLD FIELD. THE
REPRODUCIBILITY FROM SAMPLE TO SAMPLE WAS RATHER
POOR. THE LINEAR ELECTRO-OPTIC CONSTANT WAS
CALCULATED FROM THE EXPERIMENTAL RESULTS: $(n^2$
SUB (113) - n^2 SUB (333)) = 2.7×10 TO THE -
12TH POWER M/V AT THE OPTICAL WAVELENGTH 6328 Å.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-678 540 20/12 10/2 20/3
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT
IN HIGH-EFFICIENCY CDS THIN-FILM SOLAR
CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 1 JUN-
31 AUG 66,

SEP 66 25P SHIOZAWA, L. R. ; SULLIVAN,
GEORGE A. ; AUGUSTINE, F. ; JOST, J. M. ;

CONTRACT: AF 33(615)-5224

PROJ: AF-3033

TASK: 303330

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY PROGRESS REPORT
NO. 2, AD-678 542.

DESCRIPTORS: (*CADMIUM SULFIDES, *SEMICONDUCTING
FILMS), (*SOLAR CELLS, CADMIUM SULFIDES),
DIFFUSION, COPPER, COPPER COMPOUNDS, VACUUM
APPARATUS, FILMS, LABORATORY EQUIPMENT, VOLTAGE (U)
IDENTIFIERS: COPPER SULFIDE, PHOTOVOLTAIC
EFFECT (U)

EMPHASIS IN THIS REPORT WAS PLACED ON THE PLANNING
AND INITIATION OF SEVERAL EXPERIMENTS DESIGNED TO
LEAD TO AN UNDERSTANDING OF THE PHOTOVOLTAIC
MECHANISM OPERATIVE IN CDS SOLAR CELLS WHICH HAVE
BEEN DEVELOPED IN THIS LABORATORY. EXPERIMENTS
INCLUDE MEASUREMENTS OF THE DIFFUSION AND SOLUBILITY
OF COPPER IN CDS CRYSTALS, AND A MEASUREMENT OF
THE THICKNESS OF THE CU₂S LAYER IN TYPICAL SOLAR
CELLS. ALSO MENTIONED IS WORK ON THE CONSTRUCTION
OF A VACUUM EVAPORATION SYSTEM AND THE DEVELOPMENT OF
OHMIC CONTACTS TO CDS CRYSTALS, BOTH OF WHICH ARE
ESSENTIAL TO THIS RESEARCH PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-678 541 20/12 10/2 20/3
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT
IN HIGH-EFFICIENCY CDS THIN-FILM SOLAR
CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 3, 1 DEC
66-28 FEB 67;

MAR 67 30P SHIOZAWA, L. R. SULLIVAN,
GEORGE A. AUGUSTINE, FRANK I
CONTRACT: AF 33(615)-5224
PROJ: AF-3033
TASK: 303330

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-678 542.

DESCRIPTORS: (*SOLAR CELLS, CADMIUM SULFIDES),
(*CADMIUM SULFIDES, SEMICONDUCTING FILMS),
VACUUM APPARATUS, REFRACTIVE INDEX, ABSORPTION
SPECTRUM, COPPER COMPOUNDS, SULFIDES, DIFFUSION,
VAPOR PLATING (U)

IDENTIFIERS: COPPER SULFIDES, *PHOTOVOLTAIC
EFFECT (U)

THE EMPHASIS DURING THE THIRD QUARTER WAS
PLACED ON A CONTINUATION OF EXPERIMENTS NECESSARY TO
THE UNDERSTANDING OF THE THIN FILM CDS SOLAR
CELL. INCLUDED WERE DIFFUSION AND SOLUBILITY
MEASUREMENTS OF COPPER IN CDS, PERFECTION OF A
NEW VACUUM EVAPORATION SYSTEM, AND MEASUREMENTS OF
THE INDEX OF REFRACTION AND ABSORPTION COEFFICIENTS
OF EVAPORATED THIN CU2S FILMS AS A FUNCTION OF
WAVELENGTH. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-678 542 2U/12 10/2 2U/3
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT
IN HIGH-EFFICIENCY CDS THIN-FILM SOLAR
CELLS. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 2, 1 SEP-
30 NOV 66,

DEC 66 37P SHIOZAWA, L. R. SULLIVAN,
GEORGE A. AUGUSTINE, F. JUST, J. M. I

CONTRACT: AF 33(615)-5224

PROJ: AF-3033

TASK: J03330

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY PROGRESS REPORT
NO. 1, AD-678 540.

DESCRIPTORS: (*CADMIUM SULFIDES, *SEMICONDUCTING
FILMS), (*SOLAR CELLS, CADMIUM SULFIDES),
CARRIERS (SEMICONDUCTORS), DIFFUSION, COPPER,
COPPER COMPOUNDS, SULFIDES, VACUUM APPARATUS,
FILMS, VOLTAGE, EFFICIENCY (U)
IDENTIFIERS: QUANTUM EFFICIENCY, COPPER SULFIDE,
PHOTOVOLTAIC EFFECT (U)

THIS REPORT GIVES A TENTATIVE EXPLANATION OF THE
MECHANISM RESPONSIBLE FOR THE PHOTOVOLTAIC EFFECT IN
THE THIN-FILM CDS CELLS, AND A DISCUSSION OF
CRITICAL EXPERIMENTS WHICH MIGHT BE PERFORMED TO TEST
THIS MODEL. ALSO REPORTED IS THE CONTINUATION OF
THE WORK ON THE DIFFUSION OF COPPER INTO CDS
SINGLE CRYSTALS, AND THIS HAS BEEN EXTENDED TO
INCLUDE DIFFUSION OF CU IN THE CDS SOLAR CELLS.
A NEW VACUUM EVAPORATION SYSTEM FOR THE PROJECT HAS
BEEN INSTALLED AND IS NOW OPERATIONAL. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#679 130 9/1 20/1 20/12
MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

ACTIVE ACOUSTIC DEVICES. (U)

DESCRIPTIVE NOTE: FINAL REPT. JUN 64-APR 66,
NOV 68 163P SAKIUTIS, NICHOLAS G. ;
HICKERNELL, FRED S. ;
CONTRACT: AF 30(602)-347d
PROJ: AF-4159
MONITOR: RADC TR-56-352

UNCLASSIFIED REPORT

DESCRIPTORS: (*ACOUSTIC EQUIPMENT, *SEMICONDUCTOR
DEVICES), (*PIEZOELECTRIC CRYSTALS, ULTRASONIC
RADIATION), SEMICONDUCTING FILMS, CADMIUM
SULFIDES, ZINC COMPOUNDS, OXIDES, PIEZOELECTRIC
TRANSDUCERS, PERFORMANCE (ENGINEERING) (U)
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS,
ELECTRON PHONON INTERACTIONS, ACOUSTOELECTRIC
EFFECT, ZINC OXIDE, TRAVELING WAVE AMPLIFICATION,
CONTINUOUS RADIATION (U)

THE REPORT DESCRIBES EFFORTS TO DETERMINE THE
FEASIBILITY OF CONTINUOUS WAVE DEVICES AND TO
DEMONSTRATE THE CAPABILITY FOR PERFORMING ACTIVE
ELECTRONIC FUNCTIONS USING ELECTROACOUSTIC PHENOMENA
IN LOW NOISE, POWER AND RADIO FREQUENCY AMPLIFIERS
WITHIN THE FREQUENCY RANGE 1 MHZ TO 1000 MHZ.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-679 566 20/2 20/12
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 8 MAR 65-7 MAY 68.

AUG 68 191P SHIOZAWA, L. R. JUST, J.

M. SULLIVAN, G. A. I

CONTRACT: AF 33(615)-2708

PROJ: AF-7885

MONITOR: AHL 68-0153

UNCLASSIFIED REPORT

DESCRIPTORS: (*CRYSTAL GROWTH, *CADMIUM COMPOUNDS), (*SEMICONDUCTORS, CRYSTAL GROWTH), CADMIUM SULFIDES, CADMIUM SELENIDES, ZINC COMPOUNDS, TELLURIDES, SUBLIMATION, PURIFICATION, SINTERING, CRYSTAL LATTICE DEFECTS, MICROSCOPY, PHOTOCONDUCTIVITY, DIFFUSION, PROGRAMMING (COMPUTERS), PHASE DIAGRAMS (U)
IDENTIFIERS: ZINC TELLURIDES (U)

THIS RESEARCH PROGRAM HAS BEEN DIRECTED TOWARD IMPROVING THE QUALITY OF VAPOR-GROWN CDS, CUSS, AND ZNTE CRYSTALS FROM THE STANDPOINT OF BOTH FOREIGN IMPURITIES AND INTRINSIC STRUCTURAL DEFECTS. MEASURABLE IMPROVEMENTS IN PURITY OF THE FINAL CRYSTALS HAVE BEEN OBTAINED BY SPECIFIC PURIFICATION STEPS, CONSISTING OF A SINTERING PROCEDURE AND ONE OR MORE FRACTIONAL VACUUM SUBLIMATIONS, APPLIED TO AVAILABLE SEMICONDUCTOR-GRADE MATERIAL. CRYSTAL QUALITY AS RELATED TO INTRINSIC DEFECTS HAS BEEN IMPROVED, BOTH DURING CRYSTAL GROWTH AND TREATMENT AFTER GROWTH, THROUGH A BETTER UNDERSTANDING OF PHASE EQUILIBRIA AND POINT-DEFECT EQUILIBRIA AND THEIR RELATIONSHIPS. A COMPUTER PROGRAM HAS BEEN SET UP AND SPECIFIC CALCULATIONS WERE MADE FOR ZNTE. EVIDENCE FROM DIFFUSION EXPERIMENTS AND FROM THE EXAMINATION OF THE VOID-PRECIPIATION PHENOMENON IN ZNTE HAS SHOWN THAT ZN VACANCIES ARE THE SIGNIFICANT INTRINSIC POINT DEFECTS IN THIS MATERIAL. EVALUATION OF CRYSTAL QUALITY HAS PRIMARILY BEEN PLACED ON MICROSCOPIC OBSERVATIONS AND ELECTRICAL MEASUREMENTS SUCH AS PHOTOCONDUCTIVITY, THERMALLY-STIMULATED CURRENTS, AND CURRENT OSCILLATIONS. (U)

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UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-679 636 20/2 20/12
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH
OF II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 15 APR 65-14 APR 68,
MAY 68 146P FAHRIG, RICHARD H. WEBB,
GEORGE N. BROWN, LLOYD W. ;
CONTRACT: F33615-67-C-1575
PROJ: AF-7885
TASK: 7885U3
MONITOR: ARL 68-U096

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, *CRYSTAL GROWTH),
(*CADMIUM COMPOUNDS, SEMICONDUCTORS), (*ZINC
COMPOUNDS, SEMICONDUCTORS), SINGLE CRYSTALS,
PURIFICATION, SUBLIMATION, DIFFUSION, GELS,
DOPING, IMPURITIES, MASS SPECTROSCOPY, ATOMIC
SPECTROSCOPY, CADMIUM SULFIDES, CADMIUM SELENIDES,
ZINC SULFIDES, CADMIUM (U)
IDENTIFIERS: ZINC SELENIDE, ZINC TELLURIDE,
CADMIUM TELLURIDES, EMISSION SPECTROSCOPY, MIXED
CRYSTALS (U)

A PROCESS FOR THE PURIFICATION OF CADMIUM METAL BY
MULTIPLE TREATMENT STEPS IS DESCRIBED. IMPURITIES
IN CADMIUM, AS DETERMINED BY EMISSION SPECTROGRAPHIC,
MASS SPECTROGRAPHIC, AND ATOMIC ABSORPTION ARE GIVEN
IN TABULAR FORM. THE PREPARATION OF VARIOUS PURE
SEMICONDUCTOR MATERIALS OF THE GROUP II-VI
COMPOUND TYPE IS DISCUSSED AND TABLES OF ANALYTICAL
DATA FOR EACH ARE INCLUDED. THE LEVEL OF IMPURITY
CONCENTRATION IN SYNTHESIZED CADMIUM SULFIDE WAS
SIGNIFICANTLY LOWERED. LESS THAN 1 PART PER
MILLION (ATOMIC) TOTAL IMPURITIES WAS FOUND BY
THE MASS SPECTROGRAPH IN TWO BATCHES OF CDS.
THE GROWTH OF CRYSTALS OF PURE II-VI COMPOUNDS
AND MIXTURES OF COMPOUNDS FROM THE MELT IS REPORTED.
INCLUDED ARE DATA CONCERNING DOPING OF MELT GROWN
CRYSTALS WITH VARIOUS ELEMENTAL DOPANTS, AND, IN THE
CASE OF SOME COMPOUND SEMICONDUCTORS, THE MAXIMUM
DOPING LEVELS POSSIBLE BY THIS METHOD. THE RESULTS
OF VAPOR PHASE CRYSTAL GROWTH OF CDS AND ZNS,
ARE GIVEN. PRELIMINARY EXPERIMENTS WITH
HYDROTHERMAL AND GEL DIFFUSION CRYSTAL GROWTH ARE
REPORTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-679 946 2U/12 9/1
OXFORD UNIV (ENGLAND); ENGINEERING LAB

FIELD-AND PHOTON-ENHANCED FIELD EMISSION FROM
THIN-FILM FIELD-EMISSION DEVICES, (U)

JUN 68 JP ADHAM-HUSAIN, S. IWALSH, D.

CONTRACT: AF-EOAH-33-67
PROJ: AF-9767
TASK: 9767U2
MONITOR: AFOSR 68-2659

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ELECTRONICS LETTERS, V4
N16, 9 AUG 68.

DESCRIPTORS: (*CADMIUM SULFIDES, *FIELD EMISSION),
(*SEMICONDUCTING FILMS, FIELD EMISSION), SILICON
COMPOUNDS, OXIDES, SILICON COATINGS, PHOTOELECTRIC
EFFECT, GAS LASERS, LIGHT PULSES, GREAT
BRITAIN (U)
IDENTIFIERS: SILICON MONOXIDE (U)

THIN-FILM SANDWICH DEVICES OF CuS-SiO-METAL
HAVE BEEN MADE. THEY HAVE CURRENT/VOLTAGE
BEHAVIOUR CHARACTERISTICS OF FIELD EMISSION FROM
SEMICONDUCTORS. WITH REVERSE BIAS, THE CURRENT IS
VERY MUCH SMALLER. THE FIELD-EMISSION CURRENT IS
GREATLY ENHANCED BY ILLUMINATING THE DEVICE WITH 2.41
AND 2.64 EV PHOTONS (FROM AN ARGON-ION LASER).
UNDER PULSED LASER EXCITATION (PULSE DURATION 1
MICROSECOND) THE ENHANCED EMISSION PERSISTED FOR
MORE THAN 20MS. THESE EXPERIMENTS ARE ANALOGOUS TO
SOME PREVIOUS WORK ON VACUUM FIELD EMISSION. A
POSSIBLE MECHANISM FOR THE ENHANCED EMISSION IS
DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-680 583 20/12 7/4
DELAWARE UNIV NEWARK

THEORETICAL ASPECTS OF POINT AND ASSOCIATED
LUMINESCENT CENTERS, (U)

66 16P WILLIAMS, FERD ;
CONTRACT: DA-ARO(D)-J1-124-G815
PROJ: DA-20014501-B-11-B
MONITOR: AROO 4169:9

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PROCEEDINGS OF THE
INTERNATIONAL CONFERENCE ON LUMINESCENCE, P113-123
1966.

DESCRIPTORS: (*SEMICONDUCTORS, *LUMINESCENCE),
(*BAND THEORY OF SOLIDS, LUMINESCENCE),
(*CRYSTAL LATTICE DEFECTS, LUMINESCENCE),
MOLECULAR ENERGY LEVELS, CRYSTALS, CRYSTAL
LATTICES, INORGANIC COMPOUNDS, CONDUCTIVITY, COLOR
CENTERS, WAVE FUNCTIONS, SEMICONDUCTORS, CADMIUM
SULFIDES, ZINC SULFIDES, CHROMIUM, MANGANESE,
POTASSIUM COMPOUNDS, CHLORIDES, DOPING (U)
IDENTIFIERS: CRYSTAL FIELD THEORY, POTASSIUM
CHLORIDE, DONOR ACCEPTOR PAIRS, DOPED CRYSTALS (U)

THE REPORT DISCUSSES THE ELECTRONIC ENERGY LEVELS
AND RADIATIVE TRANSITIONS OF POINT AND ASSOCIATED
DEFECTS IN INORGANIC LUMINESCENT CRYSTALS. THERE
ARE SOME QUITE GENERAL THEORETICAL PROBLEMS REGARDING
THE ELECTRONIC STATES OF LUMINESCENT CENTERS.
AMONG THESE ARE: (1) THE DETERMINATION OF
ENERGIES OF LOCALIZED STATES OF IMPERFECTIONS WITH
RESPECT TO THE BAND STRUCTURE OF THE CRYSTAL; (2)
THE QUESTION OF DISCRETE IMPURITY STATES WITHIN THE
ALLOWED BANDS; (3) THE POSSIBILITY OF ANTI-
STOKES' LUMINESCENCE BASED ON ADIABATIC RELAXATION
OF EXCITED DEFECTS FROM TIGHT-BINDING TO EFFECTIVE-
MASS STATES; (4) THE INCLUSION OF EXCHANGE IN THE
THEORY OF DONOR--ACCEPTOR PAIRS (WHICH WERE
PROPOSED AS LUMINESCENT CENTERS ONLY A DECADE AGO);
(5) THE ANALYSIS OF ENERGY TRANSFER BETWEEN
ASSOCIATED AND POINT DEFECTS, AND WITHIN COMPLEX
ASSOCIATED DEFECTS; AND (6) THE CHARACTERISTICS
OF THE STATES OF IMPERFECTIONS IN INHOMOGENEOUS
LUMINESCENT CRYSTALS (A UNIQUE CLASS OF MATERIALS
JUST BEGINNING TO BE INVESTIGATED). THESE ARE
SOME OF THE THEORETICAL PROBLEMS WHICH SHALL BE
CONSIDERED, AND BECAUSE OF THEIR GENERALITY AND
DIFFICULTY, IN A PRELIMINARY AND SOMETIMES
SPECULATIVE WAY. (AUTHOR)

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UNCLASSIFIED

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/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-681 458 20/12
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED
PALO ALTO RESEARCH LAB

ENERGY BAND STRUCTURE OF SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT. 1 FEB 66-30
NOV 68,

DEC 68 410P HERMAN, FRANK IKORTUM, RICHARD
L. KORTENBURGER, IRENE B. IVAN DYKE, JOHN P.

CONTRACT: AF 19(628)-5750

PROJ: AF-5620

TASK: 562008

MONITOR: AFRL 68-U631

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN VARIOUS JNLS.

DESCRIPTORS: (*SEMICONDUCTORS; *BAND THEORY OF
SOLIDS), PHOTOELECTRIC EFFECT, REFLECTIVITY,
OPTICAL PROPERTIES, CRYSTAL STRUCTURE, METALLOIDS,
SILICON CARBIDES, CADMIUM SULFIDES, GALLIUM
ARSENIDES, ZINC SULFIDES, DIAMONDS, SILICON,
GERMANIUM, TIN (U)

IDENTIFIERS: ELECTROREFLECTANCE, AMORPHOUS
SEMICONDUCTORS (U)

THE ELECTRONIC STRUCTURE AND RELATED OPTICAL
PROPERTIES OF OVER 50 ELEMENTAL AND COMPOUND
SEMICONDUCTORS WERE INVESTIGATED. THE STUDIES HAVE
COVERED THE DIAMOND-TYPE CRYSTALS; CUBIC AND
HEXAGONAL SIC; SEVERAL III-V, II-VI, AND
I-VII COMPOUNDS; A NUMBER OF II-IV COMPOUNDS;
AND VARIOUS IV-VI COMPOUNDS; AMONG OTHERS. IN
MOST CASES ONE IS ABLE TO OBTAIN A QUALITATIVELY
RELIABLE ENERGY BAND MODEL BY CARRYING OUT A FIRST-
PRINCIPLES OPW (ORTHOGONALIZED PLANE WAVE) ENERGY
BAND CALCULATION USING A SIMPLE BUT PHYSICALLY
REALISTIC CRYSTAL POTENTIAL. WITH SUCH AN ENERGY
BAND MODEL IN HAND, ONE IS USUALLY ABLE TO ACCOUNT
FOR A WIDE VARIETY OF EXPERIMENTAL INFORMATION. A
METHOD FOR OBTAINING MORE ACCURATE ENERGY BAND
MODELS WAS DEVELOPED. THE EMPIRICALLY-REFINED
FIRST-PRINCIPLES METHOD HAS BEEN USED WITH
CONSIDERABLE SUCCESS IN A WIDE VARIETY OF
APPLICATIONS. THE PRESENT REPORT INCLUDES THE
COMPLETE TEXTS OF SEVERAL RECENT SCIENTIFIC PAPERS
WHICH ADEQUATELY DISCUSS AND ILLUSTRATE THE
EMPIRICALLY-REFINED FIRST-PRINCIPLES APPROACH TO
ENERGY BAND PROBLEMS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-681 705 9/1 20/12
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

A STUDY OF ELECTROLUMINESCENT CADMIUM SULFIDE
DIODES. (U)

DEC 68 56P KASTNING, JERRY ALBERT ;
REPT. NO. K-400
CONTRACT: DAABU7-67-C-0199, DAAKU2-67-C-0546

UNCLASSIFIED REPORT

DESCRIPTORS: (DIODES(SEMICONDUCTOR),
ELECTROLUMINESCENCE), CADMIUM SULFIDES,
TELLURIUM, CRYOGENICS, EXCITATION, IONIZATION,
TUNNELING(ELECTRONICS),
CARRIERS(SEMICONDUCTORS) (U)
IDENTIFIERS: HETEROJUNCTIONS (U)

THE PURPOSE OF THIS THESIS IS TO PRESENT AN
EXPERIMENTAL DESCRIPTION OF A NUMBER OF TELLURIUM-
CADMIUM SULFIDE HETEROJUNCTION DEVICES AND A THEORY
TO EXPLAIN THEIR MECHANISM OF OPERATION. THESE
DEVICES EXHIBIT ELECTROLUMINESCENCE WHEN OPERATED AT
LIQUID NITROGEN TEMPERATURES. LIQUID EMISSION FROM
A P-N JUNCTION WAS FIRST OBSERVED BY LOSSEV, IN
1923, IN NATURALLY OCCURRING JUNCTIONS. SINCE THE
EFFICIENCY FOR CONVERSION OF ELECTRIC ENERGY INTO
LIGHT WAS VERY LOW, THESE JUNCTIONS DID NOT SEEM TO
BE OF MUCH IMPORTANCE UNTIL THE DISCOVERY OF THE P-N
JUNCTION LASER IN 1963. THEREFORE, WITHIN THE PAST
SEVERAL YEARS, THERE HAS BEEN CONSIDERABLE INTEREST
IN THE PHENOMENON OF P-N JUNCTION LUMINESCENCE WHICH
HAS RESULTED IN NUMEROUS INVESTIGATION OF THE
PROPERTIES AND POTENTIAL APPLICATIONS OF
SEMICONDUCTOR-DIODE LIGHT SOURCES. FROM AN
APPLICATION POINT OF VIEW, THE FACT THAT LUMINESCENT
EMISSION IS SUCH A BASIC WAY OF EFFICIENTLY
COMMUNICATING INFORMATION TO THE EYE MAKES IT A TOOL
WHOSE UTILITY EXTENDS TO PRACTICALLY EVERY AREA OF
TECHNOLOGY. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-681 719 2U/12
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

TEMPERATURE DEPENDENCE OF THE RESISTIVITY AND HALL
EFFECT OF THIN CDS FILMS. (U)

DEC 68 62P JIMENEZ, RICARDO ;
REPT. NO. R-401
CONTRACT: DAABU7-67-C-0199, DA1KUZ-67-C-0546

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED IN PART BY NATIONAL
SCIENCE FOUNDATION, WASHINGTON, U. C.

DESCRIPTORS: (*SEMICONDUCTING FILMS, *CADMIUM
SULFIDES), RESISTANCE (ELECTRICAL), HALL
EFFECT, CRYOGENICS, HIGH-TEMPERATURE RESEARCH,
FILMS (U)
IDENTIFIERS: THIN FILMS (U)

A SYSTEM WAS SET UP TO STUDY THE RESISTIVITY AND
HALL MOBILITY IN THIN SEMICONDUCTOR FILMS AS A
FUNCTION OF TEMPERATURE. FOR VACUUM DEPOSITED
CDS FILMS EXHIBITING PHOTOLUMINESCENCE
RESISTIVITY DATA WERE TAKEN FOR THE TEMPERATURE RANGE
FROM 77K TO 400K, WHILE THE HALL MOBILITY WAS
MEASURED BETWEEN 300K AND 400K. A PLOT OF THE
RESISTIVITY DATA SHOWED AN EXPONENTIAL VARIATION WITH
TEMPERATURES FROM 250K TO 400K. FROM
THEORETICAL CONSIDERATIONS, IT WAS INFERRED THAT THE
DONOR LEVELS WERE NOT DISCRETE WITHIN THE ENERGY
BANDGAP. NO SYSTEMATIC VARIATION OF THE
RESISTIVITY WAS OBSERVED AT TEMPERATURES BETWEEN
77K AND 200K. THE RESISTIVITIES OF THE SAMPLES
VARIED OVER A WIDE RANGE FROM 1 OHM-CM TO 10 TO THE
7TH POWER OHM-CM AT 300K. THE HALL MOBILITY
DATA FOR THE CDS FILMS SHOWED MOBILITIES BETWEEN
ONE AND TWO SQ CM/V-SEC, AND ALSO A CONSISTENT
EXPONENTIAL VARIATION WITH TEMPERATURE. THE
MEASURED VALUES OF THE MOBILITY AND ITS EXPONENTIAL
BEHAVIOR WERE IN GOOD AGREEMENT WITH REPORTED VALUES
FOR CDS FILMS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-683 612 971 20/12
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

RESEARCH IN EXPERIMENTAL AND THEORETICAL
PHYSICS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 65-31 DEC 68.
FEB 69 15P MULLER, R. S. I
CONTRACT: DA-31-124-ARO(U)-385
PROJ: DA-2-0-U14501-B-11-B
MONITOR: AROU 553/11-E

UNCLASSIFIED REPORT

DESCRIPTORS: (*FIELD EFFECT TRANSISTORS,
ANALYSIS); (*CARRIERS(SEMICONDUCTORS);
QUANTUM STATISTICS); SEMICONDUCTING FILMS, METAL
FILMS, CADMIUM SULFIDES, CADMIUM COMPOUNDS,
SELENIDES, SILICON, CESIUM, MOBILITY (U)
IDENTIFIERS: METAL OXIDE SEMICONDUCTORS,
MOSFET(METAL OXIDE SEMICONDUCTOR FIELD
EFFECT TRANSISTORS); METAL OXIDE SEMICONDUCTOR
FIELD EFFECT TRANSISTORS, CADMIUM SELENIDES,
FERMI-DIRAC STATISTICS, COMPUTER ANALYSIS (U)

THE RESEARCH INVOLVED THE STUDY OF FIELD-EFFECT
DEVICES. THE TWO PRIMARY AREAS WERE: (1)
ANALYSIS INVOLVING THE IMPORTANT SILICON METAL-OXIDE-
SEMICONDUCTOR FIELD-EFFECT TRANSISTORS (MOSFET) AND
(2) CONSIDERATION OF NOVEL FIELD-EFFECT DEVICES.
SINCE MOSFET'S FREQUENTLY ARE USED WITH
DEGENERATE CARRIER CONCENTRATIONS IN THE CHANNEL,
FERMI-DIRAC STATISTICS, RATHER THAN MAXWELL-
BOLTZMANN STATISTICS, ARE APPROPRIATE IN THE
ANALYSIS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-684 159 20/12
PARIS UNIV (FRANCE) LABORATOIRE DE PHYSIQUE DES
SOLIDES

PHOTON-PHONON INTERACTION IN THIN FILMS, (U)

69 27P BALKANSI, M. ITOLLEC, R. LE

REPT. NO. SCIENTIFIC-2
CONTRACT: AF-EOAR-U016-68

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTING FILMS, PHONONS),
CADMIUM SULFIDES, REFLECTIVITY, DISPERSION
RELATIONS, LIGHT TRANSMISSION, INTERACTIONS,
FRANCE (U)

IDENTIFIERS: LATTICE VIBRATIONS, PHONON PHOTON
INTERACTIONS (U)

THE NORMAL MODES OF VIBRATIONS IN A PERFECT CRYSTAL LATTICE RESULTING INTO NET ELECTRIC DIPOLE MOMENT WITH ELECTRIC VECTOR PERPENDICULAR TO THE PROPAGATION VECTOR ARE STRONGLY COUPLED WITH THE RADIATION FIELD. THE RESULTING OPTICAL ABSORPTION IS VERY STRONG AT THE FREQUENCIES OF THE TRANSVERSE OPTICAL MODES. DIRECT ABSORPTION STUDIES CAN THEREFORE BE CONDUCTED ONLY ON THIN FILMS. WE EXAMINE HERE THE PARTICULAR CASE OF THIN FILMS WHERE THE PHOTON-PHONON INTERACTION CAN BE TREATED IN THE FRAME OF THE COLLISION THEORY FOR TWO TYPES OF PARTICLES, AS A TWO-STEP PROCESS: FIRST THE STRONG COUPLING OF THE RADIATION FIELD WITH THE PHONON FIELD IN TERMS OF POLARITONS AND THE CONSEQUENT POLARITON DECAY AS A SECOND STEP. THE OPTICAL ABSORPTION AT THE NORMAL MODE FREQUENCIES IS CALCULATED IN TERMS OF BAND WIDTH RELATED RESPECTIVELY TO THE POLARITON LIFE TIME, TO THE PHONON LIFE TIME AND TO THE ELASTIC DIFFUSION OF PHOTONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-684 160 2U/12
PARIS UNIV (FRANCE) LABORATOIRE DE PHYSIQUE DES
SOLIDES

INFRARED MEASUREMENTS ON CDS THIN FILMS
DEPOSITED ON ALUMINUM, (U)

69 24P PROJ. F. BALKANSKI, M. I
REPT. NO. SCIENTIFIC-3
CONTRACT: EODAR-68-0016
PROJ: AF-7885
MONITOR: ARL 69-0026

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTING FILMS, CADMIUM
SULFIDES), (*CADMIUM SULFIDES, INFRARED
RADIATION), PHONONS, REFLECTIVITY, ABSORPTION,
FRANCE (U)

IDENTIFIERS: *LATTICE VIBRATIONS, PHONON PHOTON
INTERACTIONS (U)

THE REFLECTIVITY SPECTRA OF THREE CDS THIN
FILMS (THICKNESS = 0.086 AND 0.66 MICROMETERS)
DEPOSITED ON ALUMINIUM HAVE BEEN DETERMINED AT ROOM
TEMPERATURE. THE MEASUREMENTS WERE CARRIED OUT IN
THE SPECTRAL RANGE FROM 180 TO 740 CM⁻¹ AT AN
INCIDENCE OF 45 DEG, FOR LIGHT POLARIZED WITH THE
ELECTRIC FIELD IN THE PLANE OF INCIDENCE. A SMALL
ABSORPTION PEAK IS OBSERVED NEAR $\Omega_{\text{SUB TO FOR}}$ FOR
THE THICKER SAMPLES, AND A MUCH STRONGER ABSORPTION
PEAK NEAR $\Omega_{\text{SUB TO FOR}}$ FOR ALL SAMPLES. THE
RESULTS ARE ANALYSED IN TERMS OF THE THEORY OF
FUCHS AND KLIEWER. THE FREQUENCIES OF THE
PEAKS AND THE PARTIAL WIDTHS ASSOCIATED WITH THE
VIRTUAL MODES ARE IN VERY GOOD AGREEMENT WITH THE
THEORY. IT IS ALSO FOUND THAT THE ANHARMONIC WIDTH
OF THE PEAKS IS MUCH LARGER THAN IN CDS SINGLE
CRYSTALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-684 901 9/1 20/12
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL
ENGINEERING

CIRCUIT-CONTROLLED MODES OF ACOUSTOELECTRIC
OSCILLATIONS IN PIEZOELECTRIC SEMICONDUCTORS, (U)

JUN 68 JP TURNER, C. W. BRYSON, D.

R. 1

CONTRACT: AF-AFOSR-139-67
PROJ: AF-4751
MONITOR: AFOSR 6Y-U822TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ELECTRONICS LETTERS, V4 N13
JUN 68.

DESCRIPTORS: (*CRYSTAL OSCILLATORS, TUNING
DEVICES), (*PIEZOELECTRIC CRYSTALS,
*SEMICONDUCTORS), ALTERNATING CURRENT, CADMIUM
SULFIDES, INDIUM ANTIMONIDES (U)

RESULTS ARE PRESENTED FOR EXPERIMENTS IN WHICH
CIRCUIT-CONTROLLED MODES OF ACOUSTOELECTRIC CURRENT
OSCILLATIONS WERE OBTAINED IN PIEZOELECTRIC
SEMICONDUCTORS. THE REACTIVE CIRCUITS USED ALLOWED
A 6 : 1 TUNING RANGE FROM A SINGLE SPECIMEN. THE
POSSIBLE REALISATION OF BULK DEVICE R.F. GENERATORS
GIVING LARGE PEAK POWERS IN THE REGION OF 1 MHZ IS
DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-685 280 1/3 21/5 14/4
LOGISTICS MANAGEMENT INST WASHINGTON D C

WORKLOAD FORECASTING AND ALTERNATIVE OVERHAUL
SCHEDULES FOR NAVY AIRCRAFT AND AIRCRAFT
ENGINES. (U)

JAN 69 115P
CONTRACT: SD-271
PROJ: SD-271-91

UNCLASSIFIED REPORT

DESCRIPTORS: (•NAVAL AIRCRAFT, MAINTENANCE),
(•AIRCRAFT ENGINES, MAINTENANCE), SCHEDULING,
NAVAL OPERATIONS, PREDICTIONS, MANAGEMENT
PLANNING (U)
IDENTIFIERS: FORECASTING (U)

THE REPORT PROPOSES SYSTEMS TO IMPROVE THE
PLANNING, SCHEDULING, AND MANAGEMENT OF THE OVERHAUL
AND REPAIR OF NAVY AIRCRAFT AND AIRCRAFT ENGINES.
GENERAL DESCRIPTIONS OF THESE SYSTEMS ARE PROVIDED
AS MANAGEMENT OVERVIEWS FOR THE NAVAL AIR
SYSTEMS COMMAND EXECUTIVE LEVEL. AN APPENDIX
IS PROVIDED WHICH (1) DESCRIBES IN GENERAL TERMS
THE OVERALL PROCESS BY WHICH THE OVERHAUL AND REPAIR
OF AIRCRAFT AND ENGINES ARE PLANNED AND SCHEDULED AND
(2) INDICATES THOSE PARTICULAR PROCESSES WHICH
ARE ADDRESSED BY THE REPORT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-685 673 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

THE EDGE EMISSION BANDS IN CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: INTERIM REPT.;
JUL 68 5P KINGSTON, DAVID L. GREENE;
LAWRENCE C. CROFT, LAKE W. ;
REPT. NO. ARL-68-023J
PROJ: AF-7885
TASK: 788500

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JOURNAL OF APPLIED PHYSICS,
V39 N13 P5949-5952 DEC 68.

DESCRIPTORS: (*BAND SPECTRUM, CADMIUM SULFIDES),
(*CADMIUM SULFIDES, BAND THEORY OF SOLIDS),
SEMICONDUCTORS, CRYOGENICS, PHONONS,
EXCITATION (U)
IDENTIFIERS: EMISSION SPECTRA (U)

IT IS SHOWN THAT THERE ARE FIVE CLEARLY DEFINED
SERIES OF EDGE EMISSION BANDS IN PURE CADMIUM SULFIDE
CRYSTALS. THESE SERIES HAVE THEIR ZERO PHONON
PEAKS AT 5128, 5140, 5163, 5179, AND 5234 Å AT 4.2
DEGREES K. THE TEMPERATURE DEPENDENCE OF THE
PEAK WAVELENGTHS AND INTENSITIES OF THESE SERIES IS
DISCUSSED AND A BAND MODEL PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-685 674 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

OSCILLATIONS IN EXCITON EMISSION IN THE EXCITATION
SPECTRA OF ZNSE AND CDS. (U)

FEB 69 6P PARK, Y. S. I
REPT. NO. ARL-68-0246
PROJ: AF-7885
TASK: 788500

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,
V21 N12 P798-800, 16 SEP 68.

DESCRIPTORS: (+CADMIUM SULFIDES,
CARRIERS(SEMICONDUCTORS)), (+ZINC COMPOUNDS,
CARRIERS(SEMICONDUCTORS)), SELENIDES, PHONONS,
EXCITATION, LINE SPECTRUM (U)
IDENTIFIERS: EXCITONS (U)

OSCILLATIONS PERIODIC IN AN ENERGY EQUAL TO LO
PHONON HAVE BEEN OBSERVED IN THE EXCITATION SPECTRUM
FOR THE BOUND EXCITON COMPLEXES IN ZNSE AND
CDS. THE DATA IS INTERPRETED IN TERMS OF
DIRECT PHONON-ASSISTED GENERATION OF THE FOUND
EXCITON COMPLEXES. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-685 676 2U/12 20/3
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

OSCILLATORY PHASE OF PHOTOCONDUCTIVITY OF CDS,

(U)

JUL 68 5P WEI, DAVID T. Y. ; PENCHINA,
CLAUDE M. ; PARK, Y. S. ;
REPT. NO. ARL-68-0231
PROJ: AF-7885
TASK: 783500

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICS LETTERS, V27A N8
P562-563, 9 SEP 68.

DESCRIPTORS: (*CADMIUM SULFIDES,
*PHOTOCONDUCTIVITY), CARRIERS (SEMICONDUCTORS),
OSCILLATION, PHONONS, ALTERNATING CURRENT

(U)

THE PHOTORESPONSE OF CDS TO CHOPPED LIGHT SHOWS
A PHASE DELAY WHICH OSCILLATES WITH PHOTON ENERGY.
THE PERIOD OF OSCILLATION CORRESPONDS TO THE ENERGY
OF AN LO-PHONON. THE PHOTOCURRENT CAN BE
SEPARATED INTO TWO DISTINCT COMPONENTS: ONE
OSCILLATORY; AND THE OTHER NON-OSCILLATORY. THEIR
ORIGINS ARE DESCRIBED IN TERMS OF LIFETIME VARIATIONS
AND TRAPPING. EXPERIMENTS ARE REPORTED OVER THE
TEMPERATURE RANGE OF 20K TO 55K. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-686 496 10/2 20/12
GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF

PHOTOVOLTAIC AND THERMOELECTRIC SOLAR ENERGY
CONVERSION USING THIN FILMS. (U)

DEC 61 65P ZIMMERMAN, W. B. EVANS, J.
C., JR;
REPT. NO. GDA-ERR-AN-103

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS, FILMS),
PHOTOELECTRIC EFFECT, SEEBECK EFFECT, SILICON,
SEMICONDUCTORS, BAND THEORY OF SOLIDS, CADMIUM
SULFIDES, DEPOSITION (U)
IDENTIFIERS: THIN FILMS (U)

SOLAR ENERGY CONVERSION BY THE USE OF THIN FILMS IN
PHOTOVOLTAIC AND THERMOELECTRIC DEVICES IS DISCUSSED.
EXPERIMENTAL WORK IS PRESENTED ON THE FABRICATION
OF A THIN FILM CADMIUM SULFIDE CELL WHICH UTILIZES
THE PHOTOVOLTAIC EFFECT. A THEORETICAL
INVESTIGATION IS MADE OF THE TEMPERATURE DIFFERENCES
OBTAINABLE IN SPACE BY USING THIN, LIGHT-WEIGHT
PLASTIC SHEETS, AND THE USE OF SUCH PLASTICS FOR
THERMOELECTRIC GENERATORS IS DISCUSSED.
TEMPERATURE DIFFERENCES OF SEVERAL HUNDRED
CENTRIGRADE DEGREES CAN BE OBTAINED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-687 673 20/2
CHICAGO UNIV ILL JAMES FRANCK INST

PROTON BLOCKING PATTERNS FOR HCP AND WURTZITE
STRUCTURES, (U)

SEP 68 4P BARRETT, C. S. IMUELLER, R.
M. WHITE, W. I
CONTRACT: DAHCO4-67-C-0050
PROJ: DA-2-0-U61102-B-32-D
MUNITOR: AROD 4886120-MC

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN TRANSACTIONS OF THE
METALLURGICAL SOCIETY OF AIME, V245 P427-429 FEB
69.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
NUCLEAR-CHICAGO CORP., DES PLAINES, ILL.

DESCRIPTORS: (CRYSTAL STRUCTURE, PROTON
SCATTERING), PROTON BOMBARDMENT, SEMICONDUCTORS,
METAL FILMS, COBALT, ZINC, MAGNESIUM, COPPER
ALLOYS, GERMANIUM ALLOYS, CADMIUM SULFIDES,
CADMIUM SELENIDES (U)

IDENTIFIERS: PROTON BLOCKING PATTERNS, HEXAGONAL
CLOSE PACKED LATTICES (U)

FILM-RECORDED LOW-ENERGY PROTON BLOCKING PATTERNS
FOR HCP AND WURTZITE CRYSTALS ARE REPORTED. THE
SEQUENCE OF RELATIVE LINE INTENSITIES
(CORRESPONDING TO PLANAR BLOCKING) OF COMMON HCP
METALS IS COMPARED WITH THOSE OF THE WURTZITE
SEMICONDUCTORS CDS AND CDSE. THE RESULTS
SHOW THAT THE SEQUENCE IS CHARACTERISTIC OF
STRUCTURE, FOR CLOSELY SIMILAR STRUCTURES, SUCH AS
THOSE OF CDS AND CDSE, DIFFERENCES OF LINE
INTENSITY ATTRIBUTABLE TO THE DIFFERENCE IN ATOMIC
NUMBER OF THE SCATTERING CENTERS MAY ALSO BE SEEN.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-687 900 20/12 13/8
DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA

DOPING OF SEMICONDUCTORS AND SEMICONDUCTING FILM.
VOLUME I. (U)

DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY JAN 63-FEB 69.
MAY 69 14UP
REPT. NO. DDC-TAS-69-28

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE. SEE ALSO VOLUME 2, AD-853 000.

DESCRIPTORS: (*SEMICONDUCTORS, *DOPING),
(*SEMICONDUCTING FILMS, DOPING),
(*BIBLIOGRAPHIES, SEMICONDUCTORS), BAND THEORY
OF SOLIDS, CRYSTAL LATTICE DEFECTS,
CARRIERS(SEMICONDUCTORS), CRYSTAL GROWTH,
LUMINESCENCE, SUBSTRATES, IMPURITIES, CADMIUM
COMPOUNDS, GALLIUM COMPOUNDS, LEAD COMPOUNDS, ZINC
COMPOUNDS, ANTIMONY ALLOYS, INDIUM ALLOYS,
ARSENIDES, SULFIDES, TELLURIDES, GERMANIUM,
SILICON, INDEXES (U)
IDENTIFIERS: SEMICONDUCTOR JUNCTIONS, METAL OXIDE
SEMICONDUCTORS, ION IMPLANTATION (U)

THIS IS VOLUME I OF A TWO-VOLUME SET ON
DOPING OF SEMICONDUCTORS AND SEMICONDUCTING
FILMS, WHICH HAS BEEN PREPARED FROM THE DDC
COLLECTION FROM JANUARY 1963 TO FEBRUARY 1969,
AND IT CONTAINS 107 UNCLASSIFIED AND UNLIMITED
REFERENCES. INDIVIDUAL ENTRIES ARE ARRANGED BY
AD NUMBER. COMPUTER GENERATED INDEXES OF
CORPORATE AUTHOR-MONITORING AGENCY,
PERSONAL AUTHOR, AND TITLE ARE PROVIDED.
VOLUME II, AD-853 000, WHICH SUPPLEMENTS THIS
VOLUME, IS A CUMULATIVE VOLUME. IT INCLUDES ALL
THE REFERENCES FROM VOLUME I, AS WELL AS THE 164
UNCLASSIFIED AND LIMITED DISTRIBUTION ENTRIES.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-688 903 20/2
DELAWARE UNIV NEWARK DEPT OF PHYSICS

GROWTH OF SINGLE CRYSTAL PLATELETS OF CADMIUM
SULFIDE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 69 9UP VAN DEN BERG, LODEWIJK I
R&PT. NO. TR-32

UNCLASSIFIED REPORT

DESCRIPTORS: (*CADMIUM SULFIDES, SINGLE CRYSTALS),
(*SINGLE CRYSTALS, *CRYSTAL GROWTH),
CRYSTALLIZATION, SEMICONDUCTORS, VAPOR PLATING,
TEMPERATURE, HYDROGEN COMPOUNDS,
MODELS(SIMULATIONS), THESES (U)
IDENTIFIERS: CHEMICAL VAPOR DEPOSITION,
PLATELETS (U)

SINGLE CRYSTAL PLATELETS OF CADMIUM SULFIDE
WERE GROWN BY EVAPORATION OF PURE CADMIUM SULFIDE
POUNDER IN A GAS STREAM AND SUBSEQUENT CRYSTALLIZATION
BY GRADUAL COOLING OF THE VAPOR PHASE. PARAMETERS
WHICH INFLUENCE THE RATE OF GROWTH WERE DEFINED AND
VARIED IN ORDER TO OPTIMIZE THE GROWTH PROCESS.
TWO VARIABLES, THE CONCENTRATION OF HYDROGEN
SULFIDE IN THE CARRIER GAS AND THE TEMPERATURE
GRADIENT IN THE CRYSTALLIZATION REGION, WERE SELECTED
FOR FURTHER INVESTIGATION. A THEORETICAL MODEL HAS
BEEN DEVELOPED WHICH MAKES IT POSSIBLE TO CALCULATE
THE SUPERSATURATION IN THE GAS PHASE FOR THE
DIFFERENT GROWTH CONDITIONS AND WHICH RELATES THIS
SUPERSATURATION WITH THE HABIT OF THE CRYSTALS.
THE RESULTS OF THE MODEL ARE COMPARED WITH THE
EXPERIMENTAL RESULTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-688 904 20/2 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

DESORPTION OF OXYGEN AND ITS EFFECTS ON THE
ELECTRICAL PROPERTIES OF CDS SINGLE CRYSTAL
PLATELETS. (U)

DESCRIPTIVE NOTE: TECHNICAL REP'.,
JUN 69 90P SCHUBERT, RUDOLF ;
REPT. NO. TR-33

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF
NAVAL RESEARCH, WASHINGTON, D. C., AND
DEPARTMENT OF THE ARMY, ABERDEEN PROVING GROUND,
MD. DOCTORAL THESIS.

DESCRIPTORS: (SEMICONDUCTORS, ADSORPTION),
(CALCIUM SULFIDES, ELECTRICAL PROPERTIES), BAND
THEORY OF SOLIDS, OXYGEN, PHOTOCONDUCTIVITY,
SURFACE PROPERTIES, CARRIERS (SEMICONDUCTORS),
SINGLE CRYSTALS, MODELS (SIMULATIONS),
THESES (U)

IDENTIFIERS: DESORPTION, ELECTRON TRAPS (U)

OXYGEN EFFECTS ON CDS SINGLE CRYSTAL PLATELETS
ARE SHOWN TO MANIFEST THEMSELVES IN SEVERAL WAYS AND
ALLOW ONE TO DIVIDE THE CRYSTALS INTO TWO BASIC
CLASSES. THERMALLY STIMULATED DESORPTION STUDIES,
WITH A SENSITIVE PARTIAL PRESSURE ANALYZER IN ULTRA
HIGH VACUUM, SHOW THAT THERE ARE SEVERAL LAYERS OF
MONATOMIC OXYGEN ADSORBED ON THE CRYSTAL SURFACE FOR
THE ASSUMPTION THAT THE REAL SURFACE EQUALS THE
GEOMETRICAL SURFACE. A SENSITIZATION AND
COMPENSATION MODEL IS SHOWN TO ACCOUNT QUANTITATIVELY
FOR THE OBSERVED CHANGES IN PHOTOCONDUCTANCE AND
RISING FERMI LEVEL DUE TO OXYGEN DESORPTION. IN
THIS CASE SOME OF THE SURFACE STATES WHICH ORIGINALLY
CONTAINED ADSORBED OXYGEN ACT AS SENSITIZATION
CENTERS AFTER THE OXYGEN IS DESORBED. WHEREAS OTHERS
ACT AS CHARGE COMPENSATION CENTERS. ON THE OTHER
HAND A MODEL WHICH IS BASED ON THE ADSORBED OXYGEN
CAUSING FAST SURFACE RECOMBINATION IS SHOWN TO BE
INCAPABLE OF ACCOUNTING FOR THE RISING FERMI LEVEL.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-688 945 2U/2 2D/12
PRINCETON UNIV N J DEPT OF ELECTRICAL ENGINEERING

THE INFLUENCE OF CHEMISORPTION ON THE ELECTRONIC
PROPERTIES OF THIN SEMICONDUCTORS: OXYGEN
CHEMISORPTION ON THE (11-20) SURFACE OF CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUN 69 169P GOODWIN, THOMAS A. ; MARK,
PETER I
REPT. NO. TR-2
CONTRACT: N00014-67-A-0151-0014
PROJ: NR-051-492

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (*SEMICONDUCTORS, *CHEMISORPTION),
(*CADMIUM SULFIDES, ELECTRICAL PROPERTIES), BAND
THEORY OF SOLIDS, OXYGEN, SURFACE PROPERTIES,
ELECTRICAL CONDUCTANCE, THESES (U)

A THEORETICAL INVESTIGATION OF THE EFFECTS OF
CHEMISORPTION SURFACE STATES ON THE EQUILIBRIUM
CONDUCTIVITY OF THIN, WIDE BANDGAP SEMICONDUCTORS IS
PRESENTED. CRITERIA ARE ESTABLISHED FOR THE
DETECTION AND CHARACTERIZATION OF CHEMISORPTION BY
ELECTRICAL MEASUREMENTS ON THE ADSORBENT.
MEASUREMENTS WITH OXYGEN (ACCEPTOR ADSORBATE)
ON CDS (N-TYPE ADSORBENT) CONFIRM THE
ESSENTIALS OF THE THEORY: (1) THERE IS
LITTLE OR NO CHANGE IN THE ADSORBENT CONDUCTIVITY
UNLESS THE (PRESSURE DEPENDENT) ADSORBATE SURFACE
STATE CONCENTRATION EXCEEDS THE ADSORBENT BULK
ELECTRON DENSITY PER UNIT SURFACE AREA, AND THE DEPTH
OF THE SURFACE STATE BELOW THE CONDUCTION BAND
EXCEEDS THE SURFACE POTENTIAL NECESSARY TO COMPLETELY
DEplete THE ADSORBENT BULK. (2) SATISFACTION
OF THESE CONDITIONS PRODUCE LARGE CHANGES IN THE
ELECTRICAL PROPERTIES OF THE ADSORBENT ON
CHEMISORPTION, IN BOTH THE MAGNITUDE OF THE
EQUILIBRIUM CONDUCTIVITY AND IN ITS ACTIVATION
ENERGY. A QUANTITATIVE STUDY OF THESE EFFECTS
YIELDS THE ENERGY LEVEL OF THE ADSORBATE AND THE
PRESSURE DEPENDENT SURFACE STATE CONCENTRATION.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-689 057 2U/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

ELECTRON MOBILITY IN CDS AT HIGH ELECTRIC
FIELDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 68 4P BOER, K. W. BOGUS, K. I
REPT. NO. TR-30
CONTRACT: NONR-4J36(U0)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN THE PHYSICAL REVIEW, V176
NJ P899-900, 15 DEC 68.

DESCRIPTORS: (*CADMIUM SULFIDES, HALL EFFECT),
(*CARRIERS (SEMICONDUCTORS), MOBILITY),
ELECTRONS, ELECTRIC FIELDS, ELECTRICAL
CONDUCTANCE, PHONONS (U)
IDENTIFIERS: ELECTRON MOBILITY, HOT ELECTRONS,
ELECTRON PHONON INTERACTIONS, HIGH FIELD DOMAINS,
NEGATIVE DIFFERENTIAL CONDUCTIVITY (U)

THE HALL MOBILITY OF ELECTRONS IN CDS
PLATELETS HAS BEEN MEASURED AT 230 DEGREES K AS A
FUNCTION OF THE ELECTRIC FIELD USING STATIONARY
CATHODE-ADJACENT HIGH-FIELD DOMAINS IN THE RANGE OF
NEGATIVE DIFFERENTIAL CONDUCTIVITY. THE ELECTRON
MOBILITY IS OBSERVED TO BE FIELD-INDEPENDENT UP TO 30
KV/CM. ABOVE 30 KV/CM IT DECREASES LINEARLY
WITH THE FIELD FROM ITS LOW-FIELD VALUE OF ABOUT 620
CM SQUARED/V SEC, TO ABOUT 300 CM SQUARED/V SEC
AT 70 KV/CM, INDICATING SCATTERING OF HOT ELECTRONS
WITH OPTICAL PHONONS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-689 059 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

CRITICAL CONDITIONS FOR TRANSITIONS BETWEEN
STATIONARY AND NON-STATIONARY HIGH-FIELD DOMAINS
IN SEMI-INSULATORS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
SEP 68 12P DOEHLER, G. ;
REPT. NO. TR-27
CONTRACT: NONR-4336(U)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICA STATUS SOLIDI,
V30 P627-636 1968.

DESCRIPTORS: (*SEMICONDUCTORS, ELECTRICAL
CONDUCTANCE), (*CARRIERS(SEMICONDUCTORS),
TRANSPORT PROPERTIES), BAND THEORY OF SOLIDS,
RECOMBINATION REACTIONS, PERTURBATION THEORY,
ELECTRIC FIELDS, CADMIUM SULFIDES, GERMANIUM,
STABILITY (U)
IDENTIFIERS: HIGH FIELD DOMAINS, CARRIER
RECOMBINATION, NEGATIVE DIFFERENTIAL CONDUCTIVITY (U)

AN ANALYSIS OF A FLUCTUATION IN THE NEIGHBORHOOD OF
SINGULAR POINTS OF THE POISSON AND TRANSPORT
EQUATIONS FOR A SEMI-INSULATOR WITH NEGATIVE
DIFFERENTIAL CONDUCTIVITY DUE TO FIELD ENHANCED
RECOMBINATION YIELDS A CRITERION FOR THE TRANSITIONS
BETWEEN STATIONARY AND NON-STATIONARY HIGH-FIELD
DOMAINS. CRITICAL VOLTAGES (DOMAIN LENGTHS)
AND CURRENT OSCILLATION FREQUENCIES ARE GIVEN FOR
DIFFERENT SATURATION CURRENTS AND AGREE WELL WITH
EXPERIMENTAL RESULTS REPORTED FOR FIELD-QUENCHED
CUS. IT HAS BEEN SHOWN THAT, WITH INCREASING
APPLIED VOLTAGE, ALTERNATING REGIMES OF STATIONARY
AND NON-STATIONARY SOLUTIONS EXIST FOR THE MODEL
DISCUSSED, IN AGREEMENT WITH RECENTLY REPORTED
EXPERIMENTAL INDICATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-684 060 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

SEMICONDUCTIVITY OF CDS AS A FUNCTION OF S-VAPOR
PRESSURE DURING HEAT TREATMENT BETWEEN 500 DEGREES
AND 700 DEGREES C. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JAN 69 IUP BOER, K. W. INALESNIK, W.
J. I
REPT. NO. TR-38

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN MAT. RES. BULL., V4
P153-160, 1969.
SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF
NAVAL RESEARCH, WASHINGTON, D. C.; ABERDEEN
PROVING GROUND, MD.; AND NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION, GREENBELT, MD. GODDARD
SPACE FLIGHT CENTER. REVISION OF REPT. DATED 6
DEC 68.

DESCRIPTORS: (*SEMICONDUCTORS, *CRYSTAL LATTICE
DEFECTS), (*CADMIUM SULFIDES, ELECTRICAL
CONDUCTANCE), BAND THEORY OF SOLIDS, HEAT
TREATMENT, HIGH-TEMPERATURE RESEARCH, VAPOR
PRESSURE, SULFUR (U)
IDENTIFIERS: ORDER DISORDER TRANSFORMATIONS (U)

THE DARK CONDUCTIVITY OF CDS AS A FUNCTION OF
THE SULFUR VAPOR PRESSURE IS INVESTIGATED DURING HEAT
TREATMENT IN A TEMPERATURE RANGE $500 \text{ DEGREES} < T < 700$
DEGREES C. THE RESULTS ARE EXPLAINED BY
THERMODYNAMIC DISORDER AND A CD-RICH
NONSTOICHIOMETRIC EQUILIBRIUM BELOW 525 DEGREES C.
SCHOTTKY-WAGNER DISORDER MOST PROBABLY IS
DOMINANT ABOVE 525 DEGREES C. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-691 964 20/12
OHIO STATE UNIV COLUMBUS

DIFFUSION OF RARE EARTH INTO II-VI COMPOUNDS.

(U)

69 7P GIRTON, D. G. ANDERSON, W.

W. J.

CONTRACT: DAHCO4-67-C-0043
PROJ: DA-2-D-061102-B-31-E
MONITOR: AR00 683511-E

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN TRANSACTIONS OF THE
METALLURGICAL SOCIETY OF AIME, V245 P465-466 MAR
69.

DESCRIPTORS: (SEMICONDUCTORS, LUMINESCENCE),
(RARE EARTH ELEMENTS, DIFFUSION), CADMIUM
SULFIDES, ZINC COMPOUNDS, SELENIDES, SINGLE
CRYSTALS, LINE SPECTRUM (U)
IDENTIFIERS: ZINC SELENIDES, EMISSION SPECTRA,
PHOTOLUMINESCENCE (U)

THE PHOTOLUMINESCENCE OF PR, ND, HO, ER,
TM, AND YB IN CDS, AND HO, ER, TM, AND
YB IN ZnSe HAS BEEN OBSERVED FROM CRYSTALS
PREPARED BY DIFFUSION USING RARE EARTH METALS AND AN
EXCESS CHALCOGEN PRESSURE. FOR A GIVEN
TEMPERATURE, TIME, AND CHALCOGEN PRESSURE THE
SPECTRAL CHARACTERISTICS WERE VERY REPRODUCIBLE FROM
RUN TO RUN, AND THE EMISSION INTENSITY FOR NO,
ER, AND YB IN CDS WAS AS HIGH OR HIGHER THAN
THE BEST VAPOR PHASE DOPED CRYSTALS WE HAVE GROWN.
FOR A FEW RARE EARTHS IT WAS FOUND THAT CERTAIN
CONDITIONS OF DIFFUSION TEND TO YIELD OPTIMUM RARE
EARTH EMISSION INTENSITY WITH RESPECT TO THE
BACKGROUND LATTICE EMISSION. PHOTOLUMINESCENCE
MEASUREMENTS OF YB IN CDS AS A FUNCTION OF
DEPTH GAVE A PROFILE WHICH WAS NEITHER A GAUSSIAN
NOR COMPLEMENTARY ERROR FUNCTION. PART OF THE
PROFILE APPEARS TO ARISE FROM A FAST COMPONENT OF THE
DIFFUSION AND THE OTHER PART FROM A SLOW DIFFUSING
COMPONENT. AT 960C AND 33 ATM S PRESSURE, A
COMPLEMENTARY ERROR FUNCTION APPROXIMATION OF THE
SLOW DIFFUSING COMPONENT GAVE A DIFFUSION COEFFICIENT
OF $D = 1.3 \times 10^{-10}$ TO THE -9 TH POWER CM PER SEC.
(AUTHOR) (U)

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/ZZZHY

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-692 745 2U/12
LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED
RESEARCH LAB

ELECTRONIC STRUCTURE AND OPTICAL SPECTRUM OF
SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 MAY 66-15 MAY 69;
MAY 69 416P HERMAN, FRANK; KORTUM, RICHARD
L.; ORTENBURGER, IRENE B.; VAN DYKE, JOHN P.

CONTRACT: F33615-67-C-1793
PROJ: AF-7885
MONITOR: ARL 69-U080

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, BAND THEORY OF
SOLIDS), OPTICAL PROPERTIES, CRYSTAL STRUCTURE,
PHOTOELECTRIC EFFECT, METALLOIDS, GERMANIUM,
SILICON, TIN, CADMIUM SULFIDES, GALLIUM
ARSENIDES, INDIUM ANTIMONIDES, SILICON CARBIDES,
ZINC SULFIDES, ALUMINUM COMPOUNDS, BORON
COMPOUNDS, LEAD COMPOUNDS, MAGNESIUM COMPOUNDS,
ANTIMONY ALLOYS, ARSENIDES, PHOSPHIDES,
SULFIDES, SELENIDES, TELLURIDES (U)
IDENTIFIERS: (ORTHOGONALIZED PLANE WAVE), (U)
ORTHOGONALIZED PLANE WAVE

DURING THE PAST FEW YEARS WE HAVE INVESTIGATED THE
ELECTRONIC ENERGY BAND STRUCTURE AND RELATED OPTICAL
PROPERTIES OF OVER 50 CRYSTALLINE SOLIDS, INCLUDING
THE DIAMOND-TYPE CRYSTALS; CUBIC AND HEXAGONAL
SIC; SEVERAL III-V, II-VI, AND I-VII
COMPOUNDS HAVING THE SPHALERITE OR WURTZITE
STRUCTURE; A NUMBER OF IV-VI, II-VI, AND I-
VII COMPOUNDS HAVING THE ROCK-SALT STRUCTURE; SOME
ANTI-FLUORITE-TYPE II-IV COMPOUNDS; AND A FEW
SOLID RARE GASES; AMONG OTHERS. DURING THIS
PERIOD, A LARGE NUMBER OF PAPERS WERE PUBLISHED
DEALING WITH VARIOUS ASPECTS OF THE WORK. AS THESE
PAPERS HAVE APPEARED IN WIDELY SCATTERED SCIENTIFIC
JOURNALS, CONFERENCE PROCEEDINGS, AND BOOKS, WE
THOUGHT IT WOULD SERVE A USEFUL PURPOSE TO BRING ALL
OF THEM TOGETHER UNDER ONE COVER, AND HAVE THIS
COLLECTION SERVE AS THE MAIN BODY OF THIS FINAL
REPORT. ALSO INCLUDED IN THIS FINAL REPORT
ARE TWO EARLIER PAPERS WRITTEN IN 1960 AND 1964,
WHICH FORM THE BASIS OF OUR ORTHOGONALIZED PLANE WAVE
(OPW) ENERGY BAND CALCULATIONS. (AUTHOR) (U)

298

UNCLASSIFIED

/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-693 154 20/12
HUGHES RESEARCH LABS MALIBU CALIF

SELECTIVE DOPING OF PIEZOELECTRIC CRYSTALS BY ION
IMPLANTATION. (U)

DESCRIPTIVE NOTE: SEMIANNUAL REPT. 1 JAN-30 JUN 69,
AUG 69 54P SHIFKIN, G. A. ; ZANIO, K.
R. ; JAMBA, D. M. ; JONES, N. R. ; MARSH, O.
J. ;
CONTRACT: N00014-69-C-0171

UNCLASSIFIED REPORT

DESCRIPTORS: (*PIEZOELECTRIC CRYSTALS, ION
BOMBARDMENT), (*SEMICONDUCTORS, DOPING),
ELECTRICAL CONDUCTANCE, ULTRASONIC RADIATION, HALL
EFFECT, CADMIUM SULFIDES, ZINC COMPOUNDS,
OXIDES (U)
IDENTIFIERS: *ION IMPLANTATION, PIEZOELECTRIC
SEMICONDUCTORS, ZINC OXIDES (U)

THE FEASIBILITY OF CREATING N-TYPE CONDUCTING
REGIONS IN PIEZOELECTRIC CRYSTALS BY ION IMPLANTATION
IS BEING INVESTIGATED. EXPERIMENTAL STUDIES HAVE
BEEN PERFORMED WITH CRYSTALS OF CDS AND ZNO,
AND DOPANT IONS OF H, B, F, AL, Cl, AND
GA. TO DATE, BOTH ZNO AND CDS HAVE BEEN
DOPED BY ION IMPLANTATION. THE BEST SUCCESS HAS
BEEN ACHIEVED WITH HYDROGEN IN ZNO IMPLANTED AT
ROOM TEMPERATURE, IN WHICH AN N-TYPE CONDUCTION 1000
TIMES STRONGER THAN THE UNIMPLANTED PORTION WAS
ATTAINED. IMPLANTATIONS OF B, AL, GA, F,
AND Cl IN CDS HAVE PRODUCED VARYING LESSER
DEGREES N-TYPE CONDUCTIVITY, WITH AL THE BEST.
RANGE-ENERGY CALCULATIONS HAVE BEEN PERFORMED FOR
THE ION-SUBSTRATE COMBINATIONS OF INTEREST. A
THEORETICAL INVESTIGATION OF A PIEZOELECTRIC SURFACE
WAVE PROPAGATION IN THE PRESENCE OF AN ION-IMPLANTED
LAYER IN A PIEZOELECTRIC CRYSTAL SUBSTRATE WITH THE
OBJECTIVE OF APPLICATION TO AMPLIFICATION HAS
RESULTED IN A COMPUTER PROGRAM WHICH WILL BE RUN IN
THE SECOND PERIOD OF THE PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-694 688 2U/12 14/2
TEXAS UNIV AUSTIN ELECTRONICS RESEARCH CENTER

USE OF SUPERCONDUCTING CAVITIES TO RESOLVE CARRIER
TRAPPING EFFECTS IN CDS, (U)

69 IOP HARTWIG, WILLIAM H. THINDS,
JAMES J. I
CONTRACT: AF-AFOSR-766-67
PROJ: AF-4751
MONITOR: AFOSR 69-2528TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,
V40 N5 P202U-2027 APR 69.

DESCRIPTORS: (*CADMIUM SULFIDES, BAND THEORY OF
SOLIDS); (*CARRIERS(SEMICONDUCTORS), LIFE
EXPECTANCY), PHOTOCONDUCTIVITY, CRYSTAL LATTICE
DEFECTS, DIELECTRIC PROPERTIES, SUPERCONDUCTORS,
CRYOGENICS (U)

IDENTIFIERS: PHOTOELECTRIC EFFECTS, ELECTRON
TRAPS, HOLE TRAPS, CARRIER RECOMBINATION,
SUPERCONDUCTING CAVITIES (U)

THE EXCELLENT FREQUENCY STABILITY AND CRYOGENIC
ENVIRONMENT OF A SUPERCONDUCTING RESONANT CAVITY
PROVIDES A SENSITIVE METHOD FOR OBSERVING TRAP-
FILLING IN CDS AND SIMILAR MATERIALS. WHEN
USED WITH THERMALLY STIMULATED CONDUCTIVITY AND DC
PHOTOCONDUCTIVITY, IT IS POSSIBLE TO SOLVE FOR TRAP
ENERGY, CAPTURE CROSS SECTION, DENSITY OF TRAP
STATES, AND FREE-CARRIER LIFETIME. THE TECHNIQUE
IS THAT USED BY ARNDT, HARTWIG, AND STONE TO
OBSERVE OPTICALLY INDUCED CHANGES IN THE COMPLEX
DIELECTRIC CONSTANT BY INERTIA FORCES ON FREE
CARRIERS IN SI AND OTHER INDIRECT-GAP
SEMICONDUCTORS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-694 893 10/2 22/2
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

PERFORMANCE OF CADMIUM SULFIDE THIN FILM SOLAR CELLS
IN A SPACE ENVIRONMENT. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,
DEC 68 4P STANLEY, ALAN G. I
REPT. NO. JA-3359
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-69-196

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PROCEEDINGS OF THE INSTITUTE
OF ELECTRICAL AND ELECTRONICS ENGINEERS, V57 N4 P692-
694 APR 69.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 30 OCT
68.

DESCRIPTORS: (*SATELLITES(ARTIFICIAL); SOLAR
PANELS); (*CADMIUM SULFIDES, SOLAR CELLS),
(*SOLAR CELLS, RELIABILITY(ELECTRONICS)),
FILMS, SPACE ENVIRONMENTAL CONDITIONS, THERMAL
STABILITY, ELECTRICAL PROPERTIES, DEGRADATION (U)
IDENTIFIERS: *CADMIUM SULFIDE SOLAR CELLS,
EVALUATION (U)

CADMIUM SULFIDE THIN FILM SOLAR CELLS HAVE BEEN
SUBJECTED TO EXTENDED THERMAL CYCLING TESTS IN VACUUM
TO SIMULATE THE CONDITIONS OF AN EARTH ORBITING
SATELLITE. WHEN CYCLED UNDER LOAD, THE SOLAR CELLS
EXHIBIT A SLOW LOSS OF OUTPUT. SEVERAL POSSIBLE
CAUSES OF THIS LOSS ARE SUGGESTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-695 104 2U/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

EMISSION FROM EXCITED TERMINAL STATES OF BOUND
EXCITON COMPLEXES, (U)

AUG 69 15P REYNOLDS, D. C. ;
REPT. NO. ARL-69-0125
PROJ: AF-7885
TASK: 7885UO

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ELECTRONIC STRUCTURES IN
SOLIDS, P110-121 1969.

DESCRIPTORS: (*SEMICONDUCTORS, BAND THEORY OF
SOLIDS), (*CADMIUM SULFIDES, EXCITONS),
(*CADMIUM SELENIDES, EXCITONS), LINE SPECTRUM,
ZEEMAN EFFECT, CRYOGENICS, IMPURITIES (U)
IDENTIFIERS: EMISSION SPECTRA (U)

EMISSION FROM THE EXCITED TERMINAL STATES OF BOUND
EXCITON-DONOR COMPLEXES HAS BEEN OBSERVED IN CDS
AND CDSE CRYSTALS. STUDYING THESE OPTICAL
TRANSITIONS ALLOWS ONE TO DETERMINE THE DONOR
IONIZATION ENERGIES, THE ELECTRON EFFECTIVE MASSES AS
WELL AS THE ELECTRON G-VALUES IN THESE MATERIALS.
A GOOD THEORETICAL FIT TO THE EXPERIMENTAL DATA WAS
OBTAINED, USING THE EFFECTIVE MASS APPROXIMATION.
EMISSION FROM THE EXCITED TERMINAL STATES OF BOUND
EXCITON-ACCEPTOR COMPLEXES HAS NOT YET BEEN OBSERVED
IN THESE MATERIALS. THERE IS NO BASIC REASON WHY
SUCH TRANSITIONS SHOULD NOT OCCUR. STUDYING
TRANSITIONS OF THIS TYPE WOULD ALLOW ONE TO OBTAIN
FUNDAMENTAL INFORMATION CONCERNING THE ACCEPTOR
IMPURITIES IN THESE MATERIALS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-695 110 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SOLID SOLUTIONS OF CADMIUM SULFIDE-CADMIUM
SELENIDE FILMS: PREPARATION AND DETERMINATION BY X-
RAY FLUORESCENCE METHOD, (U)

JUL 69 24P CHAN,FRANK L. ;CARPENTER,
JAMES T. I
REPT. NO. ARL-69-0111
PROJ: AF-7023
TASK: 702300

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ADVANCES IN X-RAY
ANALYSIS, V12 P581-000 1969.

DESCRIPTORS: (•CADMIUM SELENIDES, FILMS),
(•CADMIUM SULFIDES, FILMS), THICKNESS, SOLID
SOLUTIONS, X-RAY SPECTROSCOPY, FLUORESCENCE,
DEPOSITION (U)
IDENTIFIERS: •X-RAY FLUORESCENCE ANALYSIS (U)

SOLID SOLUTIONS OF CADMIUM SULFIDE AND CADMIUM
SELENIDE PREPARED BY SEVERAL METHODS AT TEMPERATURE
IN EXCESS OF 1000C IN INERT ATMOSPHERE ARE
DESCRIBED. THE COMPOSITIONS OF THESE SOLID
SOLUTIONS VARIED WIDELY, RANGING FROM PURE CADMIUM
SULFIDE TO PURE CADMIUM SELENIDE. FILMS OF SOLID
SOLUTIONS HAVE BEEN SUCCESSFULLY PREPARED BY THE
VACUUM DEPOSITION ON VARIOUS SUBSTRATES USING A
PROCEDURE PREVIOUSLY REPORTED. CONDITIONS FOR THE
DEPOSITIONS HAVE BEEN INVESTIGATED TO PREVENT
NOTICEABLE ALTERATION OF THE COMPOSITION OF THE SOLID
SOLUTION DURING VACUUM DEPOSITION. FILMS OF
VARIOUS THICKNESSES HAVE BEEN PREPARED TO DATE.
PROCEDURES HAVE BEEN ESTABLISHED FOR THE
DETERMINATION OF BOTH COMPOSITION AND FILM THICKNESS
BASED ON FLUORESCENCE INTENSITY DATA. THERE IS A
RELATIONSHIP BETWEEN THE FLUORESCENCE INTENSITY AND
APPEARANCE WHEN DEPOSITED FILMS ARE NOT OF THE SAME
THICKNESS. CORRELATION OF THESE PHENOMENA WILL BE
DEMONSTRATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-695 232 20/13 7/4
PENNSYLVANIA UNIV PHILADELPHIA LAB FOR RESEARCH ON THE
STRUCTURE OF MATTER

EXCITON-ENHANCED RAMAN SCATTERING BY OPTICAL
PHONONS,

(U)

SEP 68 8P PINCZUK, A. IUSHIUDA, S. I
BURSTEIN, E. MILLS, D. L. I
CONTRACT: DA-31-124-ARO(D)-239
PROJ: DA-2-0-061102-B-11-B
MONITOR: AROD 4882:12-P

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,
V22 N8 P348-352, 24 FEB 69.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
CALIFORNIA UNIV., IRVINE, DEPT. OF PHYSICS,
GRANT AF-AFOSR-1448-68.

DESCRIPTORS: (*SEMICONDUCTORS, BAND THEORY OF
SOLIDS), (*RAMAN SPECTROSCOPY, EXCITONS),
CADMIUM SULFIDES, INDIUM ANTIMONIDES,
ELECTROOPTICS, PHONONS
IDENTIFIERS: POLARITONS

(U)

(U)

THE THEORY OF EXCITON-ENHANCED RAMAN SCATTERING
IS FORMULATED IN TERMS OF THE SCATTERING OF
POLARITONS BY OPTICAL PHONONS VIA THE EXCITON PART OF
THE COUPLED MODES. THE EXPRESSION FOR THE EXCITON
CONTRIBUTION TO THE SCATTERING TENSOR IS GIVEN,
WITHIN A CONSTANT FACTOR, IN TERMS OF THE SAME
PARAMETERS THAT DETERMINE THE EXCITON CONTRIBUTION TO
THE FREQUENCY-DEPENDENT DIELECTRIC CONSTANT. THE
THEORY ALSO PROVIDES A NEW MECHANISM FOR THE EXCITON
CONTRIBUTION TO THE ELECTRO-OPTIC EFFECT.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-695 823 20/12
PRINCETON UNIV N J DEPT OF ELECTRICAL ENGINEERING

SURFACE CONDUCTION IN CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 3, MAR-AUG 69,
SEP 69 97P BAKER, ROGER T. MARK, PETER

CONTRACT: N00014-67-A-0151
PROJ: NR-051-492

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, SURFACE PROPERTIES), (*CADMIUM SULFIDES, ELECTRICAL CONDUCTANCE), BAND THEORY OF SOLIDS, ELECTRIC CURRENTS, HALL EFFECT, SEEBECK EFFECT, DOPING, THESES (U)
IDENTIFIERS: *SURFACE RESISTIVITY (U)

USING FOUR TERMINAL CURRENT VOLTAGE MEASUREMENTS THE AUTHORS ESTABLISHED THAT FOR THIN CRYSTALS OF HIGH RESISTIVITY CDS ALL THE DARK CURRENT FLOWS IN A THIN LAYER NEAR THE SURFACE. IT IS ESTIMATED THAT THE BULK RESISTIVITY IS AT LEAST 100 TIMES HIGHER THAN THE SURFACE RESISTIVITY. THIS NATURAL SANDWICH STRUCTURE (TWO CONDUCTION LAYERS SEPARATED BY AN INSULATING LAYER) PRODUCES SEVERAL INTERESTING EFFECTS INCLUDING A SELF-FIELD EFFECT WHICH CAUSES A STRONG CURRENT SATURATION SIMILAR TO THAT SEEN BUT NOT EXPLAINED BY HUBE AND BARTON. AFTER ESTABLISHING THAT A SURFACE CONDUCTIVITY EXISTED, HALL AND THERMOELECTRIC POWER MEASUREMENTS WERE MADE TO DETERMINE THE TRANSPORT PROPERTIES OF THE SURFACE LAYER. FROM THESE MEASUREMENTS IT WAS NOT POSSIBLE TO DETERMINE WHETHER THE SURFACE CONDUCTION WAS DUE TO A BENT CONDUCTION BAND CAUSED BY NONUNIFORM DOPING, BANDING OF SURFACE IMPURITIES, OR BANDING OF INTRINSIC SURFACE STATES. EXAMINATION OF THE LITERATURE ON THE CHEMICAL PROPERTIES OF CRYSTALLINE CDS INDICATED THAT EVEN AT ROOM TEMPERATURE THE SURFACE MAY REACT WITH OXYGEN ESPECIALLY IN THE PRESENCE OF BANDGAP ILLUMINATION AND MOISTURE. BASED ON THE CHEMICAL PROPERTIES OF CDS SURFACES A GENERAL MODEL IS PROPOSED TO EXPLAIN SOME OF THE ELECTRONIC PROPERTIES OF CDS. (AUTHOR) (U)

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UNCLASSIFIED

/ZZZHT

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-697 002 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

EFFECTIVE WORK FUNCTION OF METAL CONTACTS TO
VACUUM-CLEAVED PHOTOCONDUCTING CDS FOR HIGH
PHOTOCURRENTS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
NOV 69 14P STIRN, RICHARD J. ; BOER,
KARL W. ;
REPT. NO. TR-28
CONTRACT: NONR-4336(UO)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE AMERICAN
PHYSICAL SOCIETY IN MIAMI BEACH, FLA. NOV 68.

DESCRIPTORS: (•CADMIUM SULFIDES, NEGATIVE RESISTANCE
CIRCUITS), (•ELECTRIC TERMINALS, WORK
FUNCTIONS), ELECTRON DENSITY,
CARRIERS(SEMICONDUCTORS), PHOTOCONDUCTIVITY,
LOW-TEMPERATURE RESEARCH (U)
IDENTIFIERS: NEGATIVE DIFFERENTIAL CONDUCTIVITY,
METAL SEMICONDUCTOR CONTACTS, ELECTRIC CONTACTS,
HIGH FIELD DOMAINS (U)

STATIONARY CATHODE-ADJACENT HIGH-FIELD DOMAINS
WHICH OCCUR IN A RANGE OF NEGATIVE DIFFERENTIAL
CONDUCTIVITY HAVE BEEN USED TO DETERMINE THE ELECTRON
DENSITY AT THE CATHODE FOR VARIOUS METALS DEPOSITED
ON VACUUM-CLEAVED PHOTOCONDUCTING CDS.
MEASUREMENTS WERE TAKEN IN BANDGAP LIGHT AT VARIOUS
INTENSITIES AND AT TEMPERATURES RANGING FROM 155 TO
300 DEGREES K. THESE CRYSTALS (DOPED WITH AG
AND AL) CONSISTENTLY HAVE GAINS GREATER THAN 10
EVEN WITH METAL CONTACTS OF AU OR PT. THE
ANALYSIS SHOWS THAT THE 'EFFECTIVE BARRIER HEIGHTS'
ARE ESSENTIALLY INDEPENDENT OF THE METAL WORK
FUNCTION, ARE DEPENDENT ON THE LIGHT INTENSITY AND
TEMPERATURE, AND ARE GENERALLY LOWER IN MAGNITUDE BY
ABOUT 40% AS COMPARED TO VALUES OBTAINED FROM
PHOTORESPONSE MEASUREMENTS ON CDS WITH NEGLIGIBLE
PHOTOCURRENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-697 237 20/12 4/1
CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

EXCITATION AND DETECTION OF SURFACE ELASTIC WAVES IN
PIEZOELECTRIC CRYSTALS, (U)

69 14P JOSHI, S. G. WHITE, R. M.

CONTRACT: DA-AROD)-J1-124-G1057
MONITOR: AROD 5718:5-E

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF THE ACOUSTICAL
SOCIETY OF AMERICA, V46 N1 (PART 1) P17-21 JUL
69.

DESCRIPTORS: (*PIEZOELECTRIC CRYSTALS, MECHANICAL
WAVES), (*MECHANICAL WAVES, EXCITATION),
PIEZOELECTRIC TRANSDUCERS, SINGLE CRYSTALS,
CADMIUM SULFIDES, QUARTZ, ELASTICITY, ELECTRIC
FIELDS, SEMICONDUCTORS, DETECTION, THESES (U)
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS (U)

THE AMPLITUDE OF THE SURFACE ELASTIC WAVE PRODUCED
BY THE APPLICATION OF AN ALTERNATING VOLTAGE TO AN
INTERDIGITAL ARRANGEMENT OF ELECTRODES ON THE SURFACE
OF A PIEZOELECTRIC MEDIUM IS DETERMINED. THE
ELECTRIC FIELD PRODUCED BY THE SURFACE ELECTRODES IS
CALCULATED SUBJECT TO THE ASSUMPTION THAT THE
PIEZOELECTRIC COUPLING OF THE MATERIAL CAN BE
NEGLECTED. THIS ELECTRIC FIELD ACTS AS THE FORCING
TERM FOR THE INHOMOGENEOUS ELASTIC EQUATION, WHICH IS
THEN SOLVED TO OBTAIN THE AMPLITUDE OF THE SURFACE
WAVE GENERATED BY THE TRANSDUCER. A RECIPROCAL
RELATIONSHIP BETWEEN THE EXCITATION AND DETECTION
PROBLEMS IS USED TO OBTAIN THE POWER EXTRACTED FROM
THE SURFACE WAVE BY AN INTERDIGITAL ARRANGEMENT OF
SURFACE ELECTRODES. MEASUREMENTS MADE ON SINGLE
CRYSTALS OF QUARTZ AND CADMIUM SULFIDE ARE FOUND TO
BE IN GOOD AGREEMENT WITH THEORETICAL PREDICTIONS.
THE MAXIMUM VALUE OF THE PRODUCT (EFFICIENCY X
FRACTIONAL BANDWIDTH) FOR A SURFACE-WAVE TRANSDUCER
IS CALCULATED. FOR AN INTERDIGITAL SURFACE-WAVE
TRANSDUCER ON THE BASAL PLANE OF CDS, THE MAXIMUM
VALUE OF THIS PRODUCT IS FOUND TO BE 0.078. IT IS
SHOWN THAT ONE CAN CONNECT LINEAR PAIRS OF SURFACE
ELECTRODES IN AN APPROPRIATE BINARY CODE SO AS TO
OBTAIN HIGH EFFICIENCY AND LARGE BANDWIDTH
TRANSDUCERS. (AUTHOR) (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-698 341 20/12
HUGHES AIRCRAFT CO CULVER CITY CALIF ELECTRONIC PROPERTIES
INFORMATION CENTER

II-VI SEMICONDUCTING COMPOUNDS DATA TABLES, (U)

OCT 69 166P NEUBERGER, META I
REPT. NO. EPIC-S-11
CONTRACT: F33615-68-C-1225
PROJ: AF7381, AF-8975
TASK: 738103, 897503

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, PHYSICAL
PROPERTIES), ELECTRICAL PROPERTIES, MAGNETIC
PROPERTIES, MECHANICAL PROPERTIES, OPTICAL
PROPERTIES, THERMAL PROPERTIES, CRYSTAL STRUCTURE,
BARIUM COMPOUNDS, BERYLLIUM COMPOUNDS, CADMIUM
COMPOUNDS, CALCIUM COMPOUNDS, MAGNESIUM COMPOUNDS,
MERCURY COMPOUNDS, STRONTIUM COMPOUNDS, ZINC
COMPOUNDS, OXIDES, SELENIDES, SULFIDES,
TELLURIDES, TABLES (U)

THE TABLES INCLUDE THE MOST RELIABLE INFORMATION
AVAILABLE TO DATE FOR THE MECHANICAL,
CRYSTALLOGRAPHIC, PHYSICAL, THERMAL, MAGNETIC,
ELECTRONIC AND OPTICAL PROPERTIES OF EACH OF THE 2-6
BINARY SEMICONDUCTING COMPOUNDS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-699 721 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

TRAP-CONTROLLED FIELD INSTABILITIES IN
PHOTOCONDUCTING CDS CAUSED BY FIELD-QUENCHING,

(U)

APR 69 8P BOEHR, K. W. ;

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN IBM JNL. OF RESEARCH AND
DEVELOPMENT, V13 NS P573-579 SEP 69.

SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF
NAVAL RESEARCH.

DESCRIPTORS: (CADMIUM SULFIDES, ELECTRICAL
CONDUCTANCE), CARRIERS (SEMICONDUCTORS),
ELECTRIC FIELDS, ELECTRON DENSITY,
PHOTOCONDUCTIVITY

(U)

IDENTIFIERS: HIGH FIELD DOMAINS, NEGATIVE
DIFFERENTIAL CONDUCTIVITY, SEMICONDUCTOR TRAPS

(U)

THE FORMATION OF STATIONARY HIGH-FIELD DOMAINS
ADJACENT TO CATHODE OR ANODE, DEPENDENT ON THE
CONTACT POTENTIAL OF THE ELECTRODES, THEIR WIDENING
WITH INCREASED APPLIED VOLTAGE AND THEIR TRANSITION
INTO TWO TYPES OF MOVING DOMAINS ARE DISCUSSED.
DOMAINS WHICH MOVE UNDER DEFORMATION OF THE DOMAIN
PROFILE AND USUALLY DISSOLVE BEFORE THEY REACH THE
ANODE, AND NEARLY UNDEFORMED MOVING DOMAINS ARE
DESCRIBED. THE STRUCTURE AND KINETICS OF THESE
DOMAINS ARE DIRECTLY OBSERVED USING THE FRANZ-
KELDYSH EFFECT AND PHOTOGRAPHS OF TYPICAL DOMAIN
FORMS ARE PRESENTED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 269 20/12
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

PHOTOLUMINESCENT PROPERTIES OF VACUUM DEPOSITED
CADMIUM SULFIDE FILMS. (U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,
JAN 70 1592 BLEHA, WILLIAM PAUL, JR
REPT. NO. R-454
CONTRACT: DAAB07-67-C-0199, DAAKU2-67-C-0546

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTING FILMS, VAPOR
PLATING), (*CADMIUM SULFIDES, LUMINESCENCE),
PHOTOSENSITIVITY, RESISTANCE (ELECTRICAL), HALL
EFFECT, PHOTOCONDUCTIVITY, VACUUM APPARATUS,
PHONONS, CRYOGENICS, THESES (U)
IDENTIFIERS: *PHOTOLUMINESCENCE (U)

GREEN AND BLUE PHOTOLUMINESCENCE HAS BEEN OBSERVED
BELOW 100 DEGREES K IN VACUUM DEPOSITED, LOW
RESISTIVITY CDS FILMS GIVEN NO POST DEPOSITION
TREATMENT. THE FILMS WERE DEPOSITED IN A HEATED
CHAMBER INSIDE THE BELL JAR ON FUSED QUARTZ
SUBSTRATES HELD AT TEMPERATURES FROM 140-180 DEGREES
C. THE BACKGROUND PRESSURE IN THE VACUUM SYSTEM
WAS 0.000 001 TORR. THE EVAPORANT USED WAS
CHLORINE-DOPED CDS POWDER. THE CHLORINE DOPING
ACTIVATED THE LUMINESCENCE AND GAVE FILMS THAT HAD
RESISTIVITIES AT 300 DEGREES K IN THE RANGE OF FROM
1 TO 100 OHM-CM PARALLEL TO THE SUBSTRATE. THE
GREEN LUMINESCENCE IN THE FILMS AT 77 DEGREES K WAS
SIMILAR TO THE EMISSION REPORTED FOR DONOR-DOPED
CDS. THE GREEN EMISSION SPECTRA OBSERVED AT 10
DEGREES K BECAME BETTER RESOLVED THAN AT 77 DEGREES
K, AND THE PEAK POSITION SHIFT WITH TEMPERATURE WAS
SMALL. THE BLUE EMISSION PEAK OBSERVED IN THE
FILMS WAS AT 4892 A AT 77 DEGREES K, WHICH IS IN
THE FUNDAMENTAL ABSORPTION EDGE. SOME OF THE
LITERATURE RELATING TO THE THEORY AND PRACTICE OF
CDS VACUUM DEPOSITION IS REVIEWED. ALSO A
SUMMARY OF THE PROPERTIES OF THE GREEN LUMINESCENCE
OF PURE AND DONOR-DOPED CDS IS GIVEN.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 500 10/2 22/2
DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA

SOLAR CELLS AND SOLAR PANELS. VOLUME 1. (U)

DESCRIPTIVE NOTE: REPORT BIBLIOGRAPHY, JAN 58-OCT 69.
JAN 70 111P
REPT. NO. DDC-TAS-69-74-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-866 200, AND
VOLUME 3, AD-866 201.

DESCRIPTORS: (*SOLAR CELLS, *BIBLIOGRAPHIES),
(*SOLAR PANELS, *BIBLIOGRAPHIES), PHOTOELECTRIC
CELLS(SEMICONDUCTOR), ELECTRIC POWER PRODUCTION,
EXTENDABLE STRUCTURES, SPACECRAFT COMPONENTS,
SILICON, GALLIUM ARSENIDES, CADMIUM SULFIDES,
OPTICAL COATINGS, RADIATION DAMAGE, MANUFACTURING
METHODS, SEMICONDUCTING FILMS,
RELIABILITY(ELECTRONICS), SOLAR RADIATION,
POSITIONING DEVICES(MACHINERY), CRYSTAL
STRUCTURE, FLIGHT TESTING (U)
IDENTIFIERS: THIN FILMS (U)

AN ANNOTATED BIBLIOGRAPHY IS PROVIDED OF DOCUMENTS
IN WHICH PERFORMANCE CHARACTERISTICS OF VARIOUS SOLAR
CELLS, PARTICULARLY TYPES CONTAINING GALLIUM
ARSENIDES, SILICON, OR CADMIUM SULFIDES, ARE
EVALUATED. OTHER REPORTS INCLUDE SOLAR-CELL
FABRICATION, DEVELOPMENT OF SOLAR-CELL POWER SYSTEMS
GENERATING HIGHER ELECTRICAL POWER LEVELS, IN-FLIGHT
SOLAR-CELL DEGRADATION STUDIES, AND SYSTEMS FOR
ORIENTING SOLAR PANELS CONTINUOUSLY TOWARD THE SUN.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 554 1472 1173
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

DISPERSIVE AND NONDISPERSIVE X-RAY FLUORESCENCE
METHODS FOR THE MEASUREMENT OF THE THICKNESSES OF
FILMS OF CADMIUM SULFIDE AND OTHER II-VI
COMPOUNDS. (U)

DEC 69 31P CHAN, FRANK L. I
REPT. NO. ARL-69-0226
PROJ: AF-7023
TASK: 702300

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN DEVELOPMENTS IN APPLIED
SPECTROSCOPY, V/A PJ-30 1969.

DESCRIPTORS: (*SEMICONDUCTING FILMS, THICKNESS),
(*CADMIUM SULFIDES, SEMICONDUCTING FILMS),
SEMICONDUCTORS, X-RAY SPECTROSCOPY, MEASUREMENT,
CADMIUM SULFIDES, CADMIUM SELENIDES (U)
IDENTIFIERS: *GROUP 2B-6A COMPOUNDS, *X-RAY
FLUORESCENCE ANALYSIS (U)

CADMIUM SULFIDE AND OTHER II-VI COMPOUNDS HAVE
BEEN DEPOSITED ON VARIOUS SUBSTRATES BY THE VACUUM
TECHNIQUE USING A SET UP CONSISTING OF A MECHANICAL
PUMP AND A DIFFUSION PUMP. ATTEMPTS ARE BEING MADE
TO EMPLOY A HIGH-SPEED TURBOMOLECULAR PUMP TO PRODUCE
THE NECESSARY VACUUM. SUCH PUMPS HAVE BEEN CLAIMED
TO PRODUCE HIGHER VACUUM THAN THOSE OF EARLIER TYPES.
THE USE OF X-RAY FLUORESCENCE SEEMS TO BE THE BEST
METHOD FOR THE DETERMINATION OF THICKNESSES OF FILMS
OF THESE COMPOUNDS. BY USING THIS METHOD THE
DETERMINATION CAN BE CARRIED OUT BOTH RAPIDLY AND
NONDESTRUCTIVELY, SO THAT THE SAMPLES CAN BE USED FOR
FURTHER EXPERIMENTATION OR PRESERVED FOR FUTURE
REFERENCE. BOTH THE VACUUM AND AIRPATH
SPECTROMETERS WERE EMPLOYED WITH THE DISPERSIVE
(CONVENTIONAL) X-RAY FLUORESCENCE METHOD,
DEPENDING ON THE X-RAY SPECTRA USED AND THE FILM
THICKNESS TO BE DETERMINED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 555 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

EMISSION FROM EXCITED TERMINAL STATES OF BOUND
EXCITON COMPLEXES, (U)

JUN 69 8P REYNOLDS, D. C. COLLINS, T.
C. I
REPT. NO. ARL-69-0221
PROJ: AF-7485

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ZEITSCHRIFT FUER
NATURFORSCHUNG, V24A N9 P1311-1316 1969.

DESCRIPTORS: (*LUMINESCENCE, *EXCITONS),
(*SEMICONDUCTORS, EXCITONS), CRYSTAL LATTICE
DEFECTS, GERMANIUM COMPOUNDS, IMPURITIES,
EXCITATION, MAGNETIC FIELDS, CADMIUM SULFIDES (U)
IDENTIFIERS: *GROUP 2A-6A COMPOUNDS, EMISSION
SPECTRA (U)

EMISSION FROM THE EXCITED TERMINAL STATES OF BOUND
EXCITON-DONOR COMPLEXES HAS BEEN OBSERVED IN SEVERAL
II-VI COMPOUNDS. STUDYING THESE OPTICAL
TRANSITIONS ALLOWS ONE TO DETERMINE THE DONOR
IONIZATION ENERGIES, THE ELECTRON EFFECTIVE MASSES AS
WELL AS THE ELECTRON G-VALUES IN THESE MATERIALS.
A GOOD THEORETICAL FIT TO THE EXPERIMENTAL DATA WAS
OBTAINED, USING THE EFFECTIVE MASS APPROXIMATION.
EMISSION FROM THE EXCITED TERMINAL STATES OF BOUND
EXCITON-ACCEPTOR COMPLEXES HAS NOT YET BEEN OBSERVED
IN THESE MATERIALS. THERE IS NO BASIC REASON WHY
SUCH TRANSITIONS SHOULD NOT OCCUR. STUDYING
TRANSITIONS OF THIS TYPE WOULD ALLOW ONE TO OBTAIN
FUNDAMENTAL INFORMATION CONCERNING THE ACCEPTOR
IMPURITIES IN THESE MATERIALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-700 891 9/1 17/7 17/9 20/2

20/12

THOMSON-CSF PARIS (FRANCE)

REVUE TECHNIQUE THOMSON-CSF. VOLUME 1, NUMERO
3.

(U)

SEP 69 169P DELAGEBEAUDEUF, D. IDIAMAND,
F. MOULIN, M. WENDI, G. ITIEN, TRAN DUC I

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN REVUE TECHNIQUE THOMSON
CSF, V1 N3 P309-480 SEP 69. NO COPIES FURNISHED.

DESCRIPTORS: (*AVALANCHE DIODES, SIGNALS),
(*SEMICONDUCTING FILMS, ULTRASONIC RADIATION),
(*CADMIUM SULFIDES, CRYSTAL GROWTH), (*IMAGE
TUBES, *FIBER OPTICS), (*ION ACCELERATORS,
OPERATION), (*RADAR ECHO AREAS, DETECTION),
(*NAVIGATION SATELLITES, *NAVIGATIONAL AIDS),
FRANCE

(U)

IDENTIFIERS: TRAVELING WAVES, CHEMICAL VAPOR
DEPOSITION, HOLOGRAPHY

(U)

CONTENTS: ANALYSIS OF LARGE-SIGNAL OPERATION OF
AVALANCHE DIODES IN THE TRANSIT MODE; THEORY OF THE
TRAVELLING WAVE AMPLIFICATION IN A SEMICONDUCTOR FILM
COUPLED TO AN ELECTROMAGNETIC DELAY LINE; STUDY OF
THE GROWTH OF CADMIUM SULFIDE MONOCRYSTALS;
PROBLEMS APPEARING AT MEASUREMENTS OF THE
MODULATION TRANSFER FUNCTION OF OPTIC FIBERS FOR
ELECTRONIC TUBES AND DETERMINATION OF SAID FUNCTION
BY THE EDGE METHOD; AN APPROACH TO THE CALCULATION
OF BEAM LOADING IN AN ACCELERATING STRUCTURE
OPERATING UNDER STEADY-STATE AND TRANSIENT
CONDITIONS; AUTOMATIC DETECTOR OF RADAR ECHOES WITH
A CONSTANT FALSE ALARM RATIO; AND DIOMEDE, OPTICAL
CORRELATOR SYSTEM FOR QUICK DISTANCE MEASUREMENT. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-701 043 20/12
DAYTON UNIV OHIO DEPT OF PHYSICS

LATTICE DYNAMICS OF CdS . I. NEAREST NEIGHBOR
APPROXIMATION, (U)

NOV 69 SUP FRANK, EUGENE N. I
CONTRACT: F33615-67-C-1027
PROJ: AF-7885
TASK: 788500
MONITOR: ARL 69-0184

UNCLASSIFIED REPORT

DESCRIPTORS: (*CADMIUM SULFIDES, *BRILLOUIN
ZONES), CRYSTAL LATTICES, MATRIX ALGEBRA,
SEMICONDUCTORS, PHONONS (U)
IDENTIFIERS: *LATTICE VIBRATIONS (U)

THE REPORT PRESENTS THE FIRST PART OF A STUDY ON
THE LATTICE DYNAMICS OF CdS AND ASSUMES ONLY
NEAREST-NEIGHBOR INTERACTION BETWEEN THE IONS. THE
STRUCTURE OF CADMIUM SULFIDE IN ITS WURTZITE FORM IS
DISCUSSED. A SHORT DISCUSSION OF THE FIRST
BRILLOUIN ZONE OF THE CRYSTAL IS GIVEN. THE
EQUATIONS OF MOTION OF THE LATTICE ARE DERIVED
ASSUMING A ONE PARAMETER NEAREST NEIGHBOR TYPE OF
POTENTIAL. THE USUAL FORM FOR DISPLACEMENTS IN A
PERIODIC POTENTIAL IS ASSUMED. AS THERE ARE FOUR
ATOMS IN THE BASIS, THERE ARE FOUR INDEPENDENT VECTOR
DISPLACEMENTS INVOLVED. THE DYNAMICAL MATRIX
OBTAINED IS DIAGONALIZED YIELDING THE EIGENVALUES AND
EIGENVECTORS OF THE MATRIX. THE EIGENVALUES ARE
THE NORMAL MODE FREQUENCIES SQUARED OF THE PHONONS.
THE EIGENVECTORS ARE CLOSELY RELATED TO THE NORMAL
MODES OF THE LATTICE. THIS RELATIONSHIP IS
DEMONSTRATED EXPLICITLY FOR THE WAVE VECTORS AT THE
GAMMA POINT OF THE BRILLOUIN ZONE. DISPERSION
CURVES ARE GIVEN INDICATING THE PHONON ENERGIES
PREDICTED BY THIS MODEL FOR FOURTEEN SYMMETRY POINTS
OF THE BRILLOUIN ZONE. IT IS FOUND THAT THIS
MODEL GIVES ONLY QUALITATIVE AGREEMENT WITH
EXPERIMENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-702 U95 20/12 20/3 10/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON THE MECHANISM OF THE PHOTOVOLTAIC EFFECT
IN HIGH EFFICIENCY CDS THIN-FILM SOLAR
CELLS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 66-31
MAY 69;

OCT 69 217P SHIOZAWA, L. R. (AUGUSTINE,
F. SULLIVAN, G. A. SMITH, J. M., III. I
COOK, R., JR)

CONTRACT: AF 33(615)-5224
PROJ: AF-7885, CLEVITE-3U3J3U
MONITOR: ARL 69-U155

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS,
PERFORMANCE(ENGINEERING)), (*SEMICONDUCTING
FILMS, BAND THEORY OF SOLIDS), CADMIUM SULFIDES,
COPPER COMPOUNDS, SULFIDES, PHOTOCONDUCTIVITY,
EPITAXIAL GROWTH, SINGLE CRYSTALS, PHASE STUDIES,
MICROSTRUCTURE (U)
IDENTIFIERS: *PHOTOVOLTAIC EFFECT, COPPER
SULFIDES, HETEROJUNCTIONS (U)

THREE YEARS OF RESEARCH ON THE OPERATING MECHANISMS
OF THE CDS THIN-FILM SOLAR CELL ARE DESCRIBED IN
THIS REPORT. THE ESSENTIAL INFORMATION CONTAINED
IN ALL REPORTS PREVIOUSLY ISSUED UNDER THIS CONTRACT
HAS BEEN REASSEMBLED. NEW INFORMATION, NOT
PREVIOUSLY REPORTED INCLUDE DATA ON THE
ANTIMONOCROMATIC SPECTRAL RESPONSE OF DIFFERENT
TYPES OF CELLS, MEASUREMENTS OF THE THRESHOLD VOLTAGE
FOR ELECTROLYTIC DEPOSITION OF COPPER FROM CU₂S,
OBSERVATIONS ON THE FORMATION OF COPPER WHISKERS ON
CU₂S BY HEATING, X-RAY CRYSTALLOGRAPHIC DATA ON
LOW-TEMPERATURE PHASE TRANSFORMATIONS OF CUPROUS
SULFIDE, MEASUREMENTS OF OPTICAL TRANSMISSION OF
CU-SATURATED CDS SINGLE CRYSTALS, DATA ON THE
PHOTOCONDUCTIVE RISE AND DECAY TIMES OF CU-
COMPENSATED CDS, DISCUSSION OF THE BENEFICIAL
ROLE OF OXYGEN IN PROMOTING THE PHOTOVOLTAIC EFFECT
DURING CELL FABRICATION, AND THE SUBSEQUENT DEGRADING
EFFECTS OF OXYGEN DURING HIGH TEMPERATURE EXPOSURE.
(AUTHOR) (U)

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-702 778 2U/12
HUGHES RESEARCH LABS MALIBU CALIF

SELECTIVE DOPING FOR PIEZOELECTRIC CRYSTALS BY ION
IMPLANTATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 2, 1 JUL-31 DEC
69.

DEC 69 19P SHIFRIN, G. A. ; JAMBA, D.
M. ; JONES, W. R. ; MARSH, O. J. ; WAUK, M.
T. ;

CONTRACT: N00014-69-C-0171
PROJ: NR-251-001, WR008-U3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO SEMI-ANNUAL REPT. NO. 1,
AD-693 154.

DESCRIPTORS: (*PIEZOELECTRIC CRYSTALS; ION
BOMBARDMENT), (*SEMICONDUCTORS, DOPING),
CADMIUM SULFIDES, GALLIUM ARSENIDES, ZINC
COMPOUNDS, OXIDES, PIEZOELECTRIC TRANSDUCERS,
ULTRASONIC RADIATION (U)
IDENTIFIERS: *ION IMPLANTATION, PIEZOELECTRIC
SEMICONDUCTORS, ZINC OXIDES (U)

THE FEASIBILITY OF CREATING N-TYPE CONDUCTING
REGIONS IN PIEZOELECTRIC CRYSTALS BY ION IMPLANTATION
IS BEING INVESTIGATED. EXPERIMENTAL STUDIES HAVE
BEEN PERFORMED WITH CRYSTALS OF CDS, ZNO, AND
GAAS AND DOPANT IONS OF H, B, F, AL,
CL, AND GA. TO DATE, ZNO, CDS, AND
GAAS HAVE BEEN DOPED BY ION IMPLANTATION. THE
ZNO WORK IS BEING EXTENDED TO INCLUDE HIGH
RESISTIVITY LI-DOPED MATERIAL. SEMI-INSULATING
GAAS WAS DOPED P-TYPE BY CD(+) IMPLANTATION;
S(+) IMPLANTATION WILL BE USED TO PRODUCE THE
DESIRED N-TYPE CONDUCTION. ACOUSTIC WAVE
PROPAGATION AND TRANSDUCER INTERACTION CALCULATIONS
ARE REPORTED FOR BOTH ZNO AND GAAS.
PRELIMINARY CALCULATIONS FOR THE MONOLITHIC
AMPLIFIER CONCEPT IN GAAS ARE REPORTED. A
COMPUTER PROGRAM HAS BEEN DEVELOPED WHICH CALCULATES
THE ATTENUATION IN THE AMPLIFICATION FOR PARALLEL
ACOUSTIC PROPAGATION AND APPLIED ELECTRIC FIELD.
PRELIMINARY RESULTS FOR ACOUSTIC MONOLITHIC
AMPLIFIER OPERATION CHARACTERISTICS ARE REPORTED FOR
BOTH ZNO AND GAAS; LARGE GAINS RESULT FOR
ZNO. (AUTHOR) (U)

317

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-705 725 20/1 20/12
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF
ELECTRONICS

A. ULTRASONIC DISPERSION IN PIEZOELECTRIC SEMI-
CONDUCTORS. B. NONLINEAR SOUND TRANSMISSION
THROUGH AN ORIFICE. (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 97,
70 IUP KRISCHER, CHARLES ; INGARD, UNO

CONTRACT: N00014-67-A-0204-0019

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL ACOUSTICS, P29-
35, 15 APR 70.

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY PROGRESS REPT.
NO. 96, AD-701 215.

DESCRIPTORS: (*SEMICONDUCTORS, PIEZOELECTRIC
EFFECT); (*CADMIUM SULFIDES, ULTRASONIC
RADIATION); (*SOUND TRANSMISSION, FLOW
SEPARATION); MATHEMATICAL ANALYSIS, ORIFICES (U)
IDENTIFIERS: *PIEZOELECTRIC SEMICONDUCTORS, PHASE
VELOCITY (U)

A. IT IS SHOWN THAT THE ULTRASONIC VELOCITY IN
SEMICONDUCTING CDS, IN THE PRESENCE OF AN
ELECTRIC DRIFT FIELD, CAN EXCEED THE
PIEZOELECTRICALLY STIFFENED VALUE FOR THE INSULATING
MATERIAL, IF THE ELECTRON-TRAPPING RELAXATION TIME IS
NONZERO. B. WHEN SOUND OF SUFFICIENTLY HIGH
AMPLITUDE IS TRANSMITTED THROUGH A SHARP-EDGED
ORIFICE IN A PLATE, FLOW SEPARATION WILL OCCUR, AND
THE VELOCITY OF THE OSCILLATORY FLOW THROUGH THE
ORIFICE IS NO LONGER LINEARLY RELATED TO THE INCIDENT
SOUND PRESSURE. AS A RESULT, THE TRANSMITTED SOUND
WILL BE DISTORTED SO THAT ITS FREQUENCY SPECTRUM WILL
BE DIFFERENT FROM THAT OF THE INCIDENT SOUND. THIS
EFFECT HAS BEEN STUDIED EXPERIMENTALLY FOR THE CASE
IN WHICH THE INCIDENT SOUND IS A PURE TONE. IN
THIS EXPERIMENT THE ORIFICE PLATE WAS SET ACROSS A
DUCT THAT WAS TERMINATED BY A 100% ABSORBER.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 097 20/12
COLORADO UNIV BLUDDER PHOTOCONDUCTIVE SEMICONDUCTORS AND
DEVICES LAB

SYNTHESIS AND CHARACTERIZATION OF THIN FERROELECTRIC
AND SEMICONDUCTING FILMS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 OCT 66-30
SEP 69;

APR 70 143P CHERNOW, FRED I
CONTRACT: F33615-67-C-1050
PROJ: AF-7371
TASK: 7371U2
MONITOR: AFML TR-70-9

UNCLASSIFIED REPORT

DESCRIPTORS: (*FERROELECTRIC MATERIALS,
SYNTHESIS(CHEMISTRY)), (*SEMICONDUCTING FILMS,
SYNTHESIS(CHEMISTRY)), (*CADMIUM SULFIDES,
DOPING), ION BOMBARDMENT, HALL EFFECT,
LUMINESCENCE, SINGLE CRYSTALS, BISMUTH COMPOUNDS,
TITANIUM COMPOUNDS, DIOXIDES, CRYOGENICS, FILMS (U)
IDENTIFIERS: *ION IMPLANTATION, THIN FILMS,
*TITANIUM OXIDES, INJECTION LUMINESCENCE,
SEMICONDUCTOR JUNCTIONS (U)

THE RESULTS OF A SERIES OF ELECTRICAL MEASUREMENTS
ON THIN TiO₂ FILMS ARE DESCRIBED HEREIN. SUCH
FILMS CONSISTENTLY SHOW A NEGATIVE RESISTANCE EFFECT
WHEN NOBLE METAL ELECTRODES ARE PLACED IN CONTACT
WITH THEM. THE MAJOR PORTION OF THIS TECHNICAL
REPORT IS CONCERNED WITH ION IMPLANTATION OF SINGLE
CRYSTAL CADMIUM SULFIDE. THE EXPERIMENTAL PROGRAM
STUDIED THE EFFECTS OF GROUP V IMPLANTS. IT WAS
FOUND THAT BISMUTH IMPLANTATIONS TYPE CONVERTED
CDS FROM ITS NATURAL N-TYPE STATE. P-N
JUNCTIONS WERE CONSTRUCTED AND ROOM TEMPERATURE LIGHT
EMISSION WAS OBSERVED IN THE FORWARD BIASED MODE.
SOME OF THE ASPECTS OF LOW ENERGY ION IMPLANTATION
(25-50 KEV) WERE INVESTIGATED SUCH AS PENETRATION
DEPTH AND DAMAGE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 455 2U/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

INFLUENCE OF BOUNDARY CONDITIONS ON HIGH-FIELD
DOMAINS IN GUNN DIODES, (U)

MAY 69 8P BOER, K. W. DOEHLER, G. I

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN THE PHYSICAL REVIEW,
V186 N3 P793-800, 15 OCT 69.
SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF
NAVAL RESEARCH, WASHINGTON, D. C.

DESCRIPTORS: (*MICROWAVE OSCILLATORS,
*DIODES(SEMICONDUCTOR)),
(*CARRIERS(SEMICONDUCTORS), MOBILITY),
ELECTRICAL CONDUCTANCE, NEGATIVE RESISTANCE
CIRCUITS, CADMIUM SULFIDES (U)
IDENTIFIERS: *GUNN DIODES, *HIGH FIELD DOMAINS,
NEGATIVE DIFFERENTIAL CONDUCTIVITY (U)

USING THE METHOD OF THE FIELD OF DIRECTIONS, THE
INFLUENCE OF THE BOUNDARY CONDITIONS ON STATIONARY
AND MOVING HIGH-FIELD DOMAINS IN GUNN DIODES IS
ANALYZED AND DISCUSSED. A CRITERION FOR SELF-
INDUCED INSTABILITIES, ESPECIALLY THE GUNN
OSCILLATIONS, IS GIVEN. IT IS SHOWN THAT STATIONARY
DOMAINS MUST OCCUR PRECEDING THE GUNN OSCILLATIONS,
AND THAT SUCH OSCILLATIONS CAN ONLY OCCUR FOR
SLIGHTLY BLOCKING CONTACTS. THE ANALYSIS GIVEN IN
THIS PAPER IS SIMILAR TO THE ONE DISCUSSED FOR FIELD-
QUENCHED CDS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 505 2U/12 14/2 9/1
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL
ENGINEERING

TIME-RESOLVED SCANNING ELECTRON MICROSCOPY AND ITS
APPLICATION TO BULK-EFFECT OSCILLATORS, (U)

FEB 69 15P MACDONALD, N. C.; ROBINSON,
G. Y.; WHITE, R. M. ;
CONTRACT: AF-AFOSR-1488-68, NSF-GK-2797
PROJ: AF-4751
MONITOR: AFOSR 70-1422TR

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,
V40 N11 P4516-4528 OCT 69.

SUPPLEMENTARY NOTE: SPONSORED IN PART BY NATIONAL
INSTITUTES OF HEALTH, GRANT PHS-GM-13756-03.

DESCRIPTORS: (*ELECTRON MICROSCOPY, TEST METHODS),
(*MICROWAVE OSCILLATORS, DIODES (SEMICONDUCTOR)),
(*SEMICONDUCTORS, ELECTRICAL CONDUCTANCE),
CADMIUM SULFIDES, GALLIUM ARSENIDES, ELECTRIC
FIELDS, PHOTOCONDUCTIVITY, MOBILITY (U)

IDENTIFIERS: *GUNN DIODES, *HIGH FIELD DOMAINS,
SCANNING ELECTRON MICROSCOPES (U)

THE APPLICATION OF THE SCANNING ELECTRON MICROSCOPE
TO THE EXAMINATION OF TIME-VARYING PHENOMENA IS
DISCUSSED. THE LIMITATIONS OF RESPONSE TIME ARE
MENTIONED, AND METHODS FOR INCREASING RESPONSE SPEED
ARE CONSIDERED. THESE INCLUDE THE USE OF
ELECTROSTATIC DEFLECTION PLATES TO CHOP THE PRIMARY
ELECTRON BEAM, THE USE OF SOLID-STATE SEMICONDUCTOR
DIODES AS ELECTRON DETECTORS, AND THE USE OF SAMPLING
AND THE STORAGE AND PROCESSING OF DATA PRIOR TO
DISPLAY. TIME-RESOLVED TECHNIQUES ARE THEN APPLIED
TO A STUDY OF THE MOTION OF DOMAINS OF HIGH ELECTRIC
FIELD IN CDS ULTRASONIC OSCILLATOR DIODES AND IN
GAS GUNN EFFECT DIODES. IN BOTH
PHOTOCONDUCTING AND SEMICONDUCTING CDS, THE
DOMAIN FORMATION AND PROPAGATION IS CORRELATED TO THE
CURRENT WAVEFORM OF THE OSCILLATOR. NONUNIFORM
DOMAIN PROPAGATION IN TWO DIMENSIONS IS EXAMINED IN A
GAS OSCILLATOR. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-706 802 20/12
MASSACHUSETTS INST OF TECH CAMBRIDGE NATIONAL MAGNET
LAB

PIEZOELECTRIC POLARON-CYCLOTRON RESONANCE IN THE
QUANTUM LIMIT IN N-CDS, (U)

JAN 70 DP BUTTON, KENNETH J. ILAX,
BENJAMIN COHN, DANIEL R. I
CONTRACT: F44620-67-C-0047
PROJ: AF-9764
TASK: 976401
MONITOR: AFOSR 70-1559TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,
V24 NB P375-378, 23 FEB 70.

DESCRIPTORS: (*SEMICONDUCTORS, PIEZOELECTRIC
CRYSTALS), (*CADMIUM SULFIDES, CYCLOTRON RESONANCE
PHENOMENA), GAS LASERS, INFRARED RADIATION,
ABSORPTION SPECTRUM, ELECTRONS, PHONONS,
CRYOGENICS (U)

IDENTIFIERS: *PIEZOELECTRIC SEMICONDUCTORS,
EFFECTIVE MASS, ELECTRON PHONON INTERACTIONS,
POLARONS (U)

THE ZERO-TEMPERATURE CYCLOTRON RESONANCE OF THE
ELECTRON SPLITS INTO TWO GROUPS AS THE TEMPERATURE IS
INCREASED. ONE GROUP MOVES RAPIDLY TOWARD VERY
SMALL MASS, THE OTHER TOWARD LARGER MASS. THIS
SPLITTING HAS NOT BEEN PREDICTED BY PREVIOUS
THEORIES. MOREOVER, THE FIRST MEMBER OF THE SMALL-
MASS GROUP CAN BE ACCOUNTED FOR ONLY QUALITATIVELY BY
THESE THEORIES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-706 819 20/12 20/6
STATE UNIV OF NEW YORK STONY BROOK DEPT OF ELECTRICAL
SCIENCES

THERMAL LENS EFFECT IN CDS. (U)

SEP 69 7P THOMAS, GARY L. ISOPORI,
BHUSHAN L. ;
CONTRACT: AF-AFOSR-1116-66
PROJ: AF-9763
TASK: 976303
MONITOR: AFOSR 70-1563TR

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,
V41 N2 P603-608 FEB 70.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 31 JUL
69.

DESCRIPTORS: (*CADMIUM SULFIDES,
PHOTOCONDUCTIVITY), (*COHERENT RADIATION,
FOCUSING), REFRACTIVE INDEX, ELECTRIC CURRENTS,
SEMICONDUCTORS, GAS LASERS, HEATING,
CRYOGENICS (U)

IN THIS PAPER A THEORY IS PRESENTED TO EXPLAIN THE
OBSERVED LENS EFFECT PRODUCED BY A PHOTOCURRENT IN
CDS. AN APPLIED DC VOLTAGE CAUSES LOCAL
HEATING DUE TO THE PRESENCE OF A LOCALIZED
PHOTOCURRENT PRODUCED BY A FOCUSED LASER BEAM. THE
LOCAL HEATING CAUSES AN INCREASE IN THE INDEX OF
REFRACTION AND HENCE FOCUSING. THE THEORY PREDICTS
THAT THE MAGNIFICATION SHOULD BE LINEAR IN THE POWER
DISSIPATED BY THE PHOTOCURRENT AND THESE PREDICTIONS
FALL VERY NEAR THE MEASURED VALUES OF MAGNIFICATION
FOR DIFFERENT VALUES OF PHOTOCONDUCTANCE, WITH NO
FITTED PARAMETERS. IN ORDER TO EXPLAIN THE
THRESHOLD EFFECT OBSERVED IN SOME CDS SAMPLES THE
CHANGE IN THE INDEX OF REFRACTION WITH TEMPERATURE OF
CDS IS MEASURED OVER A TEMPERATURE RANGE OF 20
DEGREES-350 DEGREES AND IS FOUND TO BE $dn/dT =$
 $0.00015/\text{DEGREE C. (AUTHOR)}$ (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-707 173 20/6 20/12
SIGNALS RESEARCH AND DEVELOPMENT ESTABLISHMENT
CHRISTCHURCH (ENGLAND)

ANTI-STOKES EXCITED EDGE EMISSION IN CADMIUM
SULPHIDE.

(U)

DEC 69 27P BROWN, M. R. ; COX, A. F.
J. WILLIAMS, J. M. I
REPT. NO. SRDE-70002
MONITOR: TRC BR-1861B

UNCLASSIFIED REPORT

DESCRIPTORS: (*CADMIUM SULFIDES, *LUMINESCENCE),
BAND THEORY OF SOLIDS, EXCITATION, SEMICONDUCTORS,
EXCITONS, CRYOGENICS, GREAT BRITAIN

(U)

THE REPORT PRESENTS A DETAILED STUDY OF THE
VARIATIONS IN THE STRUCTURE OF BLUE AND GREEN EDGE
EMISSIONS ON STOKES AND ANTI-STOKES EXCITATION
FOR A RANGE OF DOPED AND UNDOPED CDS SAMPLES AT
4.2 DEGREES K. THE VARIATIONS OBSERVED ARE
INTERPRETED ON A MODEL THAT LINKS THE VARIATIONS WITH
THE STATE OF IONIZATION OF THE ANTI-STOKES ACTIVE
CENTER IN THE TWO EXCITATION CONDITIONS. THE MODEL
EMPHASISES THE ROLE OF THE CENTERS CORNALLY
ASSOCIATED WITH DEEP CENTER LUMINESCENCE AS THE ONES
THAT ARE ASSOCIATED WITH THE EDGE EMISSIONS.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-707 555 20/12 20/6
CORNELL UNIV ITHACA N Y MATERIALS SCIENCE CENTER

EXCITON-EXCITON INTERACTION IN CDS, CDSE,
AND ZNO.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
FEB 70 4P MAGDE, DOUGLAS MAHR, HERBERT
;
REPT. NO. MSC-1307, TR-31
CONTRACT: NONR-401(47)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,
V24 N16 P890-893, 20 APR 70.
SUPPLEMENTARY NOTE: SPONSORED IN PART BY ADVANCED
RESEARCH PROJECTS AGENCY, WASHINGTON, D. C.

DESCRIPTORS: (*CADMIUM SULFIDES, *LUMINESCENCE),
(*CADMIUM SELENIDES, LUMINESCENCE), (*ZINC
COMPOUNDS, LUMINESCENCE), (*EXCITONS,
INTERACTIONS), SEMICONDUCTORS, OXIDES

(U)

IDENTIFIERS: *EXCITON EXCITON INTERACTIONS, *ZINC
OXIDES

(U)

AN EXTRA LUMINESCENCE BAND IS OBSERVED IN CDS,
CDSE, AND ZNO UNDER INTENSE ILLUMINATION BY
LASER LIGHT. IT IS SUGGESTED THAT THE ADDITIONAL
LUMINESCENCE ARISES FROM A PARTICULAR EXCITON-EXCITON
INTERACTION PROCESS COMMON TO THESE SEMICONDUCTING
COMPOUNDS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-707 571 2U/12
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

RESONANT RAMAN SCATTERING FROM LO PHONONS IN POLAR SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,
JUN 69 5P HAMILTON, DAVID C. I
REPT. NO. JA-3517
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-70-107

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN THE PHYSICAL REVIEW,
V188 N3 P1221-1224, 15 DEC 69.

DESCRIPTORS: (•SEMICONDUCTORS, RAMAN SPECTROSCOPY), (•PHONONS, SCATTERING), LASERS, CADMIUM SULFIDES (U)
IDENTIFIERS: LO PHONONS, ELECTRON PHONON INTERACTIONS (U)

MULTIPHONON RAMAN SCATTERING FROM LO PHONONS HAS PREVIOUSLY BEEN OBSERVED IN CDS IN THE CASE WHERE THE LASER FREQUENCY LIES NEAR THE ENERGY GAP. THE COMBINED EFFECTS OF FINITE WAVE VECTOR AND RESONANT ENERGY DENOMINATORS ARE OFFERED AS THE EXPLANATION FOR CERTAIN FEATURES OF THE SCATTERING. THESE FEATURES INCLUDE THE UNUSUAL POLARIZATION PROPERTIES OF THE SINGLE-PHONON SCATTERING AND THE UNEXPECTED SHARPNESS OF THE TWO-PHONON LINE. THE EFFECTS OF THE FROHLICH INTERACTION ARE CALCULATED IN LOWEST-ORDER PERTURBATION THEORY UNDER THE ASSUMPTION OF SPHERICAL, PARABOLIC BANDS. THE IMPORTANT PART OF THE SCATTERING AMPLITUDE IS DUE TO TERMS WHERE THE LASER IS RESONANT TO INTERBAND TRANSITIONS. SINCE THE PARAMETER GV/Ω SUB L IS OF ORDER UNITY, THE DIPOLE APPROXIMATION AS Q APPROACHES ZERO IS NOT APPLICABLE. (HERE V IS THE ELECTRON VELOCITY AT THAT POINT IN THE ZONE WHERE THE LASER CAN CAUSE REAL TRANSITIONS.) IN THE SINGLE-PHONON SCATTERING, ω IS THE DIFFERENCE BETWEEN THE WAVE VECTORS OF THE INCIDENT AND SCATTERED PHOTONS, WHILE FOR THE DOUBLE-PHONON CASE, Q IS THE WAVE VECTOR OF ONE OF THE TWO FINAL-STATE PHONONS. NO EXCITON EFFECTS ARE INCLUDED. THE TEMPERATURE IS TAKEN TO BE ZERO THROUGHOUT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-707 469 10/2 20/12
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

IMPROVEMENTS IN CDS THIN FILM SOLAR CELLS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 NOV 67-1 NOV 69.

MAK 70 82P DUNN, W. F. INASTELIN, H.

E. I

CONTRACT: F33615-68-C-1182

PROJ: AF-7885

MONITOR: ARL 70-0036

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS,
PERFORMANCE (ENGINEERING)), (*SEMICONDUCTING
FILMS, ELECTRIC TERMINALS), CADMIUM SULFIDES,
SCIENTIFIC SATELLITES, BALLOONS, WORK FUNCTIONS,
COPPER COMPOUNDS, SULFIDES (U)
IDENTIFIERS: OVI-13 SATELLITE, OVI-17 SATELLITE,
COPPER SULFIDES, ELECTRIC CONTACTS, OHMIC
CONTACTS (U)

THE REPORT IS CONCERNED WITH TWO AREAS IN THE
CADMIUM SULFIDE SOLAR CELL DEVELOPMENT PROGRAM:
(1) A PROGRAM OF FLIGHT PANEL CONSTRUCTION FOR
SATELLITE AND BALLOON TESTING OF CDS SOLAR CELLS
AND (2) A DEVELOPMENTAL EFFORT FOR IMPROVING THE
STABILITY AND EFFICIENCY OF THE CDS SOLAR CELL.
EXPERIMENTAL CDS SOLAR CELLS PANELS ARE BEING
TESTED ON THE OVI-13 AND OVI-17 SATELLITE
EXPERIMENTS. THE DEVELOPMENTAL EFFORT WAS
CONCENTRATED INTO THE FOLLOWING AREAS: (1)
CONTACT RESISTANCE MEASUREMENTS MADE ON THE CDS
CURRENT COLLECTOR GRID ADHESIVE, (2) AN
OPTIMIZATION OF THE CDS CELL FOR GOOD LOW LIGHT
LEVEL PERFORMANCE, (3) AN OPTIMIZATION OF THE
CU2S BARRIER FORMATION PROCESS AND (4) AN
INVESTIGATION OF COPPER NODULES FOUND ON CDS
CELLS THAT HAD BEEN DEGRADED IN THE OPEN CIRCUIT
VOLTAGE MODE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-708 638 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

DONOR-ACCEPTOR PAIR RECOMBINATION SPECTRA IN
CADMIUM SULFIDE CRYSTALS, (U)

JUN 69 BP REYNOLDS, D. C. COLLINS, T.
C. I

REPT. NO. ARL-70-0055
PROJ: AF-7885
TASK: 7885UD

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN THE PHYSICAL REVIEW, V188
N3 P1267-1271, 15 DEC 69.

DESCRIPTORS: (*CADMIUM SULFIDES, LINE SPECTRUM),
(*CARRIERS (SEMICONDUCTORS), RECOMBINATION
REACTIONS), SEMICONDUCTORS, ZEEMAN EFFECT,
CRYOGENICS (U)
IDENTIFIERS: CARRIER RECOMBINATION, EMISSION
SPECTRA (U)

DISCRETE DONOR-ACCEPTOR PAIR LINES CONVERGING TO
THE 5163A BROAD GREEN PEAK ARE REPORTED. THE
LINES ARE CHARACTERIZED IN ZERO MAGNETIC FIELD BY
SPIN-EXCHANGE SPLITTING WHICH DECREASES WITH
INCREASING PAIR SEPARATION. SOME OF THE LINES ALSO
SHOW ZERO-MAGNETIC-FIELD SPLITTING DUE TO CRYSTAL-
FIELD EFFECTS. ASSET OF CLOSELY SPACED LINES
CONVERGING AT 2.518 EV IS ALSO REPORTED. SET
THIS SET OF LINES CAN BE INTERPRETED AS DONOR-
ACCEPTOR PAIR LINES IN WHICH THE RECOMBINATION GOES
TO AN EXCITED STATE OF THE ACCEPTOR. A GOOD
THEORETICAL FIT TO THE ENERGY PROFILE OF THE PAIR
LINES WAS NOT ACHIEVED. THE DENSITY OF PAIR LINES
CAN BE ACCOUNTED FOR BY A SINGLE DONOR AND ACCEPTOR.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-708 818 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

TRANSITIONS BETWEEN CLASS I AND CLASS II CDS
CRYSTALS INDUCED BY HEAT-TREATMENT, OXYGEN DE/
ADSORPTION AND ELECTRON BOMBARDMENT; (U)

DEC 69 5P WRIGHT, C. BOEER, K. W. I
CONTRACT: NONR-4336(UD)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICA STATUS SOLIDI, V28
PK51-K55 1970.
SUPPLEMENTARY NOTE: SPONSORED IN PART BY JET
PROPULSION LAB., PASADENA, CALIF.

DESCRIPTORS: (*SEMICONDUCTORS, PHOTOCONDUCTIVITY),
(*CADMIUM SULFIDES, PHASE STUDIES), HEAT
TREATMENT, ELECTRON BOMBARDMENT, OXYGEN,
ADSORPTION, CRYSTAL LATTICE DEFECTS (U)
IDENTIFIERS: OXYGEN DESORPTION, DESORPTION (U)

IT IS KNOWN THAT OXYGEN DESORPTION CAN CAUSE THE
PHOTOCONDUCTANCE OF CDS TO CHANGE MARKEDLY.
RECENTLY IT WAS SHOWN DIRECTLY BY A MASS-
SPECTROGRAPHIC ANALYSIS THAT OXYGEN DESORPTION IN
ULTRA-HIGH VACUUM AT TEMPERATURES BETWEEN 100 AND
300C RESULTS IN AN INCREASE OF THE PHOTOCONDUCTANCE
BY FOUR TO SEVEN ORDERS OF MAGNITUDE FOR UNDOPED
CLASS I CDS SINGLE CRYSTAL PLATELETS. IT WAS
SUGGESTED THAT A THIN LAYER WITH A HIGH DENSITY OF
DONORS (PRESUMABLY CD SURPLUS) IS RESPONSIBLE
FOR THE GREATLY ENHANCED PHOTSENSITIVITY NEAR THE
CRYSTAL SURFACE IN CLASS I CRYSTALS, AND THAT
ABSORBED OXYGEN PARTLY COMPENSATES THIS ACCUMULATION
LAYER. WITH DESORBED OXYGEN THE ACCUMULATION LAYER
BECOMES FULLY ACTIVE AND THE PHOTOCONDUCTANCE
THEREFORE INCREASES. AT ELEVATED TEMPERATURES THE
CD SURPLUS DIFFUSES INTO THE CRYSTAL BULK AND
CAUSES THERE SENSITIZATION. IT IS THE PURPOSE OF
THIS SHORT NOTE TO GIVE FURTHER SUBSTANCE TO THIS
MODEL BY PRESENTING A SERIES OF SPECTRAL DISTRIBUTION
CURVES OF THE PHOTOCURRENT AFTER CERTAIN TREATMENTS
IN ULTRA-HIGH VACUUM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-709 779 20/6 20/5
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD
MASS

PULSE STRETCHING UTILIZING TWO-PHOTON-INDUCED
LIGHT ABSORPTION.

(U)

NOV 69 5P HORDVIK, A. I
MONITOR: AFCRL 70-0416

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN IEEE JNL. OF QUANTUM
ELECTRONICS, VQE-6 N4 P199-203 APR 70.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 15 AUG
69.

DESCRIPTORS: (*LASERS, *LIGHT PULSES), CADMIUM
SULFIDES, SEMICONDUCTORS, FLUORESCENCE

(U)

IDENTIFIERS: *TWO PHOTON ABSORPTION, Q SWITCHED
LASERS, RUBY LASERS

(U)

THE EFFECT OF INSETTING AN ELEMENT EXHIBITING
INDUCED ABSORPTION INTO A Q-SWITCHED LASER CAVITY
IS INVESTIGATED THEORETICALLY AND EXPERIMENTALLY.
THE RATE EQUATIONS ARE SOLVED ASSUMING TWO TYPES OF
NONLINEAR LOSS, ONE BEING PROPORTIONAL TO THE SQUARE
OF THE LASER INTENSITY AND THE OTHER BEING
PROPORTIONAL TO THE PRODUCT OF LASER INTENSITY AND
DENSITY OF EXCITED ELECTRONS IN THE NONLINEAR
ABSORBER. EXPERIMENTS ARE PERFORMED WITH A
ROTATING-PRISM RUBY LASER WITH A CDS CRYSTAL IN
ITS CAVITY. IT IS ESTABLISHED THAT TWO-PHOTON
ABSORPTION TAKES PLACE, AND AS PREDICTED BY THE
THEORY THAT THE OUTPUT INTENSITY AND OUTPUT ENERGY
BOTH DECREASE AND PULSE LENGTH INCREASES AS COMPARED
WITH THE NORMAL Q-SWITCHED CASE. IN ADDITION, THE
OUTPUT PULSE HAS AN OSCILLATORY BEHAVIOR, AND IT IS
SUGGESTED THAT THIS IS CAUSED BY LOSS DUE TO THE
EXCITED ELECTRONS, WHICH ARE FOUND TO HAVE A LIFETIME
OF APPROXIMATELY 24 NS. (AUTHOR)

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-709 890 20/2 20/12
EAGLE-PICHER INDUSTRIES INC MIAMI OKLA MIAMI RESEARCH
LABS

RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH
OF II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 MAY 68-30
APR 70,

JUN 70 133P FAHRIG, RICHARD H. IWEBB,
GEORGE N. PORTER, CLIFFORD N. I
CONTRACT: F33615-67-C-1575
PROJ: AF-7885
MONITOR: ARL 7U-0106

UNCLASSIFIED REPORT

DESCRIPTORS: (*ZINC COMPOUNDS, CRYSTAL GROWTH),
(*CADMIUM COMPOUNDS, CRYSTAL GROWTH),
(*SEMICONDUCTORS, *CRYSTAL GROWTH), CADMIUM
SULFIDES, OXIDES, SULFIDES, SELENIDES,
TELLURIDES, ZINC SULFIDES, CHEMICAL ANALYSIS,
IMPURITIES, HIGH-PRESSURE RESEARCH (U)
IDENTIFIERS: *GROUP 2B-6A COMPOUNDS,
*HYDROTHERMAL CRYSTAL GROWTH (U)

THE PURIFICATION, BY MULTIPLE TREATMENT STEPS, OF
CADMIUM METAL AND ELEMENTAL SULFUR IS DESCRIBED.
IMPURITIES IN CADMIUM, AS DETERMINED BY EMISSION
SPECTROGRAPHIC AND ATOMIC ABSORPTION ANALYSES AND
IMPURITIES IN SULFUR DETERMINED BY MASS
SPECTROGRAPHIC ANALYSES ARE GIVEN. THE PREPARATION
OF VARIOUS PURE SEMICONDUCTOR MATERIALS OF THE
GROUP II-VI COMPOUND TYPE IS DISCUSSED AND
TABLES OF ANALYTICAL DATA FOR EACH ARE INCLUDED.
THE LEVEL OF IMPURITY CONCENTRATION IN SYNTHESIZED
CADMIUM SULFIDE WAS SIGNIFICANTLY LOWERED. THE
GROWTH OF CRYSTALS OF PURE II-VI COMPOUNDS AND
MIXTURES OF COMPOUNDS FROM THE MELT IN THE PRESSURE
FURNACES IS REPORTED. INCLUDED ARE DATA CONCERNING
DOPING OF MELT GROWN CRYSTALS WITH VARIOUS ELEMENTAL
DOPINGS BOTH SINGLY AND IN PAIRS. EXPERIMENTS ON
THE GROWTH OF ZNO CRYSTALS BY THE HYDROTHERMAL
METHOD ARE GIVEN, ALONG WITH THE PREPARATION AND
OPERATING PROCEDURES USED WITH THE AUTOCLAVE. GEL
DIFFUSION CRYSTAL GROWTH EXPERIMENTS ARE ALSO
REPORTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-709 988 20/6 20/6
MASSACHUSETTS INST OF TECH CAMBRIDGE CRYSTAL PHYSICS
LAB

GROWTH OF THIOSPINELS (INVESTIGATION OF CRYSTALS
FOR CO₂ HIGH POWER LASER WINDOWS). (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 68-30-NOV 69.
JUL 70 SIP SMAKULA, ALEXANDER ILINZ,
ARTHUR I
REPT. NO. TR-15
CONTRACT: N00014-67-A-0204-0025
PROJ: NR-015-512

UNCLASSIFIED REPORT

DESCRIPTORS: (*GAS LASERS, *OPTICAL MATERIALS),
(*INFRARED WINDOWS, *LASERS), SEMICONDUCTORS,
RUBIDIUM COMPOUNDS, IODIDES, ULTRAVIOLET OPTICAL
MATERIALS, SINGLE CRYSTALS, SPECTRA (VISIBLE +
ULTRAVIOLET), SPECTRA (INFRARED), PURIFICATION,
CRYSTAL GROWTH, INDIUM COMPOUNDS, SULFIDES,
CADMIUM SULFIDES, CARBON DIOXIDE, CHLORIDES (U)
IDENTIFIERS: INDIUM SULFIDES, *CARBON DIOXIDE (U)
LASERS, RUBIDIUM CHLORIDE

THE REPORT DEALS WITH THE INVESTIGATION OF SINGLE
CRYSTALS FOR HIGHER POWER LASER WINDOWS. THE
FOLLOWING CRYSTALS WERE GROWN AND THEIR OPTICAL
PROPERTIES STUDIED: KF, RBF, CSF,
NaCl, KCl, RbCl, KBr, RbBr, CsBr,
CsI, AgBr, CuCl, PbCl₂, PbBr₂,
CdS, In₂S₃, AND CdS·In₂S₃. THE
ULTRAVIOLET (OR VISIBLE) AND INFRARED ABSORPTION
EDGES WERE MEASURED. THE INFLUENCE OF ABSORPTION
MAXIMA, TEMPERATURE AND IMPURITIES ON THE ABSORPTION
EDGES IS DISCUSSED. COMPARING THE ABSORPTION AT
10.6 MICROM WITH INFRARED ABSORPTION EDGES, THERE IS
AN EVIDENT RELATION; FOR MOST CRYSTALS THE
ABSORPTION AT 10.6 MICROM DECREASES WITH INCREASING
SPECTRAL DISTANCE FROM THE ABSORPTION EDGES. RbCl
HAS THE LOWEST ABSORPTION OF ALL INVESTIGATED
CRYSTALS. DEVIATION FROM THE ABOVE RELATION IN SOME
CRYSTALS IS CORRELATED TO CRYSTAL DEFECTS OR SURFACE
CONTAMINATION. THE PURE POLYATOMIC SEMI-CONDUCTORS,
CdS, In₂S₃ AND CdS·In₂S₃ SHOWED TWO
ORDERS OF MAGNITUDE HIGHER ABSORPTION THAN MOST IONIC
CRYSTALS AND THEREFORE ARE NOT SUITABLE FOR HIGH
POWER LASER WINDOWS. FOR BETTER WINDOWS A FURTHER
IMPROVEMENT OF CRYSTAL PURITY IS NECESSARY.
(AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 194 20/12
BROWN UNIV PROVIDENCE R I DEPT OF PHYSICS

MODULATED PIEZOREFLECTANCE IN SEMICONDUCTORS, (U)

JUL 69 14P GAVINI, ANIBAL ICARDONA,
MANUEL I
CONTRACT: DA-31-124-ARO(D)-454
PROJ: DA-2-0-061102-B-11-B
MONITOR: AROD 6412125-P

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW, V1 N2 P672-
682, 15 JAN 70.

SUPPLEMENTARY NOTE: SPONSORED IN PART BY NATIONAL
SCIENCE FOUNDATION.

DESCRIPTORS: (SEMICONDUCTORS, *BAND THEORY OF
SOLIDS), GERMANIUM, GALLIUM ARSENIDES, ZINC
SULFIDES, CADMIUM SULFIDES, CADMIUM SELENIDES,
INDIUM COMPOUNDS, ZINC COMPOUNDS, ANTIMONY
COMPOUNDS, OXIDES, PHOSPHIDES, TELLURIDES,
CRYOGENICS, PIEZOELECTRIC TRANSDUCERS (U)
IDENTIFIERS: PIEZOREFLECTANCE, GALLIUM
ANTIMONIDES, INDIUM PHOSPHIDES, CADMIUM
TELLURIDES, ZINC OXIDES (U)

THE DIRECT GAPS OF GE, GAAS, GASE,
INP, ZNS, CDTE, CDSE, CDS, AND
ZNO HAVE BEEN MEASURED USING THE PIEZOREFLECTANCE
TECHNIQUE. THIN SINGLE CRYSTALS OF THESE MATERIALS
WERE MOUNTED ON LEAD-ZIRCONATE-LEAD-TITANATE
PIEZOELECTRIC TRANSDUCERS AND COOLED TO 77K.
MEASUREMENTS WERE PERFORMED WITH THE STRESS APPLIED
ALONG THE (100) AND (111) CRYSTALLOGRAPHIC
DIRECTIONS OF THE CUBIC MATERIALS AND ALONG THE
(0001) AND (11-20) DIRECTIONS OF THE
HEXAGONAL MATERIALS. THE SHEAR DEFORMATION
POTENTIALS B AND D OF THE HIGHEST VALENCE-BAND STATE
OF THE CUBIC MATERIALS WERE DETERMINED FROM THE RATIO
OF THE INTENSITY OF THE LIGHT POLARIZED PARALLEL AND
PERPENDICULAR TO THE DIRECTION OF THE STRESS AND THE
KNOWN VALUES OF THE HYDROSTATIC DEFORMATION
POTENTIALS. THE RESULTS SHOW A CONTINUOUS INCREASE
OF THE RATIO D/B FROM THE COVALENT MATERIALS GE AND
SI TO THE PARTIALLY IONIC III-V AND II-VI
COMPOUNDS. A SIMPLE POINT-ION MODEL IS PROPOSED TO
EXPLAIN THE INCREASE IN THE RATIO D/B WITH INCREASING
IONICITY FOR THE CUBIC MATERIALS. FOR THE WURTZITE
MATERIALS, SIMILAR MEASUREMENTS YIELD RATIOS OF SHEAR
TO HYDROSTATIC DEFORMATION POTENTIALS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#710 240 20/1 20/12 9/1
ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

ACTIVE ACOUSTO-OPTIC MODULATORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 70 65P MAURO, ROBERT I
REPT. NO. ECOM-3309
PROJ: DA-1-S-662704-A-199
TASK: 1-S-662704-A-19906

UNCLASSIFIED REPORT

DESCRIPTORS: (•ULTRASONIC RADIATION, SOURCES),
(•PIEZOELECTRIC CRYSTALS, SEMICONDUCTOR DEVICES),
MODULATORS, SEMICONDUCTORS, CADMIUM SULFIDES,
LASERS, OSCILLATORS

(U)

IDENTIFIERS: •ACOUSTOOPTIC MODULATORS,
ACOUSTOOPTIC INTERACTIONS, PIEZOELECTRIC
SEMICONDUCTORS, ULTRASONIC OSCILLATORS

(U)

IN RECENT YEARS THERE HAS BEEN CONSIDERABLE INTEREST IN THE USE OF ACOUSTO-OPTICAL INTERACTION PHENOMENA FOR THE MODULATION, DEFLECTION, AND Q SWITCHING OF LASERS. THIS HAS BEEN DUE PRINCIPALLY TO THE DEVELOPMENT OF NEW MATERIALS AND TECHNIQUES WHICH HAVE MADE SUCH DEVICES COMPETITIVE WITH THE BETTER ESTABLISHED MECHANICAL AND ELECTRO-OPTIC METHODS. TYPICALLY AN ACOUSTO-OPTIC SYSTEM CONSISTS OF AN INTERACTION MEDIUM ONTO WHICH A PIEZOELECTRIC TRANSDUCER IS BONDED, AND AN R.F. POWER SOURCE WHICH EXCITES THE TRANSDUCER PRODUCING THE REQUIRED ACOUSTIC WAVES. THIS REPORT DISCUSSES A SIMPLIFIED ALTERNATE APPROACH TO THIS PROBLEM IN WHICH AN ACTIVE ULTRASONIC OSCILLATOR EXCITED BY A DC VOLTAGE SOURCE SERVES AS BOTH THE INTERACTION MEDIUM AND THE GENERATOR OF THE ULTRASONIC WAVES. (AUTHOR)

(U)

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 448 20/12
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

PHOTOLUMINESCENCE DUE TO ISOELECTRONIC OXYGEN AND
TELLURIUM TRAPS IN II-VI ALLOYS. (U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE,
OCT 69 18P ISELER, GERALD W. ISRAUSS,
ALAN J. I
REPT. NO. JA-3579
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-70-218

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF LUMINESCENCE, V3 P1-
17 1970.

DESCRIPTORS: (*SEMICONDUCTORS, *LUMINESCENCE),
IMPURITIES, CRYSTAL LATTICE DEFECTS, OXYGEN,
ZINC COMPOUNDS, TELLURIDES, SULFIDES, CADMIUM
COMPOUNDS, SELENIDES, SOLID SOLUTIONS, CADMIUM
SULFIDES, CADMIUM SELENIDES, ZINC SULFIDES,
EXCITONS (U)
IDENTIFIERS: *PHOTOLUMINESCENCE (U)

PHOTOLUMINESCENCE SPECTRA AT 4.2K DUE TO OXYGEN
AND TELLURIUM ISOELECTRONIC TRAPS HAVE BEEN OBSERVED
IN THE FOLLOWING II-VI SOLID SOLUTIONS PREPARED
BY ANNEALING POWDER MIXTURES OF THE BINARY
COMPOUNDS: O IN $ZnTe_{(1-x)}Se_x$,
 $ZnTe_{(1-x)}S_x$, AND $Zn_{(1-
y)}Cd_yTe$; TE IN $Zn_{(1-y)}Cd_yS$,
 $Zn_{(1-y)}Cd_ySe$, $ZnS_{(1-x)}Se_x$,
 $CdS_{(1-x)}Se_x$, AND $ZnTe_{(1-
x)}Se_x$. IN ALL CASES THE QUALITATIVE CHANGE
IN TRAPPING ENERGY WITH ALLOY COMPOSITION, AS
INDICATED BY THE CHANGE IN PHOTOLUMINESCENCE ENERGY
RELATIVE TO THE ENERGY GAP, IS CONSISTENT WITH THE
ISOELECTRONIC TRAP MODEL. ACCORDING TO THIS MODEL,
THE TRAPPING ENERGY FOR AN EXCITON BOUND TO THE TRAP
SHOULD DEPEND PRIMARILY ON THE DIFFERENCE IN
ELECTRONEGATIVITY BETWEEN THE IMPURITY AND THE HOST
ATOM WHICH IT REPLACES. FOR ALLOYS INVOLVING
SUBSTITUTION ON THE ANION SUB-LATTICE, THE TRAPPING
ENERGY DECREASES MARKEDLY WITH INCREASING X EXCEPT
FOR TE IN $ZnTe_{(1-x)}Se_x$, WHERE THE
OPPOSITE CHANGE OCCURS. FOR ALLOYS INVOLVING
SUBSTITUTION ON THE CATION SUB-LATTICE, THE TRAPPING
ENERGY DOES NOT DEPEND STRONGLY ON Y. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 636 10/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

THIN FILM CDS SOLAR CELL FABRICATION PARAMETER
STUDY. (U)

DESCRIPTIVE NOTE: INTERIM TECHNICAL REPT.,
JUN 70 17P DEUCHER, T. F. I
CONTRACT: F33615-68-C-1182
PROJ: AF-7885
TASK: 788500
MONITOR: ARL 70-0099

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS, MANUFACTURING
METHODS), CADMIUM SULFIDES, METAL FILMS,
SEMICONDUCTING FILMS, PLASTIC COATINGS, VAPOR
PLATING, VACUUM APPARATUS, BARRIER COATINGS (U)
IDENTIFIERS: THIN FILMS (U)

THE STUDY IS, ESSENTIALLY, A BRIEF DESCRIPTION OF
THE PROCESSES, CURRENTLY USED AND ALTERNATIVES,
NECESSARY TO THE MANUFACTURE OF THIN FILM CDS
SOLAR CELLS. THESE PROCESSES RELATE TO THE
APPLICATION OF THE CONDUCTIVE LAYER TO THE PLASTIC
FILM, PLATING ON OF A SUITABLE METALLIC INTERLAYER,
DEPOSITION OF THE CDS LAYER, FORMATION OF THE
BARRIER, ATTACHMENT OF THE CONDUCTIVE GRID AND COVER
PLASTIC AND IN PROCESS AND FINAL TESTING. MATERIAL
COSTS AND PRODUCTIVITY OF EACH OF THE PRESENT
MANUFACTURING PROCESSES ARE LISTED, AND AS A
COMPARISON, MATERIAL COSTS AND PRODUCTIVITY BASED ON
HIGH PRODUCTION METHODS ARE ESTIMATED WHEREVER
POSSIBLE. THOSE PROCESSES OR OPERATIONS WHICH LEND
THEMSELVES PRESENTLY TO LARGE VOLUME PRODUCTION HAVE
BEEN INCORPORATED INTO SUGGESTED MECHANISMS THAT ARE
BRIEFLY DESCRIBED. A FEW, OF WHICH GRIDGING IS AN
EXAMPLE, ARE IN NEED OF FURTHER STUDY, AS TO
PROCESSES WHICH ARE MORE ADAPTABLE TO MECHANIZATION
THAN AT PRESENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 932 9/1 20/1 20/12
CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL
ENGINEERING

ACOUSTOELECTRIC DEVICE APPLICATIONS OF PIEZOELECTRIC
AND SEMICONDUCTING THIN FILMS, (U)

NOV 69 7P TURNER, C. W. I
CONTRACT: AF-AFOSR-1488-68
PROJ: AF-4751
MONITOR: AFOSR 70-2302TR

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF VACUUM SCIENCE
AND TECHNOLOGY, V7 N2 P304-308 1970.

DESCRIPTORS: (*PIEZOELECTRIC CRYSTALS; ULTRASONIC
RADIATION), (*PIEZOELECTRIC TRANSDUCERS,
DESIGN), (*SEMICONDUCTING FILMS, MICROWAVE
FREQUENCY), SINGLE CRYSTALS, CADMIUM SULFIDES,
LITHIUM COMPOUNDS, ZINC COMPOUNDS, NIOBATES,
OXIDES (U)
IDENTIFIERS: *MICROWAVE ACOUSTICS, SURFACE WAVES,
THIN FILMS, ACOUSTOELECTRIC EFFECT, ZINC OXIDES,
LITHIUM NIOBATES (U)

RECENT ADVANCES IN MICROWAVE ACOUSTICS TECHNIQUES
HAVE RESULTED IN A GROWING DEMAND FOR HIGH-QUALITY
THIN FILMS FOR USE IN VARIOUS ACOUSTIC DEVICES.
ORIENTED PIEZOELECTRIC FILMS WERE FIRST USED TO
INCREASE THE EFFICIENCY OF TRANSDUCERS FOR BULK
ACOUSTIC WAVES AT FREQUENCIES ABOVE THE LIMIT OF
CRYSTAL PLATE RESONATORS. ALTHOUGH EXTENSIVE
APPLICATION OF THESE TRANSDUCERS IN BOTH PASSIVE AND
ACTIVE DEVICES HAS BECOME POSSIBLE WITH THE
IMPROVEMENTS IN FILM QUALITY, IT NOW APPEARS THAT
SURFACE ELASTIC WAVES WILL AFFORD THE MAIN VEHICLE
FOR THIN-FILM ACOUSTIC DEVICE APPLICATIONS. THE
PROPERTIES OF SURFACE WAVES ARE DISCUSSED HERE AND
THE PRINCIPAL DEVICES CURRENTLY UNDER INVESTIGATION
ARE DESCRIBED. THE DETAILED REQUIREMENTS OF THIN
FILMS SUITABLE FOR SURFACE WAVE DEVICES ARE PRESENTED
TOGETHER WITH EXAMPLES OF THE SHORTCOMINGS OF
CURRENTLY AVAILABLE FILMS. PARTICULAR ATTENTION IS
FOCUSED ON AMPLIFYING STRUCTURES EMPLOYING EITHER
LARGE AREA ORIENTED PIEZOELECTRIC FILMS OR HIGH-
MOBILITY SINGLE-CRYSTAL SEMICONDUCTOR FILMS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-710 988 20/12 20/5
NAVAL ELECTRONICS LAB CENTER SAN DIEGO CALIF

PHYSICS OF STIMULATED EMISSION IN II-VI
SEMICONDUCTING COMPOUNDS. (U)

DESCRIPTIVE NOTE: RESEARCH AND DEVELOPMENT REPT. NOV 69-
APR 70.

JUN 70 41P TAYLOR, H. F. ;

REPT. NO. NELC-TR-1713

PROJ: NELC-2212; ZF-52-512-003

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, ABSORPTION
SPECTRUM), (*LASERS, SEMICONDUCTOR DEVICES),
(*CADMIUM SELENIDES, PUMPING(OPTICAL)),
EXCITONS, PHONONS, CADMIUM SULFIDES (U)
IDENTIFIERS: *SEMICONDUCTOR LASERS (U)

THE LITERATURE RELATED TO STIMULATED EMISSION IN
II-VI SEMICONDUCTING COMPOUNDS IS SUMMARIZED.
STIMULATED EMISSION GAIN CURVES ARE CALCULATED FOR
CdSe. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-712 914 20/12
MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF
ELECTRONICS

ENHANCEMENT OF THE PIEZOELECTRICALLY STIFFENED
ULTRASONIC VELOCITY BY ELECTRON TRAPPING IN CDS.

(U)

APR 70 5P KRISCHER, CHARLES ; INGARD, UNO

CONTRACT: N00014-67-A-0204-0019

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICS LETTERS, V32A N1
P41-42, 1 JUN 70.

DESCRIPTORS: (SEMICONDUCTORS, PIEZOELECTRIC
CRYSTALS), (CADMIUM SULFIDES, ULTRASONIC
RADIATION), VELOCITY, CRYOGENICS

(U)

IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS,
ELECTRON TRAPS

(U)

IT IS SHOWN THAT THE ULTRASONIC VELOCITY IN
SEMICONDUCTING CDS, IN THE PRESENCE OF AN APPLIED
ELECTRIC DRIFT FIELD, CAN EXCEED THE
PIEZOELECTRICALLY STIFFENED VALUE FOR THE INSULATING
MATERIAL, IF THE ELECTRON-TRAPPING RELAXATION TIME IS
NONZERO. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-712 936 20/12 13/8 10/2
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

PROPERTIES OF P-N JUNCTIONS IN CADMIUM SULFIDE
AND CONSTRUCTION OF PHOTOELECTRIC TRANSDUCERS, (U)

JUN 70 8P KNEV, STEFAN ; STOYANOV, VASIL
ISTEFANOV, RODOSLAV ;
REPT. NO. FTD-HC-23-133-70
PROJ: FTD-7230178

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF BULGARSKA
AKADEMIYA NA NAUKITE, SOFIA, FIZICHESKI INSTITUT.
IZVESTIYA, V17 P13-20 1968.

DESCRIPTORS: (*SEMICONDUCTORS, INTERFACES);
(*CADMIUM SULFIDES, PHOTOELECTRIC EFFECT),
(*SOLAR CELLS, MANUFACTURING METHODS),
PERFORMANCE(ENGINEERING), USSR (U)
IDENTIFIERS: *SEMICONDUCTOR JUNCTIONS, (U)
TRANSLATIONS

THE DEVELOPMENT OF EFFICIENT PHOTOELECTRIC
CONVERTERS BASED ON CDS IS DESCRIBED. THE
PHOTOELECTRIC P-N JUNCTIONS WERE MADE AS FOLLOWS:
CADMIUM SULFIDE POWDER WAS PRESSED INTO SMALL
TABLETS UNDER A PRESSURE OF SEVERAL HUNDRED KILOGRAMS
PER CM(SUPERSCRIP 2). THE TABLETS WERE BAKED
FOR 15 MIN UNDER CLOSELY CONTROLLED CONDITIONS TO
FORM PURE MONOCRYSTALS (SIZE, UP TO 50 MU) ON ONE
SIDE OF THE TABLET, I.E., TO FORM THE WORKING SURFACE
OF THE CONVERTER. THIS WORKING SURFACE WAS THEN
IMMERSED FOR SEVERAL SECONDS IN A BOILING, SATURATED
WATER SOLUTION OF COPPER SULFATE TO COVER IT WITH A
THIN COATING WHICH CONTAINED P-TYPE CARRIERS AND WAS
PRESUMED TO BE FORMED BY THE CHEMICAL REACTION GIVEN.
THE COATED TABLET WAS THEN HEATED AT A TEMPERATURE
OF 350 DEGREES CENTIGRADE FOR ABOUT 20 SEC. THE
CONVERTER WAS COMPLETED BY DEPOSITING ELECTRODES ON
BOTH SIDES OF THE TABLET. EFFICIENCIES OF THE ORDER
OF 8 PERCENT WERE OBTAINED WITH THE DESCRIBED
PHOTOELECTRIC CONVERTERS. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-713 181 20/12 20/6
CORNELL UNIV ITHACA N Y MATERIALS SCIENCE CENTER

LUMINESCENCE STUDY OF EXCITON-EXCITON INTERACTION
IN CADMIUM SULFIDE, CADMIUM SELENIDE, AND ZINC
OXIDE. (U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,
JUN 70 140P MAGDE, MICHAEL DOUGLAS I
REPT. NO. MSC-1325, MSC-TR-32
CONTRACT: NONR-401(47)

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, *LUMINESCENCE),
(*CADMIUM SULFIDES, EXCITONS), (*CADMIUM
SELENIDES, EXCITONS), BAND THEORY OF SOLIDS,
ZINC COMPOUNDS, EXCITATION, PHONONS, CRYOGENICS,
LASERS, OXIDES, THESES (U)
IDENTIFIERS: *EXCITON EXCITON INTERACTIONS, *ZINC
OXIDES, TWO PHOTON ABSORPTION (U)

THE THESIS REPORTS THE RESULTS OF AN EXPERIMENTAL
STUDY OF LUMINESCENCE IN SEVERAL 2-6 SEMICONDUCTING
COMPOUNDS AT EXCITATION LEVELS, PROVIDED BY LASER
PULSES, OF 1 KW/SQ CM TO 5 MW/SQ CM. UNDER SUCH
CONDITIONS AN ADDITIONAL LUMINESCENCE BAND APPEARS
WHICH IS NOT OBSERVED WHEN LUMINESCENCE IS EXCITED BY
MUCH LOWER INTENSITY CONVENTIONAL MERCURY LAMPS.
THE ADDITIONAL EMISSION WAS OBSERVED IN TWO
DIFFERENT TYPES OF CDS AS WELL AS IN CDSE AND
ZNO. IN EACH CASE IT INCREASED AT A RATE
FASTER THAN LINEAR, BECOMING PROMINENT IN THE RANGE
10 - 100 KW/SQ CM WHEREAS LUMINESCENCE ATTRIBUTED
TO BOUND EXCITONS INCREASED LINEARLY WITH EXCITATION
INTENSITY AT FIRST, BUT EVENTUALLY, IN ALL CASES
EXCEPT ZNO, APPEARED TO SATURATE. A KINETIC
TREATMENT OF THE MODEL YIELDS THE FOLLOWING VALUE FOR
THE CROSS SECTION FOR THIS PROCESS: 10 TO THE 16TH
POWER/SQ CM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-713 837 2U/2
OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

SURFACE MORPHOLOGY OF SUBLIMATED CRYSTALS OF CADMIUM
AND ZINC SULFIDES. (U)

JAN 70 IUP MUNIR, Z. A.; HIRTH, J. P.

REPT. NO. USURF-2966-TR-1
CONTRACT: N00014-67-A-0232-0005; NONR-495(26)
PROJ: NR-036-U47; USURF-2966

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,
V41 N6 P2697-2704 MAY 70.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH SAN
JOSE STATE COLL., CALIF. DEPT. OF MATERIALS
SCIENCE.

DESCRIPTORS: (*CRYSTAL GROWTH; *SUBLIMATION),
(*CADMIUM SULFIDES; SURFACE PROPERTIES), (*ZINC
SULFIDES; SURFACE PROPERTIES), SINGLE CRYSTALS,
SEMICONDUCTORS, ETCHED CRYSTALS, DISLOCATIONS (U)

THE SURFACE STRUCTURE OF (0001)- AND (101-
110)-ORIENTED SINGLE CRYSTALS OF ZNS AND
CDS SUBLIMATED UNDER CONTROLLED VARIABLE VAPOR
PRESSURE WAS INVESTIGATED. THE RESULTS WERE FOUND
TO BE CONSISTENT WITH THE TERRACE-LEDGE-KINK MODEL OF
SUBLIMATION. POSSIBLE REVISIONS TO THE THEORY OF
THE EFFECT OF CHARGED CARRIER CONCENTRATION ON
SUBLIMATION OF II-VI COMPOUNDS ARE SUGGESTED.
(AUTHOR) (U)

UNCLASSIFIED

JDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-714 314 7/4
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

QUANTITATIVE ANALYSIS OF TERNARY AND
QUATERNARY SEMICONDUCTING ALLOYS WITH
ELECTRON MICROPROBE.

(U)

DESCRIPTIVE NOTE: JOURNAL ARTICLE.
JAN 70 4P FINN, MARY C. I
REPT. NO. JA-3646
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-70-254

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN ANALYTICAL CHEMISTRY, V42 N9
P1084-1086 AUG 70.

DESCRIPTORS: (*SEMICONDUCTORS, *QUANTITATIVE
ANALYSIS), CADMIUM SULFIDES, LEAD COMPOUNDS,
CADMIUM SELENIDES, GERMAINIUM COMPOUNDS,
TELLURIDES, SULFIDES, SELENIDES
IDENTIFIERS: *GROUP 4A-6A COMPOUNDS, *GROUP
5B-6A COMPOUNDS, ELECTRON PROBES

(U)

(U)

QUANTITATIVE ANALYSIS WITH THE ELECTRON MICROPROBE
DEPENDS UPON THE CONVERSION OF MEASURED X-RAY
INTENSITIES TO CHEMICAL COMPOSITIONS. THE PAPER
DESCRIBES A METHOD WHICH USES THEORETICAL CALIBRATION
CURVES IN THE DETERMINATION OF ELEMENTS A AND B
IN TERNARY $A(1-x)B(x)C$ ALLOYS WHICH ARE
PSEUDOBINARY SOLID SOLUTIONS OF THE SEMICONDUCTING
COMPOUNDS AC AND BC. THIS METHOD HAS BEEN USED
FOR ANALYZING THE FOLLOWING ALLOYS: $CdTe(1-x)Se(x)$,
 $CdS(1-x)Se(x)$, $Zn(1-x)Cd(x)Te$,
 $ZnTe(1-x)S(x)$, $ZnTe(1-x)Se(x)$,
 $ZnSe(1-x)S(x)$, $Hg(1-x)Cd(x)Te$,
 $Pb(1-x)Ge(x)Se$, $Pb(1-x)Ge(x)Te$,
 $Pb(1-x)Sn(x)S$, $Pb(1-x)Sn(x)Se$,
 $Pb(1-x)Sn(x)Te$, $Sn(1-x)Ge(x)Te$,
 $GaAs(1-x)P(x)$, $Ga(1-x)In(x)P$,
 $Ga(1-x)In(x)As$, $InSb(1-x)Te(x)$,
 $Pb(1-x)Cd(x)S$. EXCEPT FOR THE SYSTEMS
FORMED BETWEEN $InSb$ AND $InTe$ AND BETWEEN
 PbS AND CdS , BOTH CONSTITUENT COMPOUNDS IN
EACH SYSTEM BELONG TO THE SAME GROUP OF
SEMICONDUCTORS, EITHER THE II-VI, IV-VI, OR
III-V GROUP. AN ITERATIVE PROCEDURE FOR USING
THEORETICAL CALIBRATION CALCULATIONS IN DETERMINING
ALL FOUR ELEMENTS IN THE QUATERNARY SOLID SOLUTION
 $Pb(1-x)Sn(x)Te(1-y)Se(y)$ IS ALSO
DESCRIBED. (AUTHOR)

(U)

343

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-715 167 20/12
YALE UNIV NEW HAVEN CONN DEPT OF ENGINEERING AND APPLIED
SCIENCE

RESONANT CANCELLATION OF RAMAN SCATTERING
FROM CDS AND SI.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 70 6P RALSTON, J. M. IWADSACK, R.
L. CHANG, R. K. ;
REPT. NO. TR-3
CONTRACT: N00014-67-A-0097-0005
PROJ: NR-016-203

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW LETTERS,
V25 N12 P814-818, 21 SEP 70.

DESCRIPTORS: (*SEMICONDUCTORS, *RAMAN
SPECTROSCOPY), (*CADMIUM SULFIDES, RAMAN
SPECTROSCOPY), (*SILICON, RAMAN SPECTROSCOPY),
MOLECULAR ENERGY LEVELS, BAND THEORY OF SOLIDS
IDENTIFIERS: LASER SPECTROSCOPY

(U)

(U)

A PRONOUNCED DECREASE IN THE TO RAMAN SCATTERING
EFFICIENCIES OF CDS HAS BEEN OBSERVED AS THE
INCIDENT PHOTON ENERGY APPROACHES THE DIRECT-ENERGY
GAP. PREVIOUS RESONANT RAMAN MEASUREMENTS HAVE
SHOWN ONLY MONOTONICALLY INCREASING EFFICIENCIES. A
DECREASE OF THE F(2G) MODE IN SI HAS ALSO BEEN
OBSERVED AS THE RESONANCE WITH THE INDIRECT-ENERGY
GAP IS APPROACHED. THE OBSERVED DECREASES IN
CDS AND SI CAN BOTH BE ACCOUNTED FOR BY
EXTENDING LOUDON'S THEORY TO INCLUDE A DESTRUCTIVE
INTERFERENCE BETWEEN THE RESONANT AND NONRESONANT
CONTRIBUTIONS TO THE RAMAN SCATTERING AMPLITUDES.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

ADP715 285 10/2
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

DEGRADATION OF LDS THIN FILM SOLAR
CELLS IN DIFFERENT ENVIRONMENTS. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,
NOV 70 24P STANLEY, ALAN G. ;
REPT. NO: TN-197U-33
CONTRACT: F19628-7U-C-0230
PROJ: AF-649L
MONITOR: ESD TR-70-341

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS, DEGRADATION), TEST
METHODS, THERMAL STRESSES, SPACE ENVIRONMENTAL
CONDITIONS, CADMIUM SULFIDES,
FAILURE (ELECTRONICS), SEMICONDUCTOR DEVICES,
RELIABILITY (ELECTRONICS) (U)
IDENTIFIERS: PHOTOVOLTIC EFFECT (U)

CADMIUM SULFIDE THIN FILM CELLS WERE OPERATED UNDER
DIFFERENT BIAS CONDITIONS FOR PERIODS OF SIX MONTHS
IN THE FOLLOWING ENVIRONMENTS: VACUUM THERMAL
CYCLING BETWEEN -160 AND 60C, CONSTANT ILLUMINATION
IN VACUUM AND IN DRY OXYGEN AT 60C. THE RESULTS
WERE COMPARED TO THE DEGRADATION OF TEST CELLS IN
SYNCHRONOUS ORBIT. IT WAS CONCLUDED FROM THE
OBSERVED CHANGES IN THE I-V CHARACTERISTICS THAT
THE DEGRADATION IS CAUSED PRIMARILY BY A COMBINATION
OF LIGHT AND TEMPERATURE AND NOT BY PURELY THERMAL
STRESSES. THE PRESENCE OF A VACUUM DOES NOT APPEAR
TO BE A SIGNIFICANT CONTRIBUTORY FACTOR TO THE
ULTIMATE DEGRADATION OF THE CELLS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-715 574 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

LINEAR COMPRESSIBILITIES OF II-VI COMPOUND
SINGLE CRYSTALS, (U)

APR 70 BP MONTALVO, R. A. ILANGER, D.
W. ;
REPT. NO. ARL-70-026U
PROJ: AF-7885
TASK: 788500

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,
V41 N10 P4101-4104 SEP 70.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 27 JAN
70.

DESCRIPTORS: (*ZINC COMPOUNDS, COMPRESSIVE
PROPERTIES), (*CADMIUM COMPOUNDS, COMPRESSIVE
PROPERTIES), SINGLE CRYSTALS, SULFIDES,
SELENIDES, OXIDES, TELLURIDES, INTERFEROMETERS,
CADMIUM SULFIDES, CADMIUM SELENIDES, ZINC
SULFIDES, SEMICONDUCTORS (U)
IDENTIFIERS: *GROUP 2B-6A COMPOUNDS, ZINC
SELENIDES, ZINC TELLURIDES, ZINC OXIDES, CADMIUM
TELLURIDES (U)

THE ISOTHERMAL LINEAR COMPRESSIBILITIES OF THE
II-VI COMPOUND SINGLE CRYSTALS, CDS,
CDSE, CDTE, ZNO, ZNS, ZNSE, AND
ZNTE WERE MEASURED BY AN OPTICAL INTERFEROMETER.
THE CHANGE IN LENGTH OF THE CRYSTALS WAS OBTAINED
RELATIVE TO IRON UNDER HYDROSTATIC PRESSURE TO OBTAIN
THE INITIAL PARAMETERS OF THE INTERFEROMETER.
(AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-715 674 20/1 20/12
NORTHWESTERN UNIV EVANSTON ILL INFORMATION-PROCESSING AND
CONTROL SYSTEMS LAB

SURFACE MICROACOUSTICS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
SEP 70 89P EPSTEIN, MAX I
REPT. NO. TR-70-101
CONTRACT: N00014-67-A-0356-0003, ARPA ORDER-1129

UNCLASSIFIED REPORT

DESCRIPTORS: (*ULTRASONIC RADIATION, MICROWAVE
FREQUENCY), STATE-OF-THE-ART REVIEWS,
BIBLIOGRAPHIES, PIEZOELECTRIC CRYSTALS,
SEMICONDUCTORS, CADMIUM SULFIDES,
MAGNETOSTRICTION, RADAR EQUIPMENT (U)

IDENTIFIERS: *MICROWAVE ACOUSTICS, *ACOUSTIC
SURFACE WAVES, SURFACE WAVES, LOVE WAVES,
*MICROACOUSTICS, INTERDIGITAL TRANSDUCERS,
MAGNETOELASTIC EFFECTS, PIEZOELECTRIC
SEMICONDUCTORS, LITHIUM NIOBATES, MAGNONS (U)

THE REPORT CONTAINS AN INTRODUCTION TO THE FIELD OF
SURFACE MICROACOUSTICS. IT INCLUDES A REVIEW OF
THE PRESENT STATE-OF-THE-ART, AND AN ANNOTATED
BIBLIOGRAPHY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-716 097 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

FIELD QUENCHING AS MECHANISM OF NEGATIVE
DIFFERENTIAL CONDUCTIVITY IN PHOTOCONDUCTING
CDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.:
JAN 70 13P DUSSEL, G. A. BOER, K. W.

REPT. NO. TR-41
CONTRACT: NONR-4336(UO)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICA STATUS SOLIDI, V39
P391-402 1970.

DESCRIPTORS: (*SEMICONDUCTORS, NEGATIVE RESISTANCE
CIRCUITS), (*CADMIUM SULFIDES, ELECTRICAL
CONDUCTANCE), BAND THEORY OF SOLIDS,
CARRIERS(SEMICONDUCTORS), PHOTOCONDUCTIVITY,
ELECTRON DENSITY (U)

IDENTIFIERS: *NEGATIVE DIFFERENTIAL
CONDUCTIVITY (U)

IT IS SHOWN THAT THE OBSERVED STEEP DECREASE OF THE
ELECTRON DENSITY IN PHOTOCONDUCTING CDS(AL,
AG) WITH FIELD IN THE RANGE BETWEEN 20 AND 70
KV/CM IS CAUSED BY A REDISTRIBUTION OF HOLES FROM
SLOW TO FAST RECOMBINATION CENTRES (FIELD
QUENCHING). THIS REDISTRIBUTION IS PRODUCED BY
FIELD-ENHANCED IONIZATION OF HOLES FROM COULOMB-
ATTRACTIVE SLOW RECOMBINATION CENTERS. THE ABRUPT
ONSET OF THE FIELD QUENCHING OCCURS BECAUSE OF THE
SLOW RECOMBINATION TRAFFIC MASKING THE FAST CENTER
TRAFFIC UNTIL IT BECOMES PREDOMINANT. COMPETING
INFRARED QUENCHING REDUCES THE MASKING EFFECT AND
UNCOVERS THE EARLIER PHASES OF FIELD QUENCHING
ALREADY NEAR 1 KV/CM (AT 200K). IMPACT
IONIZATION AND ZENER EXTRACTION OF HOLES FROM SLOW
CENTERS CANNOT EXPLAIN THE OBSERVED BEHAVIOR.
HOWEVER, QUANTITATIVE AGREEMENT BETWEEN EXPERIMENT
AND FIELD QUENCHING VIA FIELD-ENHANCED IONIZATION CAN
BE REACHED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-716 210 20/12 20/2
PENNSYLVANIA UNIV PHILADELPHIA LAB FOR RESEARCH ON THE
STRUCTURE OF MATTER

EPITAXIAL SUBLIMATION METHODS FOR THE STUDY OF
PSEUDO-BINARY SEMICONDUCTOR ALLOYS. (U)

DESCRIPTIVE NOTE: PROGRESS REPT. 1 JUN-30 NOV 70,
DEC 70 25P ZELMEL, JAY N. 1
CONTRACT: N60921-70-C-0251

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, *BAND THEORY OF
SOLIDS), (*SEMICONDUCTING FILMS, *EPITAXIAL
GROWTH), CADMIUM SULFIDES, GERMANIUM COMPOUNDS,
LEAD COMPOUNDS, TIN COMPOUNDS, OXIDES, SULFIDES,
TELLURIDES, ULTRASONIC RADIATION, PIEZOELECTRIC
CRYSTALS (U)

IDENTIFIERS: LEAD SULFIDES, LEAD OXIDES, LEAD
TELLURIDES, TIN TELLURIDES, CADMIUM TELLURIDES,
GERMANIUM TELLURIDES, AUGMENTED PLANE WAVE METHOD (U)

THE FIRST SIX MONTHS HAVE SEEN THE INITIATION OF:
RESEARCH ON A VARIETY OF PSEUDO-BINARY ALLOY
MATERIALS; A SERIES OF FEASIBILITY STUDIES ON
EXTENDING EXISTING TECHNIQUES NEVER PREVIOUSLY
EMPLOYED ON HETERO-EPITAXIAL FILMS TO THESE MATERIALS
AS WELL AS CONSIDERING SOME OTHER METHODS UNIQUE TO
FILM STUDIES; A PHYSIO-CHEMICAL RESEARCH PROGRAM ON
THE PBS-PBO ALLOY SYSTEM; SUBSTANTIAL
PROGRESS IN THEORETICAL BAND STRUCTURE CALCULATIONS
ON END POINT MATERIALS (E.G. SNTI AND CDS);
A REFORMULATION OF THE APW PROGRAM TO SIMPLIFY
FUTURE CALCULATIONS. OF THE FIVE MATERIALS UNDER
STUDY, FOUR ARE BEING PREPARED ROUTINELY AS EPITAXIAL
FILMS. THE EVAPORATION SYSTEM FOR THE FIFTH
MATERIAL IS RAPIDLY APPROXIMATING COMPLETION.
MEASUREMENT EQUIPMENT HAS BEEN ORDERED WHERE NEEDED
AND SOME INITIAL PROGRESS HAS BEEN MADE IN TESTING
THESE MATERIALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /ZZZHT

AD-716 892 20/12
DAYTON UNIV OHIO

CALCULATION OF THE EXCHANGE ENERGY FOR
EXCITONS IN THE TWO BODY MODEL.

(U)

DEC 70 12P ROHNER, PETER G. ;
CONTRACT: F33615-67-C-1027
PROJ: AF-7885
TASK: 788500
MONITOR: AKL 70-U308w

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW, VB3 N15
DEC 70.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH THE
TECHNICAL UNIV. OF BERLIN (GERMANY).

DESCRIPTORS: (EXCITONS, ENERGY), BAND THEORY OF
SOLIDS, APPROXIMATION (MATHEMATICS), CADMIUM
SULFIDES, ZINC COMPOUNDS, OXIDES, SEMICONDUCTORS
IDENTIFIERS: EFFECTIVE MASS

(U)
(U)

THE EXCHANGE ENERGY FOR THE WANNIER EXCITON IS
CALCULATED BY SOLVING A PREVIOUSLY DERIVED TWO BODY
HAMILTONIAN $H_{\text{SUP}}(2)$. TWO DIFFERENT
METHODS ARE GIVEN TO OBTAIN THE SOLUTION OF THE
EIGENVALUE PROBLEM OF $H_{\text{SUP}}(2)$ IN THE
EFFECTIVE MASS APPROXIMATION. BOTH CALCULATIONS
YIELD THE SAME RESULTS. THE EXCHANGE ENERGY IS
CALCULATED FOR SEVERAL EXAMPLES AND VALUES BETWEEN
108 AND 208 OF THE BINDING ENERGY OF THE PURE
HYDROGENLIKE CASE WERE FOUND. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-716 895 20/12
DAYTON UNIV OHIO

PHONON SIDEBANDS ON BOUND EXCITON
TRANSITIONS IN CDS AND ZNO,

(U)

70 7P FRANK, E. N. REYNOLDS, D.
C. MITTON, C. W. COLLINS, T. C. I
CONTRACT: F33615-67-C-1027
PROJ: AF-7885
TASK: 788500
MONITOR: ARL 7U-U310W

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PROCEEDINGS OF THE
INTERNATIONAL CONFERENCE ON THE PHYSICS OF
SEMICONDUCTORS (IUTH), HELD AT OAK RIDGE,
TENN., ON OCT 7U, P519-524.

DESCRIPTORS: (*SEMICONDUCTORS, *PHONONS),
(*CADMIUM SULFIDES, LINE SPECTRUM), (*ZINC
COMPOUNDS, LINE SPECTRUM), EXCITONS, OXIDES,
CRYOGENICS
IDENTIFIERS: *ZINC OXIDES, EMISSION SPECTRA

(U)

(U)

PHONON SIDEBANDS HAVE BEEN OBSERVED ON AN EMISSION
LINE DUE TO AN EXCITON BOUND TO AN IONIZED DONOR AND
ALSO ON AN EMISSION LINE DUE TO AN EXCITON BOUND TO A
NEUTRAL ACCEPTOR IN CDS. THE PHONON ENERGY
INDICATES THAT THE COUPLING IS THROUGH THE
LONGITUDINAL OPTICAL PHONONS. THE PHONON ASSISTED
LINES ARE VERY SHARP AND BOTH THE GAMMA SUB 1 AND
GAMMA SUB 5 COMPONENTS ARE OBSERVED. PHONON
SIDEBANDS ON THE 3688.46A EMISSION LINE IN ZNO
HAVE BEEN OBSERVED. THIS LINE IS DUE TO AN EXCITON
BOUND TO A NEUTRAL DONOR. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-716 896 20/12
DAYTON UNIV OHIO RESEARCH INST

CONDUCTION ELECTRON HYPERFINE INTERACTION IN
SEMICONDUCTING CDS, (U)

JAN 70 5P LOOK, D. C. ;
CONTRACT: F33615-67-C-1027
PROJ: AF-7885
TASK: 788500
MONITOR: ARL 70-0311W

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF PHYSICS AND
CHEMISTRY OF SOLIDS, V31 P2151-2154 JUL 70.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 1 DEC
69.

DESCRIPTORS: (*SEMICONDUCTORS, BAND THEORY OF
SOLIDS), (*CADMIUM SULFIDES, NUCLEAR MAGNETIC
RESONANCE), CARRIERS (SEMICONDUCTORS),
HYPERFINE STRUCTURE, HALL EFFECT, SINGLE CRYSTALS,
PIEZOELECTRIC CRYSTALS (U)

IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS, SPIN
LATTICE RELAXATION (U)

THE CONDUCTION-ELECTRON HYPERFINE INTERACTION IN
CDS HAS BEEN MEASURED BY NMR AND HALL-EFFECT
TECHNIQUES. RESULTS ARE DISCUSSED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-717 296 20/12
YALE UNIV NEW HAVEN CONN DUNHAM LAB

TEMPERATURE DEPENDENCE OF RAMAN LINEWIDTH AND
INTENSITY OF SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
68 14P CHANG, R. K. IRALSTON, J.
M. KEATING, D. E. I
REPT. NO. TR-4
CONTRACT: N00014-67-A-0097-0005
PROJ: NR-016-203

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN LIGHT SCATTERING SPECTRA
OF SOLIDS, PROCEEDINGS OF THE INTERNATIONAL
CONFERENCE HELD AT NEW YORK UNIV., 3-6 SEP 68,
P364-379 1969.

DESCRIPTORS: (*SEMICONDUCTORS; *RAMAN
SPECTROSCOPY); CADMIUM SULFIDES; CADMIUM
SELENIDES; GALLIUM ARSENIDES; SILICON; LASERS;
CRYOGENICS
IDENTIFIERS: LATTICE VIBRATIONS

(U)

(U)

A PRONOUNCED DECREASE IN THE SILICON RAMAN
INTENSITY AS THE TEMPERATURE WAS INCREASED HAS BEEN
MEASURED WITH A ND:YAG LASER. A BRIEF EXTENSION
OF RESONANCE RAMAN EFFECT IS MADE FOR
SEMICONDUCTORS WITH INDIRECT ENERGY BAND GAP. THE
PROGRESSION OF THE LO AND TO RAMAN ACTIVE MODES
OF CDSE IS PRESENTED AS THE S CONCENTRATION WAS
INCREASED FOR VARIOUS ALLOYS OF $CdS(x)Se(1-x)$.
THE EFFECT OF ANHARMONIC FORCES IN SHIFTING
THE LO AND TO MODES OF GAAS AND IN BROADENING
THE LINEWIDTHS OF THESE MODES AND THE TRIPLY
DEGENERATE MODE OF SILICON HAS BEEN MEASURED FROM
10K TO 475K. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-717 526 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SHORT WAVELENGTH IMPURITY EXCITON
TRANSITIONS IN CDS AT 1.2 K, (U)

MAR 70 8P REYNOLDS, D. C. LITTON, C.
W. COLLINS, T. C. I
REPT. NO. ARL-70-0348
PROJ: AF-7885
TASK: 788500

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. PHYSICS, C: SOLID
STATE PHYSICS, V3 N10 P2092-2097 1970.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 22 DEC
69.

DESCRIPTORS: (*CADMIUM SULFIDES, EXCITONS),
(*SEMICONDUCTORS, BAND THEORY OF SOLIDS),
SPECTRA (VISIBLE + ULTRAVIOLET), ZEEMAN EFFECT,
CRYOGENICS, IMPURITIES (U)
IDENTIFIERS: EMISSION SPECTRA (U)

EMISSION LINES ON THE HIGH ENERGY SIDE OF THE
GROUND STATE EXCITON HAVE BEEN OBSERVED IN CDS
CRYSTALS. THESE ARE VERY SHARP LINES
CHARACTERISTIC OF BOUND EXCITON TRANSITIONS.
ZEEMAN SPLITTINGS OF THE LINES CONFIRM THAT
EXCITONS BOUND TO BOTH NEUTRAL AND IONIZED CENTRES
ARE INVOLVED. THE MOST LOGICAL INTERPRETATION IS
THAT THE EMISSION LINES ARE THE RESULT OF RADIATIVE
DISSOCIATION OF EXCITED STATE EXCITON COMPLEXES WHOSE
HOLES DERIVE FROM THE GAMMA SUB 9 VALENCE BAND.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-718 162 20/12
CORNELL UNIV ITHACA N Y LAB OF ATOMIC AND SOLID STATE
PHYSICS

KINETICS OF EXCITONS IN CDS AT TEMPERATURE,

(U)

JUL 70 6P MAGDE, DOUGLAS ; MAHR, HERBERT

REPT. NO. TR-33, MSC-1395
CONTRACT: NONR-401(47)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V2
NID P4098-4103, 15 NOV 70.

DESCRIPTORS: (CADMIUM SULFIDES, *EXCITONS);
(*SEMICONDUCTORS, LUMINESCENCE); CRYOGENICS,
LASERS, LIFE EXPECTANCY, PHOTSENSITIVITY,
MATHEMATICAL MODELS (U)
IDENTIFIERS: PHOTOLUMINESCENCE, EXCITON EXCITON
INTERACTIONS (U)

NEW EXPERIMENTAL RESULTS OF PHOTOLUMINESCENCE OF
CDS AT THE TEMPERATURES SUGGEST TWO ALTERNATIVE
MODELS FOR THE FATE OF AN EXCITON IN CDS. THE
MODELS, INCLUDE EXCITON-EXCITON INTERACTION AND
EXPLAIN IN A SELF-CONSISTENT WAY ALL KNOWN
EXPERIMENTAL FACTS. ONE MODEL ASSUMES THAT THE LOW
OVER-ALL LUMINESCENT EFFICIENCY OF CDS AT LOW
TEMPERATURES IS DUE TO THE EXISTENCE OF A LARGE
CONCENTRATION OF NONRADIATIVE TRAPS. THE
ALTERNATIVE MODEL ASSUMES THAT THE OVER-ALL LOSS IN
EXCITATION IS CAUSED BY THE PROCESS OF FORMATION OF
EXCITONS FROM ELECTRON-HOLE PAIRS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-720 030 20/12
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS

POLARITON THEORY OF RAMAN SCATTERING IN
INSULATING CRYSTALS. II.

(U)

DESCRIPTIVE NOTES: TECHNICAL REPT.,

FEB 70 14P BENDOW, BERNARD I

REPT. NO. TR-1

CONTRACT: N00014-69-A-0200-6026, AF-AFOSR-610-67

PROJ: NR-017-631

MONITOR: AFOSR TR-71-1833

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V2

N12 P5051-5062, 15 DEC 70.

DESCRIPTORS: (+SEMICONDUCTORS, *RAMAN
SPECTROSCOPY), (+DIELECTRICS, RAMAN
SPECTROSCOPY), BAND THEORY OF SOLIDS, HAMILTONIAN,
CADMIUM SULFIDES, EXCITONS, PHONONS

(U)

IDENTIFIERS: POLARITONS, RAMAN SCATTERING

(U)

A FORMAL THEORY OF POLARITON RAMAN SCATTERING IN
INSULATORS IS DEVELOPED, USING BOTH THE EQUATION-OF-
MOTION AND SCATTERING-OPERATOR TECHNIQUES, AND THE
TEMPERATURE-DEPENDENT CROSS SECTION IS OBTAINED.
EXPLICIT FORMS ARE DERIVED FOR POLARITON
DISPERSIONS AND TRANSFORMATION COEFFICIENTS, AND FOR
THE RAMAN CROSS SECTION, FOR VARIOUS SPECIFIC
CASES, AMONG THEM A NON-DISPERSIVE HYDROGENIC
EXCITON-BAND MODEL. NUMERICAL CALCULATIONS ARE
CARRIED OUT FOR THE LATTER MODEL; THE RESULTING CROSS
SECTION DISPLAYS CONSIDERABLE VARIATION WITH INCOMING
FREQUENCY, DISPLAYING, AMONG OTHER THINGS, IN-OUT
RESONANCES WITH DISCRETE STATES, AND INTERFERENCE
BETWEEN DISCRETE AND CONTINUUM CONTRIBUTIONS TO
SCATTERING. COMPARISON WITH OTHER RESULTS AND WITH
EXPERIMENT IS GIVEN. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: /ZZZHT

AD-720 497 20/6 20/12
MISSOURI UNIV ROLLA

GENERALIZED PRINCIPAL ANGLE OF INCIDENCE AND
CRITICAL ANGLE,

(U)

OCT 69 JP ARMSTRONG, KANDALL R. IBELL,
ROBERT J. I
CONTRACT: F44620-69-C-0122
PROJ: AF-9556
MONITOR: AFOSR TR-71-0640

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN OPTICAL SOCIETY OF
AMERICA, V60 N5 P701-702 MAY 70.

DESCRIPTORS: (*CADMIUM SULFIDES, LIGHT
TRANSMISSION), (*SEMICONDUCTORS, SURFACE
PROPERTIES), INDIUM ANTIMONIDES, REFLECTION,
ABSORPTION, PHONONS

(U)

IDENTIFIERS: ANGLE OF INCIDENCE, PLASMON PHONON
INTERACTIONS, CRITICAL ANGLE REFLECTIVITY

(U)

ON STUDYING SURFACE PHENOMENA IT IS SOMETIMES
NECESSARY TO MEASURE VERY SMALL ABSORPTION OF
ELECTROMAGNETIC FIELDS. ACCORDINGLY, THE PRINCIPLE
ANGLE AND CRITICAL ANGLE MUST BE EXAMINED WITH CARE
FOR SURFACE STATE EXPERIMENTS. IN A PREVIOUS
PUBLICATION THE GENERALIZED LAWS OF REFRACTION AND
REFLECTION WERE PRESENTED. THE RESULTS HAVE BEEN
EXTENDED TO CALCULATE THE PRINCIPAL ANGLE OF
INCIDENCE AND THE CRITICAL ANGLE FOR TOTAL INTERNAL
REFLECTION. THE RESULTS WHICH HAVE BEEN
APPROXIMATED APPEAR TO BE REASONABLY ACCURATE.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-721 406 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SPIN EXCHANGE IN EXCITONS, THE QUASICUBIC
MODEL AND DEFORMATION POTENTIALS IN II-VI
COMPOUNDS.

(U)

MAY 70 18P LANGER, D. W. FEUWEMA, R.
N. IERA, KUH IKODA, TAKAO ;
REPT. NO. ARL-71-0009

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V2
NO P4005-4022, 15 NOV 70.

DESCRIPTORS: (SEMICONDUCTORS, EXCITONS), BAND
THEORY OF SOLIDS, CADMIUM SULFIDES, CADMIUM
SELENIDES, ZINC SULFIDES, COMPRESSIVE PROPERTIES,
CRYOGENICS, OXIDES, ZINC COMPOUNDS, SELENIDES
IDENTIFIERS: ZINC OXIDES, ZINC SELENIDES,
DEFORMATION POTENTIALS, SPIN ORBIT INTERACTIONS,
LIGAND FIELDS

(U)

(U)

THE EFFECT OF THE SPIN-EXCHANGE INTERACTION BETWEEN
ELECTRON AND HOLE IS INVESTIGATED FOR THE CASE OF
EXCITONS ORIGINATING FROM ONE OF THE P-LIKE VALENCE
BANDS AND AN S-LIKE CONDUCTION BAND, AS IS THE CASE
FOR 2B-6B COMPOUNDS. A GENERAL EXCITON MATRIX IS
CONSTRUCTED, STARTING FROM THE WORK OF PIKUS. IT
INCLUDES SPIN-ORBIT, CRYSTAL-FIELD, SPIN-EXCHANGE,
AND DEFORMATION-POTENTIAL INTERACTIONS. USE OF
THIS MATRIX THEN ALLOWS A THEORETICAL FIT TO THE
EXPERIMENTAL DATA WHICH DESCRIBES THE SHIFT OF
EXCITON LEVELS UNDER UNIAxIAL PRESSURE IN ZNO,
CUS, AND CDSE. THIS FIT RESULTS IN THE
DETERMINATION OF SIX DEFORMATION POTENTIALS, TWO
SPIN-ORBIT PARAMETERS, THE CRYSTAL-FIELD PARAMETER,
AND THE EXCHANGE PARAMETER. THE GENERAL THEORY,
WHEN ADAPTED TO THE ZINC-BLENDE STRUCTURE, PERMITS
THE AUTHORS TO FIT THEIR DATA ON CUBIC ZNS AND
ZNSE, RESULTING IN A DETERMINATION OF TWO
DEFORMATION POTENTIALS AND THE SPIN-EXCHANGE
PARAMETER FOR EACH COMPOUND. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-721 761 20/12
WASHINGTON UNIV SEATTLE

ACOUSTOELECTRIC AFTERCURRENT IN PHOTOCONDUCTING
CUS. (U)

70 9P HIGGINS, THOMAS J. (PARENT,
ROBERT J. (REDINBO, G. ROBERT (MOHR, JUDITH (

CONTRACT: DA-ARO-D-21-124-70-G58
PROJ: DA-2-0-D61102-B-31-E
MONITOR: AROD 839111-E

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PROCEEDINGS OF THE
NATIONAL ELECTRONICS CONFERENCE, HELD IN CHICAGO,
ILL., ON 7-9 DEC 70.

DESCRIPTORS: (*SEMICONDUCTORS, PIEZOELECTRIC
CRYSTALS), (*CADMIUM SULFIDES, ELECTRIC
CURRENTS), PHOTOCONDUCTIVITY, PHONONS,
MATHEMATICAL MODELS (U)
IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS (U)

IN A PIEZOELECTRIC SEMICONDUCTOR, IN WHICH THE
DRIFT VELOCITY OF THE CURRENT CARRIERS IS FASTER THAN
THE SOUND VELOCITY, ENERGY IS TRANSFERRED FROM THE
CARRIERS TO THE ACOUSTIC SYSTEM OF THE MATERIAL.
THIS ACOUSTOELECTRIC AFTER-CURRENT IS THE SUBJECT
OF THIS PAPER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-721 786 20/1 20/12 9/1
CALIFORNIA UNIV BERKELEY

SURFACE ELASTIC WAVES,

(U)

MAY 70 41P WHITE, RICHARD M. ;
CONTRACT: DA-AROD)-31-124-G1057
MONITOR: AROD 571B:9-E

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PROCEEDINGS OF THE IEEE, V58
NB P1238-1276 AUG 70.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 13 APR
70.

DESCRIPTORS: (*ULTRASONIC RADIATION, MICROWAVE
FREQUENCY), (*PIEZOELECTRIC CRYSTALS, ULTRASONIC
RADIATION), (*DELAY LINES, FEASIBILITY STUDIES),
PIEZOELECTRIC TRANSDUCERS, SEMICONDUCTORS, LITHIUM
COMPOUNDS, NIOBATES, CADMIUM SULFIDES.

REVIEWS

(U)

IDENTIFIERS: *ACOUSTIC SURFACE WAVES, SURFACE
WAVES, MICROWAVE ACOUSTICS, LITHIUM NIOBATES,
ACOUSTOOPTIC INTERACTIONS, PIEZOELECTRIC
SEMICONDUCTORS, INTERDIGITAL TRANSDUCERS

(U)

MANY OF THE RECENTLY DISCOVERED CHARACTERISTICS AND
APPLICATIONS TO ELECTRONICS OF SURFACE ELASTIC WAVES
ARE DISCUSSED. FIRST, THE PROPAGATION OF VARIOUS
ELASTIC WAVES AT THE SURFACES OF SOLIDS IS
CONSIDERED, FOLLOWED BY DESCRIPTIONS OF THE MANY WAYS
WHICH HAVE BEEN DEMONSTRATED FOR TRANSDUCTION BETWEEN
SURFACE ELASTIC WAVES AND ELECTROMAGNETIC WAVES.
SURFACE-WAVE AMPLIFICATION, PRIMARILY IN
SEMICONDUCTORS, AND WAVE GUIDING, FOCUSING, AND
REFLECTION ARE EXAMINED. THE PROPERTIES OF THESE
WAVES SUIT THEM FOR USE IN A NUMBER OF APPLICATIONS,
WHICH ARE DISCUSSED, RANGING FROM REALIZATION OF
ELECTRONIC AMPLIFIERS, FREQUENCY AND ANALOG TIME-
DOMAIN FILTERS, AND CODING DEVICES, TO THE MODULATION
OF LIGHT BEAMS AND THE MEASUREMENT OF SURFACE
PROPERTIES OF SOLIDS. MANY REFERENCES TO THE RECENT
SURFACE-WAVE LITERATURE ARE INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-721 050 20/12
PRINCETON UNIV N J DEPT OF ELECTRICAL ENGINEERING

METHODS OF DETERMINING SURFACE STATE
ENERGIES.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
APR 71 34P MARK, PETER I
REPT. NO. TR-11
CONTRACT: NOUC14-67-A-0151-0014
PROJ: NR-056-492

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF SURFACE SCIENCE,
V25 P192-223, MAR 71.

DESCRIPTORS: (*BAND THEORY OF SOLIDS, SURFACES),
SEMICONDUCTORS, DIELECTRICS, CADMIUM SULFIDES,
BRILLOUIN ZONES, POTENTIAL THEORY, WORK FUNCTIONS
IDENTIFIERS: SURFACE STATES

(U)

(U)

THE SURFACES OF SOLIDS PRESENT ELECTRONIC STATES,
SO-CALLED SURFACE STATES, IN ADDITION TO THE BAND
STRUCTURE OF THE INFINITE LATTICE. THIS PAPER
DISCUSSES THE ORIGIN OF THESE STATES, THEIR MAJOR
FEATURES, AND SURVEYS THE PRINCIPAL EXPERIMENTAL
TECHNIQUES FOR THEIR CHARACTERIZATION. IT ALSO
STRESSES THE IMPORTANCE OF STRUCTURE IN SURFACE STATE
THEORY, ENUMERATES THE DIFFICULTIES IN THE
INTERPRETATION OF EXPERIMENTAL SURFACE STATE
DISTRIBUTION MEASUREMENTS, AND SUGGEST THAT SUCH
MEASUREMENTS MAY BE HELPFUL IN THE INTERPRETATION OF
SURFACE STRUCTURE MEASUREMENTS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-722 112 10/2 20/12
CLEVITE CORP CLEVELAND OHIO

RESEARCH ON THE OPERATING AND FAILURE
MECHANISMS IN CDS SOLAR CELLS.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 69-31
MAY 70,

SEP 70 147F SHIOZAWA, L. R. AUGUSTINE,
F. COOK, W. R. JR;
CONTRACT: F33615-69-C-1732
PROJ: AF-7885, AF-916080/7885
MONITOR: ARL 7U-0169

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS,
FAILURE (ELECTRONICS)), (*SEMICONDUCTING FILMS,
ELECTRICAL PROPERTIES), CADMIUM SULFIDES, COPPER
COMPOUNDS, ELECTRIC CURRENTS, MANUFACTURING METHODS,
VAPOR PLATING, PHASE STUDIES, PHASE DIAGRAMS (U)
IDENTIFIERS: COPPER SULFIDES, THIN FILMS (U)

THE OPERATING AND FAILURE MECHANISMS OF CU₂S:
CDS THIN FILM SOLAR CELLS WERE EXAMINED FURTHER
DURING THE PAST YEAR. THE SHORT CIRCUIT CURRENT OF
PILOT PRODUCTION CELLS WAS FOUND TO BE SENSITIVE TO
THE UNIFORMITY OF ZN PLATING AND TO THE TEXTURE OF
THE METALLIZED PLASTIC SUBSTRATE. EXTENSIVE
LITERATURE AND EXPERIMENTAL STUDIES ON THE VARIOUS
FORMS OF CUPROUS SULFIDE WERE CARRIED OUT.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-722 701 20/12
YALE UNIV NEW HAVEN CONN DEPT OF ENGINEERING AND APPLIED
SCIENCE

AN EXPERIMENTAL STUDY OF THE VIBRONIC AND
ELECTRONIC RESONANCE RAMAN EFFECT IN
SEMICONDUCTOR AND GARNET CRYSTALS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAR 71 164P WAUSACK, RONALD L. ;
REPT. NO. TR-5
CONTRACT: N00014-67-A-0097-0005
PROJ: NR-016-203

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (*SEMICONDUCTORS, *RAMAN
SPECTROSCOPY), (*CADMIUM SULFIDES, RAMAN
SPECTROSCOPY), (*GARNET, RAMAN SPECTROSCOPY),
ALUMINUM COMPOUNDS, DYSPROSIUM COMPOUNDS, GALLIUM
COMPOUNDS, LUTECIUM COMPOUNDS, YTTERBIUM COMPOUNDS,
GAS LASERS, CRYOGENICS, PHONONS, THESES
IDENTIFIERS: LATTICE VIBRATIONS, ARGON LASERS

(U)

(U)

THE WORK DESCRIBES THE FIRST OBSERVATION OF
'RESONANT CANCELLATION' OF RAMAN SCATTERING FROM
LATTICE VIBRATIONS IN CdS AND ELECTRONIC LEVELS
IN DyAlG . PREVIOUS EXPERIMENTAL MEASUREMENTS
AND THEORETICAL PREDICTIONS HAD INDICATED THAT THE
RAMAN SCATTERING CROSS SECTION SHOULD INCREASE
MONOTONICALLY AS THE ENERGY OF THE INCIDENT RADIATION
APPROACHED THAT OF A FUNDAMENTAL ELECTRONIC
TRANSITION OF THE CRYSTAL. ESSENTIAL TO THIS
INVESTIGATION WAS THE AVAILABILITY OF A MULTI-
WAVELENGTH SOURCE OF INTENSE MONOCHROMATIC LIGHT.
A SENSITIVE RAMAN SPECTROSCOPY SYSTEM WAS
CONSTRUCTED WHICH EMPLOYED A FLOWING-GAS CW ARGON-
KRYPTON-XENON LASER. A CONTROL OF 22 LASING
TRANSITIONS WAS ACHIEVED: THE MAXIMUM OUTPUT POWER
WAS 0.65W AT 514.5 NM. SAMPLES WERE MOUNTED IN A
LIQUID NITROGEN COLD-FINGER DEWAR. RIGHT-ANGLE
SCATTERING WAS EMPLOYED WITH THE SCATTERED RADIATION
DETECTED BY THE USUAL COMBINATION OF A TANDEM DOUBLE-
MONOCHROMATOR AND A PHOTOMULTIPLIER TUBE. A PHOTON
COUNTER WITH DIGITAL/ANALOG OUTPUTS DROVE AN X-Y
RECORDER WHICH DISPLAYED THE RESULTANT SPECTRA.
(AUTHOR)

(U)

363

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#723 J15 10/2
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV
IMPROVEMENTS IN CDS THIN FILM SOLAR
CELLS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 NOV 69-31
OCT 70;
JAN 71 BIP DUNN, WILLIAM F. ;
CONTRACT: F33615-68-C-1182
PROJ: AF-7885
MONITOR: ARL 71-0015

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS,
PERFORMANCE(ENGINEERING)); SEMICONDUCTOR
DEVICES; CADMIUM SULFIDES; FLIGHT TESTING,
SCIENTIFIC SATELLITES (U)
IDENTIFIERS: OVI-13 SATELLITE, OVI-17 SATELLITE,
THIN FILMS (U)

THE REPORT IS CONCERNED WITH TWO AREAS IN THE
CADMIUM SULFIDE THIN FILM SOLAR CELL DEVELOPMENT
PROGRAM: (1) A REPORT ON SPACE FLIGHT TESTING
OF CDS CELLS AND (2) RESULTS OF A DEVELOPMENT
PROGRAM FOR IMPROVING THE STABILITY AND EFFICIENCY OF
THE STANDARD CDS CELL. TWO SPACE FLIGHT TESTS
OF CDS CELLS ARE REPORTED. THE FIRST TEST,
ARX-701, CONTAINED TWO CDS PANELS ON THE OVI-
13 SATELLITE. THE SECOND SPACE FLIGHT TEST
CONTAINED ONE CDS PANEL, ARX-901, AND WAS FLOWN
ON THE OVI-17 SATELLITE. A DEVELOPMENT PROGRAM
FOR OBTAINING ENGINEERING MEASUREMENTS FROM THE
CDS CELL WAS CARRIED OUT. A STUDY WAS MADE OF
HEATING EFFECTS ON THE CADMIUM SULFIDE THIN FILM CELL
AFTER FORMATION OF THE BARRIER LAYER. ADDITIONAL
INVESTIGATIONS WERE MADE OF LOW PRESSURE LAMINATIONS,
A SILVER COATED GLASS POWDER FOR METALLIZED SUBSTRATE
USE AND VARIATIONS IN GRIDGING ATTACHMENT.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY .SEARCH CONTROL NO. /ZZZHT

AU-723 373 20/12
MANITOBA UNIV WINNIPEG DEPT OF ELECTRICAL
ENGINEERING

CURRENT SATURATION IN CDS FILMS AT
VARIOUS TEMPERATURES, (U)

SEP 70 4P SADHU, A. IKAO, K. C. I

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN SOLID STATE
COMMUNICATIONS, V8 P2013-2015 1970. NO COPIES
FURNISHED BY DDC OR NTIS.

DESCRIPTORS: (*SEMICONDUCTING FILMS, ELECTRIC
CURRENTS), (*CADMIUM SULFIDES,
PHOTOCONDUCTIVITY), PHONONS, PIEZOELECTRIC
CRYSTALS (U)

IDENTIFIERS: PIEZOELECTRIC SEMICONDUCTORS,
PHOTOELECTRIC EMISSION, ACOUSTIC SURFACE WAVES,
SURFACE WAVES (U)

THE THRESHOLD FIELD FOR THE ONSET OF HIGH-FIELD
PHOTOCURRENT SATURATION IN A CDS FILM INCREASES
WITH INCREASING TEMPERATURE AND DECREASES WITH
INCREASING ILLUMINATION INTENSITY. THIS PHENOMENON
IS ATTRIBUTED TO THE ACOUSTIC WAVE INTERACTION WITH
FREE CARRIERS IN THE FILM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-723 713 20/12
UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ELECTRONIC
SCIENCES LAB

MULTIPLE-PHONON RESONANT RAMAN SCATTERING
THEORY,

(U)

SEP 70 6P WILLIAMS, M. L. ISMIT, J. I
CONTRACT: AF-AFOSR-1622-69
PROJ: AF-4751
MONITOR: AFOSR TR-71-1292

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN SOLID STATE
COMMUNICATIONS, V8 N23 P2009-2011 1970.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 3 AUG
70.

DESCRIPTORS: (*SEMICONDUCTORS, RAMAN
SPECTROSCOPY), (*CADMIUM SULFIDES, *RAMAN
SPECTROSCOPY), PHONONS, COHERENT RADIATION,
LASERS

(U)

MULTIPLE-PHONON RAMAN SCATTERING IN CDS IS
EXPLAINED BY A MODEL IN WHICH RESONANT ABSORPTION
OCCURS FOR ELECTRONICALLY AND VIBRATIONALLY EXCITED
LOCALIZED STATES. THE RADIUS OF THE LOCALIZED STATE
IS ESTIMATED TO BE ABOUT 20A. (AUTHOR)

(U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-723 927 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SELF-CONSISTENT ORTHOGONALIZED-PLANE-WAVE
CALCULATIONS:

(U)

FEB 71 46P EUWEMA, R. N. ISTUKEL, D.
J. COLLINS, T. C. I
REPT. NO. ARL-71-GU45
PROJ: AF-7085
TASK: 788500

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN COMPUTATIONAL METHODS IN
BAND THEORY, P82-12J 1971.

DESCRIPTORS: (*BAND THEORY OF SOLIDS, NUMERICAL
ANALYSIS), (*SEMICONDUCTORS, BAND THEORY OF
SOLIDS), FOURIER ANALYSIS, SERIES, WAVE
FUNCTIONS, INTEGRAL TRANSFORMS, CONVERGENCE,
DIAMONDS, ZINC SULFIDES, SILICON, CADMIUM
SULFIDES, CADMIUM SELENIDES

(U)

IDENTIFIERS: *ORTHOGONALIZED PLANE WAVE THEORY,
FOURIER SERIES, FOURIER TRANSFORMATION, ENERGY
BANDS

(U)

A NATURAL WAY TO DESCRIBE MATHEMATICALLY A VALENCE
WAVE FUNCTION IN A PERIODIC CRYSTAL IS IN TERMS OF A
FOURIER SERIES. HOWEVER, CONVERGENCE OF SUCH A
PLANE-WAVE SERIES IS VERY POOR BECAUSE THOUSANDS OF
PLANE-WAVE TERMS ARE REQUIRED TO SIMULATE THE RAPID
OSCILLATIONS OF THE WAVE FUNCTION CLOSE TO THE ATOMIC
NUCLEI. TO IMPROVE CONVERGENCE, HERRING PROPOSED
THE ORTHOGONALIZED-PLANE-WAVE (OPW) METHOD IN
WHICH THE PLANE-WAVE TERMS MAKING UP THE FOURIER
SERIES ARE ORTHOGONALIZED TO ALL THE TIGHTLY-BOUND,
CORE-WAVE FUNCTIONS. THIS ORTHOGONALIZATION VASTLY
IMPROVES THE CONVERGENCE BECAUSE THE CORE FUNCTIONS
PRESENT IN THE VALENCE WAVE FUNCTION EXPANSION
CORRECTLY SIMULATE THE BEHAVIOR OF THE VALENCE WAVE
FUNCTION IN THE CORE REGIONS, WHILE THE PLANE-WAVE
TERMS ADEQUATELY DESCRIBE THE OVERALL CRYSTALLINE
BEHAVIOR OF THE FUNCTION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD#724 818 20/5 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

SIMULATED EMISSION SPECTRA OF CDS
PLATELETS UNDER VARIOUS EXCITATION LEVELS. (U)

AUG 70 10P ERA, KOH ; LANGER, DIETRICH
W. I
REPT. NO. ARL-71-0060
PROJ: AF-7885
TASK: 788500

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,
V42 N3 P1021-1027, 1 MAR 71.

DESCRIPTORS: (=CADMIUM SULFIDES, COHERENT
RADIATION), SPECTRA (VISIBLE + ULTRAVIOLET),
GAS LASERS, SEMICONDUCTORS, CRYOGENICS,
EXCITONS (U)

IDENTIFIERS: EMISSION SPECTRA, NITROGEN LASERS,
STIMULATED RADIATION, EXCITON EXCITON
INTERACTIONS, CADMIUM SULFIDE LASERS (U)

THE REPORT DISCUSSES THE STIMULATED EMISSION OF
CDS PLATELETS EXCITED BY LIGHT PULSES FROM A N2
LASER AT 2 DEGREES AND 77 DEGREES K, AS A FUNCTION
OF THE LEVEL OF EXCITATION AND FOR DIFFERENTLY
PREPARED CRYSTALS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-724 886 2U/2
DELAWARE UNIV NEWARK DEPT OF PHYSICS

GROWTH AND PROPERTIES OF STEEPLY GRADED
Zn(F)Cd(1-F)S CRYSTALS, (U)

OCT 70 IJP BITEK, W. J. WILLIAMS, FEND

CONTRACT: DA-ARO-D-31-124-71-G30
PROJ: DA-2-0-061102-H-11-B
MONITOR: AROU 4169:16-P

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF LUMINESCENCE, V3
P395-404 1971.

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 27 JUL
70.

DESCRIPTORS: (*ZINC SULFIDES, *EPITAXIAL GROWTH);
(*CADMIUM SULFIDES, EPITAXIAL GROWTH);
LUMINESCENCE, ULTRAVIOLET RADIATION, ELECTRICAL
PROPERTIES, OPTICAL PROPERTIES, SEMICONDUCTORS (U)
IDENTIFIERS: CHEMICAL VAPOR DEPOSITION,
PHOTOLUMINESCENCE, MINORITY CARRIER LIFETIME (U)

STEEPLY GRADED MIXED CRYSTALS OF Zn(F)Cd(1-F)
S WERE GROWN BY A VAPOR PHASE DEPOSITION OF
CdS ONTO CLEAVED SLICES OF ZnS FOLLOWED BY A
PERIOD OF INTERDIFFUSION. THIS PRODUCED A GRADED
REGION BETWEEN 50 AND 100 MICROMETERS WIDE WITH A
BANDGAP GRADIENT $(dE_{\text{SUB } G})/DX$ VARYING BETWEEN 10
AND 100 EV/CM. THE DIFFUSION COEFFICIENT WAS
DETERMINED AS A FUNCTION OF POSITION. THE CRYSTALS
HAVE GOOD PHOTOLUMINESCENT PROPERTIES. WITH UV
EXCITATION, THE ZnS SIDE SHOWS BLUE EMISSION AT
77K WHILE THE CdS SIDE HAS RED
PHOTOLUMINESCENCE. BY IRRADIATING THE GRADED
REGION, THE PEAK OF THE PHOTOLUMINESCENCE SHIFTS AS A
FUNCTION OF THE WAVELENGTH OF EXCITATION. THE
CRYSTALS DO NOT EXHIBIT MEASURABLE
ELECTROLUMINESCENCE OR DEPENDENCE OF THE
PHOTOLUMINESCENCE ON APPLIED ELECTRICAL FIELD. A
LOW MINORITY CARRIER LIFETIME IS EXPLAINED BY THE
HIGH DENSITY OF DEEP ACCEPTORS. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-725 062 20/2 20/12 7/4
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 68-31
MAY 70.

JAN 71 119P SHIOZAWA, L. R. JOOST, J.

M. ;

CONTRACT: F33615-68-C-1601

PROJ: AF-7885

MONITOR: ARL 71-0017

UNCLASSIFIED REPORT

DESCRIPTORS: (*CADMIUM COMPOUNDS, CRYSTAL GROWTH),
(*ZINC COMPOUNDS, CRYSTAL GROWTH),
(*SEMICONDUCTORS, *CRYSTAL GROWTH), CADMIUM
SULFIDES, CADMIUM SELENIDES, TELLURIDES, PHASE
STUDIES, THERMODYNAMICS, ZINC SULFIDES, SELENIDES (U)
IDENTIFIERS: CADMIUM TELLURIDES, ZINC TELLURIDES,
ZINC SELENIDES (U)

THERMODYNAMIC PROPERTIES ASSOCIATED WITH THE II-VI SYSTEMS HAVE BEEN DETERMINED FROM VARIOUS PUBLISHED DATA AND FROM EXPERIMENTAL WORK DONE HERE. ACCURATE VAPOR PRESSURE EQUATIONS HAVE BEEN OBTAINED FOR ZN, CD, S, SE, AND TE. THE PHASE DIAGRAMS OF THE ZN-S, CD-S, ZN-SE, CD-SE, ZN-TE, AND CD-TE SYSTEMS HAVE BEEN ESTABLISHED, ALTHOUGH IN SOME CASES ONLY TENTATIVELY. THE TEMPERATURE DEPENDENT EQUILIBRIUM CONSTANTS FOR THE SUBLIMATION OF ZNS, CDS, ZNSE, CDSE, ZNTE, AND CDTE HAVE BEEN ACCURATELY EVALUATED. THE COMPONENT PRESSURES AT THE SOLID STABILITY FIELD BOUNDARIES (P-T DIAGRAMS) OF CDS, CDSE, ZNTE, AND CDTE HAVE BEEN DETERMINED EXPERIMENTALLY. THE BOUNDARY PRESSURES FOR ZNS AND ZNSE ARE ESTIMATED BY ANALOGY. A THEORY OF THE CONSTITUTION OF THE EQUILIBRIUM LIQUID AT THE SOLID STABILITY FIELD BOUNDARIES INVOKING SPECIFIC MOLECULAR SPECIES HAS BEEN DEVELOPED AND APPLIED TO THE CD-TE SYSTEM. THE COMPOSITIONS AT THE SOLID STABILITY FIELD BOUNDARIES (X-T DIAGRAMS) OF CDS AND ZNTE HAVE BEEN TENTATIVELY EVALUATED. SOME APPLICATION OF THIS BASIC INFORMATION HAS BEEN MADE IN EXERCISING CONTROL OF II-VI CRYSTAL GROWTH AND TREATMENT. (AUTHOR) (U)

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UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-725 177 20/12 7/4
PRINCETON UNIV N J DEPT OF ELECTRICAL ENGINEERING

AUORPTION-INDUCED CONDUCTIVITY CHANGES IN
COMPOUND SEMICONDUCTORS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT., SEP 69-JUN 71,
JUN 71 17JP BAIDYAROV, SUPRASAD ; MARK,
PETER ;
REPT. NO. TR-9
CONTRACT: N00014-67-A-0151-DU14
PROJ: NR-056-492

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (*SEMICONDUCTORS, ELECTRICAL
CONDUCTANCE), (*CHEMISORPTION, SEMICONDUCTORS),
CADMIUM SULFIDES, CADMIUM SELENIDES, LEAD
COMPOUNDS, IODIDES, OXYGEN, SINGLE CRYSTALS,
SURFACE PROPERTIES, PHOTSENSITIVITY,
SEMICONDUCTING FILMS, BAND THEORY OF SOLIDS
IDENTIFIERS: LEAD IODIDES

(U)

(U)

LARGE CHANGES IN THE EQUILIBRIUM SEMICONDUCTIVITY
OF THIN COMPOUND SEMICONDUCTORS INDUCED BY
CHEMISORPTION ARE INVESTIGATED. EVAPORATED FILMS
AND SINGLE CRYSTALS OF CDS AND SINGLE CRYSTALS OF
CDSE (BOTH N-TYPE) SHOW A GRADUAL REDUCTION
IN SEMICONDUCTIVITY COUPLED WITH AN INCREASE IN
ACTIVATION ENERGY WITH INCREASING OXYGEN PRESSURE
ABOVE A CERTAIN THRESHOLD. EVAPORATED CDS FILMS
ARE MORE SENSITIVE TO SUCH CHANGES AT LOWER PRESSURE
AS ARE THE MORE HIGHLY COMPENSATED CU AND AU
DOPED FILMS. OXYGEN CHEMISORPTION STATES OF CDS
AND CDSE ARE DISTRIBUTED IN ENERGY IN THE
SEMICONDUCTOR BANDGAP BEING LARGEST AT THE CONDUCTION
BAND EDGE AND DECREASING EXPONENTIALLY WITH ENERGY
INTO THE GAP. ATOMICALLY STRUCTURED CDS SINGLE
CRYSTAL SURFACES, OBTAINED BY ION BOMBARDMENT AND
VACUUM ANNEALING ARE INSENSITIVE TO CHEMISORPTION.
THUS, ADSORPTION SITES CAN BE ASSOCIATED WITH
SURFACE IMPURITIES AND/OR IMPERFECTIONS. PB12
(P-TYPE) EXHIBITS AN INCREASE IN SEMICONDUCTIVITY
WITH OXYGEN PRESSURE IN ACCORD WITH THE MODELS
DEVELOPED IN THE REPORT. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-725 634 20/12
MASSACHUSETTS INST OF TECH CAMBRIDGE FRANCIS BITTER
NATIONAL MAGNET LAB

ANOMALOUS FAR INFRARED MAGNETOABSORPTION IN
N-TYPE CADMIUM SULFIDE, (U)

DEC 70 6P COHN, DANIEL R. ILAX,
BENJAMIN I;BUTTON, KENNETH J. I;DREYBRODT, WOLFGANG

CONTRACT: F44620-67-C-0047
PROJ: AF-9764
TASK: 976401
MONITOR: AFOSR TR-71-1813

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN SOLID STATE
COMMUNICATIONS, V9 N7 P441-444 1971.

DESCRIPTORS: (*SEMICONDUCTORS, CYCLOTRON RESONANCE
PHENOMENA); (*CADMIUM SULFIDES, INFRARED
RADIATION), ABSORPTION SPECTRUM, GAS LASERS,
SUBMILLIMETER WAVES, MAGNETIC FIELDS, CRYOGENICS,
ANOMALIES (U)

IDENTIFIERS: FAR INFRARED RADIATION, (U)
MAGNETOABSORPTION (U)

MAGNETIC FIELD DEPENDENT FAR INFRARED ABSORPTION IN
N-CDS HAS BEEN STUDIED OVER A WIDE RANGE OF
FREQUENCIES AND MAGNETIC FIELDS AT 1.4K. TWO
STRONG ABSORPTIONS WHICH ARE CHARACTERIZED BY A
LINEAR DEPENDENCE OF FREQUENCY UPON MAGNETIC FIELD
ARE OBSERVED. HOWEVER, THE BEHAVIOR OF THESE
ABSORPTIONS INDICATES THAT THEY ARE NOT DUE TO
CYCLOTRON RESONANCE TRANSITIONS. THE EXISTENCE OF
A VERY SHALLOW BOUND STATE IS POSTULATED IN ORDER TO
EXPLAIN THE FEATURES OF THESE ABSORPTIONS.
(AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-725 942 20/12
PENNSYLVANIA UNIV PHILADELPHIA LAB FOR RESEARCH ON THE
STRUCTURE OF MATTER

RESONANCE-ENHANCED BRILLOUIN SCATTERING IN
CRYSTALS. (U)

MAR 70 16P BURSTEIN, E. ; ITO, R. ;
PINCZUK, A. ; SHAND, M. ;
CONTRACT: DA-31-124-ARO(D)-239
PROJ: DA-2-0-061102-B-11-B
MONITOR: AROD 4882:18-P

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN THE JNL. OF THE
ACOUSTICAL SOCIETY OF AMERICA, V49 N3 PT3 P1013-1025
MAR 71.

DESCRIPTORS: (•LIGHT TRANSMISSION, CRYSTALS),
RAMAN SPECTROSCOPY, EXCITONS, PHONONS,
SEMICONDUCTORS, SCATTERING, CADMIUM SULFIDES,
ZINC COMPOUNDS, OXIDES (U)

IDENTIFIERS: •BRILLOUIN SCATTERING, POLARITONS,
LIGHT SCATTERING, ZINC OXIDES, ACOUSTOOPTIC
INTERACTIONS, PHOTON PHONON INTERACTIONS (U)

THE PHENOMENOLOGICAL THEORY OF LIGHT SCATTERING BY
OPTICAL AND ACOUSTICAL PHONONS IS REVIEWED. THE
RESONANCE ENHANCEMENT OF BRILLOUIN SCATTERING BY
ACOUSTICAL PHONONS IN THE VICINITY OF THE INTRINSIC
ABSORPTION EDGE IS RELATED TO THE ENHANCEMENT OF THE
ELASTO-OPTICAL CONSTANTS. A MACROSCOPIC THEORY OF
RESONANCE-ENHANCED BRILLOUIN SCATTERING BY
ACOUSTICAL PHONONS ANALOGOUS TO THAT OF RESONANCE-
ENHANCED RAMAN SCATTERING BY OPTICAL PHONONS IS
FORMULATED IN TERMS OF THE SCATTERING OF POLARITONS
BY THE ACOUSTIC PHONONS VIA THE EXCITON AND CONTINUUM
ELECTRON-HOLE PAIR EXCITATION PARTS OF THE INCIDENT
AND SCATTERED POLARITONS. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-725 995 9/1 20/1 20/12
HARRY DIAMOND LABS WASHINGTON D C

GENERATION AND PROPAGATION OF HYPERSONIC
WAVES AND THEIR APPLICATIONS TO MICROWAVE
FREQUENCIES. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAY 71 49P REGGIA, FRANK I
REPT. NO. HDL-YR-1530
PROJ: DA-1-T-061101-B-31-A, HDL-KEL25

UNCLASSIFIED REPORT

DESCRIPTORS: (*DELAY LINES, MICROWAVE FREQUENCY);
(*ULTRASONIC RADIATION, MICROWAVE FREQUENCY),
SEMICONDUCTOR DEVICES, PIEZOELECTRIC CRYSTALS,
CADMIUM SULFIDES, ZINC COMPOUNDS, OXIDES,
ALUMINA, PIEZOELECTRIC TRANSDUCERS, VAPOR PLATING,
VACUUM APPARATUS, THESES (U)
IDENTIFIERS: *MICROWAVE ACOUSTICS, ZINC OXIDES,
THIN FILMS, PIEZOELECTRIC SEMICONDUCTORS,
ELASTIC WAVES (U)

THE PAPER DESCRIBES TECHNIQUES FOR THE GENERATION,
AMPLIFICATION, AND PROPAGATION OF ELASTIC WAVES IN
THE FREQUENCY RANGE 1 TO 3 GHZ. THESE TECHNIQUES
INCLUDE THE DESIGN, FABRICATION, AND EVALUATION OF
MICROWAVE ACOUSTIC DELAY LINES CONSISTING OF HIGHLY
ORIENTED ELECTROACOUSTIC CDS AND ZNO
TRANSDUCERS VACUUM-DEPOSITED ON SINGLE-CRYSTAL
SAPPHIRE (AL2O3) PROPAGATING MEDIA. TYPICAL
ELECTRICAL CHARACTERISTICS AT 2 GHZ OF THESE THIN-
FILM TRANSDUCERS (ABOUT 1 MICROMETER THICK) AND
DELAY MEDIA COMBINATION, IN BOTH 6 MICROSEC,
INSERTION LOSS LESS THAN 40 DB, INPUT VSWR LESS
THAN 2.0 OVER A 20-PERCENT BANDWIDTH, AND OPERATING
TEMPERATURE FROM -74 DEGREES TO +96 DEGREES C.
THESE FIXED, PASSIVE MICROWAVE ACOUSTIC DELAY LINES
(MAUL) ARE VERY RELIABLE AND ARE SMALL,
LIGHTWEIGHT, AND RELATIVELY INEXPENSIVE TO FABRICATE.
ACOUSTIC PROPAGATION VELOCITY, POWER HANDLING
CAPABILITIES, IMPEDANCE MATCHING TECHNIQUES, AND
APPLICATIONS OF THESE ELECTROACOUSTIC DELAY LINES ARE
ALSO DISCUSSED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-726 138 20/12 20/3
INTERNATIONAL UNION OF PURE AND APPLIED PHYSICS LONDON
(ENGLAND)

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON
PHOTOCONDUCTIVITY (JRD) HELD AT STANFORD
UNIVERSITY, CALIFORNIA, ON 12-15 AUGUST 1969. (U)

71 421P PELL,ERIK M. :

UNCLASSIFIED REPORT

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SUPPLEMENTARY NOTE: SPONSORED IN PART BY OFFICE OF
NAVAL RESEARCH, WASHINGTON, D. C. PREPARED IN
COOPERATION WITH AMERICAN PHYSICAL SOCIETY, NEW
YORK.

DESCRIPTORS: (PHOTOCONDUCTIVITY, SYMPOSIA),
(SEMICONDUCTORS, PHOTOCONDUCTIVITY), BAND
THEORY OF SOLIDS, FERROELECTRIC CRYSTALS, GERMANIUM,
SILICON, GALLIUM ARSENIDES, CADMIUM SULFIDES,
ZINC SULFIDES, ANTHRACENES, STRONTIUM COMPOUNDS,
BARIUM COMPOUNDS, INDIUM ANTIMONIDES, ALKALI METAL
COMPOUNDS, HALIDES, TITANATES, DOPING,
LUMINESCENCE, IMPURITIES, PHONONS, EXCITONS,
GREAT BRITAIN (U)

IDENTIFIERS: METAL OXIDE SEMICONDUCTORS, ENERGY
BANDS, PHOTOVOLTAIC EFFECT, HIGH FIELD DOMAINS,
HETEROJUNCTIONS, SCHOTTKY BARRIERS, ELECTRON
PHONON INTERACTIONS (U)

CONTENTS: PHOTOCONDUCTIVITY GENERAL;
SEMICONDUCTORS; PHOTOCONDUCTIVITY GENERAL, HIGH
RESISTIVITY MATERIALS; PHOTOCONDUCTIVITY GENERAL,
IONIC CRYSTALS; MOSTLY TERNARY COMPOUNDS;
IMPURITIES AND DEFECTS; ORGANIC MATERIALS-PHONON
EFFECTS; STRUCTURES, JUNCTIONS, BARRIERS. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 048 20/2 20/12 13/8
CLEVITE CORP CLEVELAND OHIO ELECTRONIC RESEARCH DIV

RESEARCH ON IMPROVED II-VI CRYSTALS. (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 1 JUN 70-31
JAN 71.

MAR 71 36P SHIOZAWA, L. K. ; JOST, J.

M. ;

CONTRACT: F33615-68-C-1601

PROJ: AF-7885

MONITOR: ANL 71-0054

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-725 062.

DESCRIPTORS: (*CADMIUM SULFIDES, CRYSTAL GROWTH),
(*CADMIUM SELENIDES, CRYSTAL GROWTH),
(*SEMICONDUCTORS, *CRYSTAL GROWTH), ZINC
COMPOUNDS, ZINC SULFIDES, TELLURIDES, SELENIDES.
PHASE STUDIES, TWINNING (CRYSTALLOGRAPHY) (U)
IDENTIFIERS: *CADMIUM TELLURIDES, *ZINC
TELLURIDES, ZINC SELENIDES (U)

VAPOR PHASE GROWTH OF SINGLE-CRYSTAL BOULES OF
CDTE, CDSE, ZNTE, AND CDS WAS
ATTEMPTED BY THE SEED-GROWTH METHOD USING A CAPILLARY
LEAK TO MAINTAIN A STOICHIOMETRICALLY-PROPORTIONED
VAPOR COMPOSITION DURING THE GROWTH PROCESS.
ALTHOUGH A MEASURE OF SUCCESS WAS ATTAINED,
DIFFICULTIES AROSE SUCH AS FORMATION OF EXTRANEUS
NUCLEATION AND OCCURRENCE OF INCLUSIONS OF SiO₂
PARTICLES. SINGLE-CRYSTAL GROWTH AT RELATIVELY HIGH
GROWTH RATES OVER AT LEAST A LIMITED SEED AREA WAS
OBTAINED FOR EACH COMPOUND FOR THE COMPLETE LENGTH OF
THE BOULE. IMPROVED TECHNIQUES SHOULD ELIMINATE
MUCH OF THE DIFFICULTY BUT SOME MODIFICATIONS OF THE
METHOD MAY BE NECESSARY TO ATTAIN COMPLETE SUCCESS.
AN ANALYSIS OF MULTIPLE TWINNING IN CDTE AND
ZNTE CRYSTALS OCCURRING DURING THE GROWTH PROCESS
IS ALSO GIVEN. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 061 20/12 20/5
ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB

RADIATION EFFECTS IN SEMICONDUCTING LASER
MATERIALS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 4 JAN 70-JAN 71,
MAR 71 45P ARORA, B. M. ;
CONTRACT: F33615-69-C-1251
PROJ: AF-7885
MONITOR: ARL 71-U064

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, RADIATION DAMAGE),
(*LASERS, SEMICONDUCTORS), CADMIUM SULFIDES,
CADMIUM SELENIDES, DOPING, SODIUM CHLORIDE,
LUMINESCENCE, NEUTRON REACTIONS

(U)

IDENTIFIERS: *LASER MATERIALS, CADMIUM SULFIDE
LASERS, CADMIUM SELENIDE LASERS, SEMICONDUCTOR
LASERS, EMISSION SPECTRA

(U)

LUMINESCENCE OF PURE CDSE, CDS AND
COSSE HAS BEEN INVESTIGATED IN THE TEMPERATURE
RANGE FROM ABOUT 6K TO 80K. AT LOW
TEMPERATURE, THE STIMULATED LUMINESCENCE OF A
CDSE PLATELET CONSISTS OF SEVERAL LASER PEAKS
DEPENDING UPON THE PLATELET UNDER STUDY AND THE LEVEL
OF ITS EXCITATION. SOME OF THE LASER PEAKS APPEAR
TO BE CORRELATED TO THE SPONTANEOUS LINES SEEN IN OUR
MEASUREMENTS, AND REPORTED AS WELL AS INTERPRETED BY
OTHER INVESTIGATORS. IRRADIATION OF CDSE
PLATELETS WITH FAST NEUTRONS INTRODUCES NEW LASER
LINES WHICH ARE SHIFTED TOWARDS LONGER WAVELENGTHS.
THESE RESULTS ARE INTERPRETED IN TERMS OF THE DECAY
OF EXCITONS BOUND TO DEFECTS. SOME EFFECTS OF
CHEMICAL DOPING HAVE ALSO BEEN INVESTIGATED. BROAD
BAND EDGE EMISSION, WHICH IS ABSENT IN THE PURE
CRYSTALS, APPEARS VERY STRONG ON DOPING CDS AND
CDSE WITH NACL. THIS SUGGESTS THAT NA
AND CL ARE THE IMPURITIES RESPONSIBLE FOR THE PAIR
EMISSION, WHICH IS CONSISTENT WITH THE SUGGESTION OF
HENRY AND THOMAS THAT NA ACTS AS AN ACCEPTOR
AND CL AS A DONOR IN THESE MATERIALS.

(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 097 20/12
HUGHES RESEARCH LABS MALIBU CALIF

SELECTIVE DOPING OF PIEZOELECTRIC CRYSTALS BY
ION IMPLANTATION.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,
MAY 71 107P MARSH, U. J. ; JONES, W. R.
; WALDNER, M. ; WALK, M. T. ; HART, R. R. ;
CONTRACT: N00014-69-C-0171
PROJ: NR-251-U01, #RU08-U3/R152-545

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, DOPING),
(*PIEZOELECTRIC CRYSTALS, ION BOMBARDMENT),
GALLIUM ARSENIDES, CADMIUM SULFIDES, ZINC
COMPOUNDS, OXIDES

(U)

IDENTIFIERS: *ION IMPLANTATION, ZINC OXIDES,
SURFACE WAVES, SURFACE WAVE AMPLIFIERS

(U)

THE FEASIBILITY OF CREATING N-TYPE CONDUCTING
REGIONS IN SEMI-INSULATING (> 10 TO THE 7TH POWER
CM) PIEZOELECTRIC CRYSTALS BY ION IMPLANTATION HAS
BEEN INVESTIGATED. THE ULTIMATE PURPOSE WOULD BE
TO FORM MONOLITHIC ACOUSTIC SURFACE-WAVE AMPLIFIERS.
EXPERIMENTAL STUDIES HAVE BEEN PERFORMED WITH
ZNO, CDS, AND GAAS. CADMIUM SULFIDE WAS
IMPLANTED WITH B, AL, GA, FL, AND CL.
SULFUR IMPLANTATIONS INTO GAAS PRODUCED N-TYPE
LAYERS WITH MOBILITIES OF 2000 SQ CM/V-SEC.
STUDIES OF IMPLANTATION DOPING WITH PROTONS INTO
ZNO SHOWED THAT LAYERS OF CONTROLLED SHEET
RESISTIVITIES COULD NOT BE PREDICTED BUT COULD BE
PRODUCED. ADSORPTION AND DESORPTION OF OXYGEN
DURING AND AFTER IMPLANTATION PLAYED A SIGNIFICANT
ROLE IN DETERMINING THE CONDUCTIVITY OF THE IMPLANTED
LAYER, SUGGESTING THAT CONSIDERABLE DIFFICULTY WITH
STABILITY IN THE FINAL DEVICE MIGHT BE EXPECTED.
CARRIER MOBILITIES IN THE PROTON IMPLANTED LAYERS
AS HIGH AS 71 SQ CM/V-SEC WERE OBSERVED, WHICH IS
SUFFICIENT FOR AMPLIFIER ACTION. THE MONOLITHIC
AMPLIFIER DEVICE HAS BEEN ANALYZED THEORETICALLY,
TREATING SEPARATELY THE PROPAGATING CHARACTERISTICS
OF SURFACE WAVES AND THE AMPLIFYING SECTION UTILIZING
A THIN DOPED CONDUCTING REGION. CALCULATIONS ON THE
PERFORMANCE OF THE AMPLIFYING ELEMENT HAVE BEEN MADE
IN TWO WAYS. FIRST, AN ANALYTICAL EXPRESSION IS
DERIVED IN A SIMPLE WAY ON THE ASSUMPTION THAT THE
CONDUCTING REGION IS VERY THIN.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-727 544 2U/12
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

THE OPTICAL PROPERTIES OF THIN SINGLE-
CRYSTAL CDS FILMS IN A WIDE SPECTRAL
INTERVAL,

(U)

JUN 71 13P BRODIN, M. S. ISTRASHNIKOVA,
M. I. ;
REPT. NO. FTD-MT-24-49-71

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF ELECTRON.
PROTSESSY POVERKH. MONOKRIST SLOYAKH POLUPROV.
SIBIRSKOE UTGELENIE. INSTITUT FIZ. POLUPROV.
SIMPOZIUM, N.P., 1967. TRUDY (ELECTRONIC PROCESSES
OF SINGLE-CRYSTAL LAYERS OF SEMICONDUCTORS. THE
SIBERIAN BRANCH OF THE INSTITUTE OF PHYSICS OF
SEMICONDUCTORS. SYMPOSIUM, N.P., 1967.
TRANSACTIONS), N.P. 1967 P177-18U. BY CHARLES T.
OSTERTAG.

DESCRIPTORS: (SEMICONDUCTING FILMS, BAND THEORY OF
SOLIDS), (CADMIUM SULFIDES, OPTICAL
PROPERTIES), SINGLE CRYSTALS, POLARIZATION,
ULTRAVIOLET SPECTROSCOPY, EXCITONS, CRYOGENICS,
USSR

(U)
(U)

IDENTIFIERS: TRANSLATIONS

FOR REFLECTION, ABSORPTION, AND DISPERSION
MEASUREMENTS, SINGLE-CRYSTAL CDS THIN FILMS OF
VARIOUS THICKNESS WERE USED. THE THICKNESS OF THE
PARTICULAR THIN FILM USED WAS DETERMINED.
REFLECTION CURVES WERE MEASURED BY THE NORMAL
INCIDENCE OF LIGHT ON THE CRYSTAL STUDIED. FOR THE
MEASUREMENTS OF THE ABSORPTION AND DISPERSION CURVES,
PHOTOGRAPHIC, PHOTOELECTRIC, AND INTERFERENCE METHODS
WERE USED. THE CURVES OBTAINED ARE DISCUSSED IN
DETAIL, AND THE MEASURED VALUE COMPARED WITH
CALCULATED VALUES. THERE IS ESSENTIALLY NO
DIFFERENCE BETWEEN THE SURFACE AND THE BULK LAYERS OF
CDS CRYSTALS, INSOFAR AS THE OPTICAL PROPERTIES
ARE CONCERNED. THE USE OF THIN SINGLE-CRYSTAL
FILMS MAKES IT POSSIBLE TO MEASURE THE SPECTRAL
DISTRIBUTION OF ABSORPTION AND DISPERSION IN A
POLARIZED LIGHT IN A WIDE REGION BEYOND THE
ABSORPTION LIMIT, CORRESPONDING TO THE EXCITATION OF
THE DEPTH OF THE CONDUCTION BAND.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 219 7/2
BELL AND HOWELL CO PASADENA CALIF ELECTRONIC MATERIALS
DIV

ANALYTICAL TECHNIQUES FOR THE DETERMINATION OF
TRACE IMPURITIES IN II-VI COMPOUNDS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JUN 68-31 MAY 70,
SEP 70 9:30 P SOCHA, ARTHUR J.; MASUMOTO,
ELEANOR M.; WILKINSON, ROBERT K. ;
CONTRACT: F33615-68-C-1635
PROJ: AF-7885
MONITOR: AKL 70-U170

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPERSEDES AD-717 706.

DESCRIPTORS: (*SULFIDES, *MASS SPECTROSCOPY),
(*SEMICONDUCTORS, CHEMICAL ANALYSIS), (*CADMIUM
COMPOUNDS, CHEMICAL ANALYSIS), (*ZINC COMPOUNDS,
CHEMICAL ANALYSIS), IMPURITIES, CADMIUM
SULFIDES, CADMIUM SELENIDES, ZINC SULFIDES, ZINC
OXIDES, SURFACES, IONIZATION, SPECTRUM
ANALYZERS (U)
IDENTIFIERS: *GROUP 2B-6A COMPOUNDS (U)

ANALYSES OF II-VI COMPOUNDS WERE PERFORMED
USING SPARK SOURCE MASS SPECTROMETER TECHNIQUES.
OF A TOTAL OF 193 SAMPLES, 153 WERE ANALYZED USING
PHOTOGRAPHIC TECHNIQUES AND 40 USING ELECTRONIC
METHODS. THE COMPOUNDS OF PRIMARY INTEREST WERE
GDS, CDSE, ZNS, AND ZNSE. DETECTION
LIMITS WERE ON THE ORDER OF 1 TO 10 PARTS PER
MILLION. A TECHNIQUE WAS DEVELOPED FOR DETERMINING
OXYGEN IN CADMIUM SULFIDE. OXYGEN WAS FOUND IN
CONCENTRATIONS OF A FEW PARTS PER MILLION. STUDIES
WERE MADE INVOLVING PLATINUM AS A PROBE MATERIAL.
THE EFFECTS OF USING 24 KV ACCELERATING VOLTAGE
AS COMPARED WITH 16 KV WERE ALSO INVESTIGATED. A
NEW TECHNIQUE WAS DEVELOPED FOR THE ANALYSIS OF
SULFUR. DETECTION LIMITS OF <0.1 PARTS PER
MILLION WERE OBTAINED. A NEW TYPE OF MASS
SPECTROMETER WAS USED FOR THE FIRST TIME TO
INVESTIGATE THE DISTRIBUTION OF IMPURITIES IN CADMIUM
SULFIDE. THE INSTRUMENT, CALLED THE ION
MICROANALYZER HAS THE CAPABILITY OF ANALYZING
SURFACES BY SPUTTERING AWAY SUCCESSIVE MONOLAYERS OF
MATERIAL WITH A BEAM OF IONIZED GAS. ION IMAGES,
AND MASS SPECTRA WERE OBTAINED FOR SAMPLES OF SODIUM-
AND COPPER-DOPED CADMIUM SULFIDE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 387 2U/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

AG DOPING OF CADMIUM SULFIDE AND ITS
INFLUENCE ON ELECTRICAL PROPERTIES. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUN 71 65P HADLEY, HENRY C., JR;
REPT. NO. TR-2
CONTRACT: N00014-71-C-0169

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, DOPING),
(*CADMIUM SULFIDES, ELECTRICAL CONDUCTANCE),
NEGATIVE RESISTANCE CIRCUITS, SILVER, ALUMINUM,
IONIZATION, THESES (U)
IDENTIFIERS: *SEMICONDUCTOR DOPING, NEGATIVE
DIFFERENTIAL CONDUCTIVITY, HIGH FIELD DOMAINS,
ELECTRON TRAPS (U)

IT WAS RECOGNIZED THAT AG DOPING WAS A
SIGNIFICANT FACTOR IN DETERMINING THE ELECTRICAL
CHARACTERISTICS OF CDS THAT PRODUCE NEGATIVE
DIFFERENTIAL CONDUCTIVITY (NDC) NECESSARY FOR HIGH
FIELD DOMAINS (HFD) IN CDS. DOPING WITH
NITRATES OF AG AND AL WAS A METHOD OF OBTAINING
CDS CRYSTALS EXHIBITING SUCH PHENOMENA,
ATTRIBUTED TO FIELD QUENCHING CAUSED BY FIELD
ENHANCED IONIZATION. HOWEVER, VERY LITTLE WAS
KNOWN ABOUT THE RELATIONSHIP BETWEEN DOPING AND THE
ELECTRICAL CHARACTERISTICS THAT PRODUCE NDC. IN
ORDER TO GAIN SOME UNDERSTANDING OF THIS
RELATIONSHIP, THE STUDY OF THE EFFECTS OF AG DOPING
ON NDC WAS UNDERTAKEN. IT WAS THE MAIN PURPOSE
OF THIS STUDY TO GET A RELIABLE PROCEDURE FOR DOPING
WITH AG AND AL TO OBTAIN CRYSTALS FOR FURTHER
STUDIES OF NDC AND FIELD QUENCHING, AND TO WHAT
MICROSCOPIC PROCESSES MAY BE INVOLVED IN THE DOPING.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 544 2U/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

OSCILLATORY PHOTOCONDUCTIVE AND EXCITATION
SPECTRA OF CDS AND ZNSE, (U)

69 IUP WEI, D. T. Y. (PENCHINA,
C. M. (PARK, Y. S.)
REPT. NO. ARL-71-0111
PROJ: AF-7885
TASK: 7885U0

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PROCEEDINGS OF THE
PHOTOCONDUCTIVITY CONFERENCE (3RD), STANFORD, 12-
14 AUG 1969, P343-350.

DESCRIPTORS: (*SEMICONDUCTORS,
*PHOTOCONDUCTIVITY), (*CADMIUM SULFIDES,
LUMINESCENCE), ZINC COMPOUNDS, SELENIDES,
EXCITATION, PHONONS, EXCITONS, CRYOGENICS (U)
IDENTIFIERS: *ZINC SELENIDES, OSCILLATORY
PHOTOCONDUCTIVITY (U)

THE PHOTOCONDUCTIVE SPECTRA OF CDS AND ZNSE
AT 4.2K HAVE OSCILLATIONS WITH PERIODS EQUAL TO AN
LO-PHONON ENERGY. IN CDS THREE SERIES OF
OSCILLATIONS OCCUR UP TO 35K. TWO SERIES APPEAR
IN THE A.C.-PHOTOCURRENT AMPLITUDE WITH MINIMA AT THE
GROUND STATE ENERGY OF EXCITON A PLUS MULTIPLES OF
AN LO-PHONON ENERGY (A-SERIES), AND AT THE
GROUND STATE ENERGY OF EXCITON B PLUS MULTIPLES OF
AN LO-PHONON ENERGY (B-SERIES). A THIRD
SERIES APPEARS IN THE PHASE OF A.C.-PHOTOCURRENT.
THERE ARE INDICATIONS THAT ALL THREE SERIES ARE
INDEPENDENT. IN ZNSE, ONLY ONE SERIES APPEARS,
WITH ZERO PHONON LINE AT THE EXCITON GROUND STATE
ENERGY. THE EXCITATION SPECTRA OF SEVERAL
LUMINESCENT LINES OF CDS AND ZNSE ALSO HAVE
OSCILLATIONS, WHOSE MAXIMA CORRESPOND TO MINIMA IN
THE PHOTOCONDUCTIVE SPECTRA. THE MECHANISM OF
OSCILLATION CAN BE EXPLAINED BY THE RESONANCE
GENERATION OF LO-PHONONS COUPLED TO AN EXCITON, IN
ADDITION TO THE PHOTOCONDUCTIVE CARRIERS. THIS
MECHANISM IS CORROBORATED BY THE OSCILLATIONS IN
LUMINESCENCE EXCITATION SPECTRA OF CDS AND
ZNSE, AND BY OPTICAL QUENCHING OF A-SERIES
PHOTOCONDUCTIVE OSCILLATIONS IN CDS.
(AUTHOR) (U)

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UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 564 2U/12
NEW SOUTH WALES UNIV KENSINGTON (AUSTRALIA) DEPT OF
PHYSICS

CARBON EPR SIGNAL FROM VACUUM HEATED
SURFACES, (U)

AUG 70 5P MILLER, D. J. HANEMAN, D. I
CONTRACT: DA-CRD-AFE-592-544-69-6154
PROJ: DA-1-Z-624201-D-466
TASK: 1-Z-624201-D-46603
MONITOR: ARDG(FE) 440-AUG-70

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN SURFACE SCIENCE, V24 P639-
642 1971.

DESCRIPTORS: (*SEMICONDUCTORS, SURFACES),
(*CARBON, *PARAMAGNETIC RESONANCE), CARBIDES,
IMPURITIES, HEAT TREATMENT, CADMIUM SELENIDES,
CADMIUM SULFIDES, ZINC SULFIDES, SILICON,
AUSTRALIA (U)
IDENTIFIERS: *ELECTRON PARAMAGNETIC RESONANCE (U)

RECENTLY A NARROW ELECTRON PARAMAGNETIC RESONANCE
(E.P.R.) SIGNAL HAS BEEN REPORTED FROM THE
SURFACES OF CUSE, CUS, AND ZNS POWDERS
AFTER HEATING IN VACUUM. EACH OF THE SIGNALS WAS
FORMED BY VACUUM HEAT TREATMENT IN THE RANGE 400-
600C, WITH G=2.0027 AND WIDTH APPROX. ONE GAUSS,
AND WAS REVERSIBLY BROADENED BEYOND DETECTION UPON
ADMISSION OF AIR OR OXYGEN. IT WAS SUGGESTED THAT
SURFACE VACANCIES CAUSED THE E.P.R. SIGNAL. THE
AUTHORS HAVE PREVIOUSLY FOUND A SIGNAL WITH THE ABOVE
PROPERTIES ON SEVERAL OTHER SUBSTANCES, AND FROM AN
ANALYSIS OF ITS OCCURRENCE, HAVE CONCLUDED THAT IT
WAS DUE TO CARBON CONTAMINATION FROM THE VACUUM
SYSTEM. IT IS SUGGESTED THAT THE SIGNALS RECENTLY
REPORTED ON CUSE, CUS AND ZNS ARE IN FACT
ALL DUE TO CARBON CONTAMINATION. (AUTHOR) (U)

UNCLASSIFIED

DJC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 645 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

AN INVESTIGATION OF THE SEMICONDUCTOR-TO-METAL TRANSITION IN CHLORINE DOPED CADMIUM SULFIDE USING NUCLEAR MAGNETIC RESONANCE.

(U)

MAY 71 212P ADAMS, FRANK D. ;
REPT. NO. ARL-71-0088
PROJ: AF-7885
TASK: 788501

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, NUCLEAR MAGNETIC RESONANCE), (•CADMIUM SULFIDES, ELECTRICAL CONDUCTANCE), HALL EFFECT, DOPING, CHLORINE, BAND THEORY OF SOLIDS, IMPURITIES, CRYOGENICS, FREQUENCY SHIFT, THESES (U)
IDENTIFIERS: SEMICONDUCTOR METAL TRANSITION, SPIN LATTICE RELAXATION, KNIGHT SHIFT (U)

SPIN-LATTICE RELAXATION TIMES AND KNIGHT SHIFTS WERE MEASURED FOR CU113 NUCLEI IN TWELVE CDS CRYSTALS DOPED WITH VARIOUS AMOUNTS OF CHLORINE. HALL CONSTANTS WERE ALSO MEASURED TO OBTAIN THE CONDUCTION ELECTRON CONCENTRATIONS. DATA WERE OBTAINED ON ALL SAMPLES AT 300K AND FOR SOME HEAVILY DOPED SAMPLES AT 77K, 4.2K AND 2.13K. IT WAS FOUND THAT WITH INCREASED DOPING, AN IMPURITY CONDUCTION BAND IS FORMED IN AN ELECTRON CONCENTRATION RANGE (5×10 TO THE 17TH POWER $< N < 1.6 \times 10$ TO THE 18TH POWER/CC). THE IMPURITY CONDUCTION BAND AND CDS CONDUCTION BAND ARE MERGED WHEN A FURTHER INCREASE IN DOPANT EXTENDS THE ELECTRON CONCENTRATION TO (1.6×10 TO THE 18TH POWER/CC $< N < 2.4 \times 10$ TO THE 18TH POWER/CC). ALL SAMPLES WITH $N = > 2.4 \times 10$ TO THE 18TH POWER/CC HAVE ESSENTIALLY METALLIC PROPERTIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-728 916 2U/12
WASHINGTON UNIV SEATTLE DEPT OF ELECTRICAL
ENGINEERING

OPTICAL PROBING OF RESISTIVITY PROFILES IN
CDS AND THEIR RELATION WITH ACOUSTOELECTRIC
CURRENT OSCILLATIONS. (U)

JUL 7U 8P YEE, S. S. MCCARTHY, S.

J. ;

CONTRACT: DA-ARO-D-31-124-70-G58
PROJ: DA-2-0-061102-B-31-E
MONITOR: AROU 839112-E

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN SOLID-STATE ELECTRONICS,
V14 N4 P342-346 1971.

DESCRIPTORS: (SEMICONDUCTORS, PIEZOELECTRIC
EFFECT), (CADMIUM SULFIDES,
RESISTANCE (ELECTRICAL)), ELECTRIC CURRENTS,
OSCILLATION (U)

IDENTIFIERS: ACOUSTOELECTRIC EFFECT, ELECTRICAL
RESISTIVITY, PIEZOELECTRIC SEMICONDUCTORS (U)

THE CORRELATION OF CURRENT OSCILLATIONS WITH
RESISTIVITY PROFILES IS PRESENTED FOR SAMPLES OF
SEMICONDUCTING CDS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-729 725 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

ELECTRONIC CORE LEVELS OF THE IIB-VIA
COMPOUNDS.

(U)

MAR 71 15P VESELY, C. J. ILANGER, D.

W. :

REPT. NO. ARL-71-0143

PROJ: AF-7685

TASK: 788500

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V4 N2
P451-462, 15 JUL 71.

DESCRIPTORS: (*SEMICONDUCTORS, *BAND THEORY OF
SOLIDS), ZINC SULFIDES, CADMIUM SULFIDES,
CADMIUM SELENIDES, ZINC COMPOUNDS, CADMIUM
COMPOUNDS, MERCURY COMPOUNDS, OXIDES, SULFIDES,
SELENIDES, TELLURIDES, PHOTOELECTRIC EFFECT

(U)

IDENTIFIERS: ZINC OXIDES, ZINC SELENIDES, ZINC
TELLURIDES, CADMIUM OXIDES, CADMIUM TELLURIDES,
MERCURY SULFIDES, MERCURY SELENIDES, MERCURY
TELLURIDES, EMISSION SPECTRA, SPIN ORBIT
INTERACTIONS

(U)

X-RAY INDUCED ELECTRON-EMISSION MEASUREMENTS WERE
USED TO DETERMINE THE ENERGY LEVELS OF CORE ELECTRONS
IN ZNO, ZNS, ZNSE, ZNTE, CDU,
CDS, CDSE, COTE, HGS, HGSE, AND
HGTE. THE INVESTIGATED ENERGY RANGE EXTENDS
FROM THE BOTTOM OF THE VALENCE BAND TO ABOUT 1200
eV BELOW THE FERMI LEVEL. CHEMICAL SHIFTS WERE
DETERMINED BY COMPARING THESE RESULTS WITH
EXPERIMENTAL VALUES FOR THE PURE ELEMENTS. THESE
SHIFTS ARE PLOTTED AS A FUNCTION OF THE FRACTIONAL
IONICITY VALUES DETERMINED BY PHILLIPS AND VAN
VECHTEN, PAULING, AND COULSON. SPIN-ORBIT-
SPLITTING VALUES WERE EXPERIMENTALLY DETERMINED FOR
THE FIRST TIME FOR SEVERAL LEVELS INCLUDING THE
ZN3D, CD4D, AND HG5D LEVELS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-729 408 20/12 9/1 9/5
FLORIDA UNIV GAINESVILLE DEPT OF ELECTRICAL
ENGINEERING

A CENTER OF COMPETENCE IN SOLID STATE
MATERIALS AND DEVICES, (U)

MAR 71 229P LINDHOLM, FRED A. ; BRUDERSEN,
ARTHUR J. ; CHENETTE, EUGENE R. ; DIRECTOR,
STEPHEN W. ; HENCH, LARRY L. ;
REPT. NO. SCIENTIFIC-7
CONTRACT: F19628-68-C-0058, ARPA ORDER-1060
PROJ: AF-8687
MONITOR: AFCRL 71-0309

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, ELECTRICAL
PROPERTIES), (*SEMICONDUCTOR DEVICES, ELECTRICAL
PROPERTIES), (*INTEGRATED CIRCUITS, DESIGN),
MATHEMATICAL MODELS, NOISE (RADIO), RADIATION
DAMAGE, NEUTRON REACTIONS, HALL EFFECT,
TRANSISTORS, CADMIUM SULFIDES, SILICON,
IMPURITIES (U)
IDENTIFIERS: AMORPHOUS SEMICONDUCTORS, EQUIVALENT
CIRCUITS, PHOTOMAGNETOELECTRIC EFFECT (U)

IN SEMICONDUCTOR AND SEMICONDUCTOR DEVICE RESEARCH,
A COMPLETE EQUIVALENT CIRCUIT FOR THE NOISE
PERFORMANCE OF PHOTOTRANSISTORS IS DEVELOPED AND THE
CURRENT GAIN AND CUTOFF FREQUENCY ARE DERIVED FROM
NOISE MEASUREMENTS. STUDY OF THE DESIGN OF A
DETECTORS USING THE PME EFFECT IN GOLD-DOPED
SILICON SHOWS THE COMPROMISES REQUIRED IN THE
CONCENTRATIONS OF GOLD AND SHALLOW-LEVEL IMPURITIES
TO YIELD BOTH SPEED AND SENSITIVITY. MEASUREMENT OF
CONDUCTIVITY AND HALL EFFECT IN IN-DOPED AND
CU-DOPED CDS REVEALS THE IMPURITY LEVELS AND
DOMINANT SCATTERING MECHANISMS. MEASUREMENT OF THE
PME AND PC EFFECTS IN GOLD-DOPED SILICON YIELDS
THE RECOMBINATION PARAMETERS. A METHOD IS
DESCRIBED THAT SO SELECTS MODEL COMPLEXITY IN THE
SIMULATION OF TRANSISTOR CIRCUITS AS TO SAVE CPU TIME
AND TO ACCOMMODATE LARGER CIRCUITS THAN HERETOFORE
POSSIBLE. IN GLASS AND SEMICONDUCTING GLASS
RESEARCH, EXPERIMENTS DEMONSTRATE THAT CRYSTALLITE
SIZE DETERMINES THE THRESHOLD OF FAST-NEUTRON DAMAGE
IN HETEROGENEOUS AMORPHOUS SEMICONDUCTORS. VARIOUS
METHODS FOR SURFACE CHARACTERIZATION OF CERAMIC
POWDERS ARE DETAILED.

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(U)

UNCLASSIFIED

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UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-730 133 20/12
BROWN UNIV PROVIDENCE R I METALS RESEARCH LAB

ELECTRONIC ENERGY STATES OF DISLOCATIONS IN
CDS-TYPE SEMICONDUCTORS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
MAY 68 41P HOLMES, R. R. SELBAUM, C. I
CONTRACT: NONR-562(27)

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, BAND THEORY OF
SOLIDS), (*CADMIUM SULFIDES, PHOTOCONDUCTIVITY),
DISLOCATIONS, CRYSTAL LATTICE DEFECTS, ELECTRICAL
CONDUCTANCE (U)

IT IS SHOWN THAT ELECTRONIC ENERGY BANDS ARE ASSOCIATED WITH DISLOCATIONS IN WIDE BAND GAP, COMPOUND SEMICONDUCTORS. THE EIGENVALUE PROBLEM FOR THE DISLOCATION BAND EDGE IS SOLVED FOR CDS TYPE CRYSTALS, AND THE OCCUPATION OF THE BAND IS CALCULATED. THE FERMİ ENERGY IS THEN DETERMINED FOR CRYSTALS CONTAINING MANY DEEP LYING DISCRETE LEVELS AS WELL AS DISLOCATION BANDS. IT IS PREDICTED THAT WHEN A CRYSTAL IS ILLUMINATED WITH LIGHT OF APPROPRIATE WAVELENGTH AND INCREASING INTENSITY, THE THERMAL ACTIVATION ENERGY GOVERNING THE ELECTRICAL CONDUCTIVITY PASSES THROUGH A SERIES OF ENERGY PLATEAUS WHICH ARE EQUAL TO THE ENERGY OF THE DISCRETE LEVELS. IN A DISLOCATION FREE CRYSTAL, THESE PLATEAUS ARE CONNECTED BY STEP CHANGES, WHILE IN A CRYSTAL WITH DISLOCATIONS THEY ARE CONNECTED BY BROAD TRANSITION REGIONS. IN ORDER TO STUDY THE PREDICTIONS THE THERMAL ACTIVATION ENERGY WAS MEASURED AS A FUNCTION OF LIGHT INTENSITY IN BOTH DEFORMED AND UNDEFORMED SAMPLES OF CDS. IN ALL CASES, PLATEAUS AT 0.80 PLUS OR MINUS 0.02 EV AND 0.66 PLUS OR MINUS 0.02 EV WERE OBSERVED. THE TRANSITION BETWEEN THESE PLATEAUS WAS SHARP IN THE CASE OF THE UNDEFORMED SAMPLES AND BROAD IN THE CASE OF THE DEFORMED SAMPLES. THESE RESULTS CONFIRM THE PREDICTIONS MENTIONED ABOVE. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-730 237 20/12
DELAWARE UNIV NEWARK DEPT OF PHYSICS

DETERMINATION OF FIELD-DEPENDENT CARRIER
DENSITY AND MOBILITY IN PHOTOCONDUCTORS USING
HIGH-FIELD DOMAINS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
AUG 69 7P BOER, K. W. ;
REPT. NO. TR-45
CONTRACT: NONR-4336(UD)

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PROCEEDINGS OF THE
PHOTOCONDUCTIVITY CONFERENCE (3RD) HELD IN
STANFORD, CALIF. 12-15 AUG 69 P75-79.

DESCRIPTORS: (•CADMIUM SULFIDES;
PHOTOCONDUCTIVITY), HALL EFFECT,
CARRIERS(SEMICONDUCTORS), WORK FUNCTIONS,
TRANSPORT PROPERTIES (U)
IDENTIFIERS: CARRIER MOBILITY (U)

UNDER CERTAIN EXPERIMENTAL CONDITIONS HIGH-FIELD
DOMAINS WHICH OCCUR IN THE RANGE OF NEGATIVE
DIFFERENTIAL CONDUCTIVITY REMAIN STATIONARY ADJACENT
TO ONE ELECTRODE AND CAN BE USED TO ANALYZE THE
FIELD-DEPENDENT CONDUCTIVITY. USING THE MEASURED
CURRENT DENSITY AND FIELD STRENGTH IN THE DOMAIN, PMR
ONE OBTAINS THE CONDUCTIVITY AS A FUNCTION OF THE
FIELD. THE HALL-EFFECT CAN BE USED TO DETERMINE
THE MOBILITY WITHIN A HIGH-FIELD DOMAIN AND YIELDS
MICRO(F). FROM THE CONDUCTIVITY ONE THEN
OBTAINS THE FIELD-DEPENDENT CARRIER DENSITY. IN
PHOTOCONDUCTORS, SUCH AS CDS, THE NEGATIVE
DIFFERENTIAL CONDUCTIVITY IS CAUSED BY A STEEP
DECREASE OF CARRIER DENSITY AND ONLY SLIGHTLY
DECREASED MOBILITY WITH FIELD IN THE INVESTIGATED
RANGE. WITH THIS METHOD THE CARRIER DENSITY AND
MOBILITY CAN UNAMBIGUOUSLY AND QUITE ACCURATELY BE
DETERMINED AS FUNCTIONS OF THE FIELD STRENGTH AND A
DETAILED KINETIC ANALYSIS IS JUSTIFIED FOR
INVESTIGATING THE FIELD EXCITATION MECHANISM. SUCH
ANALYSIS IS DONE FOR CDS IN THE FIELD RANGE
BETWEEN 30 AND 100KV/CM (AT 200K) AND SHOWS
THAT A MODIFIED FRENKEL-POOLE FIELD-ENHANCED
THERMAL EXCITATION OF HOLES FROM SLOW RECOMBINATION
CENTERS INTO THE VALENCE BAND (FIELD QUENCHING)
IS THE PREDOMINANT MECHANISM CAUSING THE NEGATIVE
DIFFERENTIAL PHOTOCONDUCTIVITY. (AUTHOR) (U)

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-731 547 20/12 9/1 20/5
MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

SOLID STATE RESEARCH, 1971:J. (U)

DESCRIPTIVE NOTE: QUARTERLY TECHNICAL SUMMARY 1 MAY-31
JUL 71.

AUG 71 60P MCMHURTER, ALAN L. ;

CONTRACT: F19628-70-C-0230

PROJ: AF-649L

MONITOR: ESD TR-71-247

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT DATED 15 FEB 71,
AD-724 074.

DESCRIPTORS: (*SOLID STATE PHYSICS, PERIODICALS),
(*SEMICONDUCTORS, SCIENTIFIC RESEARCH),
PHOTODIODES, LASERS, RAMAN SPECTROSCOPY, ZEEMAN
EFFECT, INTEGRATED CIRCUITS, MANUFACTURING METHODS,
BAND THEORY OF SOLIDS, INDIUM ANTIMONIDES, CADMIUM
SULFIDES, GALLIUM ARSENIDES, CRYSTAL STRUCTURE,
CARBON MONOXIDE, ABSORPTION SPECTRUM, CRYOGENICS (U)
IDENTIFIERS: COMPUTER AIDED DESIGN, *SEMICONDUCTOR
LASERS, RAMAN LASERS, FERRUMAGNETIC SEMICONDUCTORS (U)

THE REPORT COVERS IN DETAIL THE SOLID STATE
RESEARCH WORK OF THE SOLID STATE DIVISION AT
LINCOLN LABORATORY FOR THE PERIOD 1 MAY THROUGH
31 JULY 1971. THE TOPICS COVERED ARE SOLID
STATE DEVICE RESEARCH, QUANTUM ELECTRONICS,
MATERIALS RESEARCH, PHYSICS OF SOLIDS, AND
MICROELECTRONICS. THE MICRO SOUND WORK IS
SPONSORED BY ABMDA AND IS REPORTED UNDER THAT
PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-731 551 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

ELECTRON EMISSION STUDIES OF THE IIB-VIA
SEMICONDUCTOR COMPOUNDS, (U)

AUG 71 96P VESELY, CHARLES J. I
REPT. NO: ARL-71-0136
PROJ: AF-7885
TASK: 788500

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, *BAND THEORY OF
SOLIDS), (*PHOTOELECTRIC EFFECT,
SEMICONDUCTORS), SPECTROSCOPY, PHOTON
BOMBARDMENT, X RAYS, MOLECULAR ENERGY LEVELS,
SULFIDES, TELLURIDES, SELENIDES, OXIDES, ZINC
COMPOUNDS, CADMIUM COMPOUNDS, ZINC SULFIDES,
MERCURY COMPOUNDS, CADMIUM SELENIDES, CADMIUM
SULFIDES, SPECTROPHOTOMETERS (U)

IDENTIFIERS: *PHOTOELECTRON SPECTROSCOPY, *GROUP
2B-6A COMPOUNDS, EMISSION SPECTRA, ZINC
SELENIDES, CADMIUM TELLURIDES, SPIN ORBIT
INTERACTIONS (U)

X-RAY INDUCED ELECTRON EMISSION MEASUREMENTS WERE
USED TO DETERMINE THE ENERGY LEVELS OF CORE ELECTRONS
IN ZNO, ZNS, ZNSE, ZNTE, CDO,
CDS, CDSE, COTE, HGS, HGSE AND
HGTE. THE INVESTIGATED ENERGY RANGE EXTENDS
FROM THE BOTTOM OF THE VALENCE BAND (6-8 EV BELOW
THE FERMI LEVEL) TO ABOUT 1200 EV BELOW THE
FERMI LEVEL. CHEMICAL SHIFTS WERE DETERMINED BY
COMPARING THE RESULTS OF THESE MEASUREMENTS WITH
EXPERIMENTAL VALUES FOR THE PURE ELEMENTS. THESE
SHIFTS ARE PLOTTED AS A FUNCTION OF THE FRACTIONAL
IONICITY VALUES DETERMINED BY PHILLIPS AND VAN
VECHTEN, PAULING AND COULSON. CORE LEVEL
VALUES FOR ZNSE AND COTE ARE COMPARED WITH
SELF-CONSISTENT RELATIVISTIC ORTHOGONALIZED PLANE
WAVE CALCULATIONS FOR THE EXCITATION ENERGIES OF
THESE COMPOUNDS. AGREEMENT WITH THESE THEORETICAL
CALCULATIONS IS BEST FOR THE LEVELS CLOSEST TO THE
VALENCE BAND AND APPEARS TO BE ANGULAR-MOMENTUM
DEPENDENT. FOR THE FIRST TIME, SPIN-ORBIT
SPLITTING VALUES WERE EXPERIMENTALLY DETERMINED FOR
SEVERAL LEVELS INCLUDING ZN 3D, CD 4D AND HG 5D
LEVELS. THE MEASURED ENERGY VALUES FOR THE UPPER
D-LEVELS ARE COMPARED WITH VALUES OBTAINED BY
ULTRAVIOLET INDUCED ELECTRON EMISSION, (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-732 301 9/5
HUGHES RESEARCH LABS MALIBU CALIF

BI-STABLE ELECTROPHOTOGRAPHIC DISPLAY
DEVICE.

(U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. FEB 70-JUN 71.
OCT 71 95P ROBERTSON, GLENN D., JR.
CONTRACT: F30602-69-C-0157
MONITOR: RADC TR-71-210

UNCLASSIFIED REPORT

DESCRIPTORS: (*DISPLAY SYSTEMS, *PHOTOELECTRIC
MATERIALS), (*VIEWING SCREENS, *SEMICONDUCTING
FILMS), (*CADMIUM SULFIDES, *PHOTOCONDUCTIVITY),
DEPOSITION, DESIGN, ELECTRON BEAMS, PHOTON
BOMBARDMENT, PHOTOGRAPHIC PROJECTORS, GLASS,
ELECTRICAL CONDUCTANCE, PRODUCTION, EXCITATION,
ELECTRIC CONNECTORS, OPTICAL PROPERTIES,
RESOLUTION

(U)

IDENTIFIERS: *SUSTAINED ELECTRON BOMBARDMENT INDUCED
CONDUCTIVITY, *ELECTROCHROMIC FILMS, *SEBIC FILMS,
ELECTRIC CONTACTS

(U)

A STUDY HAS BEEN PERFORMED OF THE FEASIBILITY OF
USING A SUSTAINED ELECTRON BOMBARDMENT
INDUCED CONDUCTIVITY (SEBIC) LAYER TO CONTROL A
LIGHT MODULATING ELECTROCHROMIC (EC) FILM IN A
PROJECTION DISPLAY DEVICE. SUCH CONTROL WAS
DEMONSTRATED BUT A VARIETY OF PRACTICAL PROBLEMS HAS
PREVENTED FABRICATION OF A USABLE DEVICE. A MAJOR
PROBLEM AREA IS THE INTERLAYER NEEDED TO SEPARATE THE
EC AND SEBIC FILMS. (AUTHOR)

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 239 20/12 18/8
AIR FORCE INST OF TECH WRIGHT-PATTENSON AFB OHIO SCHOOL OF
ENGINEERING

RADIATION DAMAGE EFFECTS IN ELECTRON
IRRADIATED CADMIUM SULFIDE PLATELETS AT LOW
TEMPERATURE.

(U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,
AUG 71 143P ELSBY, C. NEALE ;
REPT. NO. DS/PH/71-5

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, *RADIATION DAMAGE),
(*CADMIUM SULFIDES, RADIATION DAMAGE); ELECTRON
BOMBARDMENT, CRYOGENICS, LUMINESCENCE, ANNEALING,
ATOMIC ENERGY LEVELS, BAND THEORY OF SOLIDS,
THESES

(U)

A STUDY WAS MADE OF THE LUMINESCENCE PROPERTIES OF
CADMIUM SULFIDE PLATELETS WHICH WERE BOMBARDED AT
NEAR LIQUID HELIUM TEMPERATURE WITH FAST ELECTRONS AT
ENERGIES ABOVE 100 KEV. PHOTOLUMINESCENCE AND
CATHODOLUMINESCENCE SPECTRA WERE EVALUATED. POST-
IRRADIATION ANNEALING AND THERMAL AND OPTICAL
QUENCHING EXPERIMENTS WERE CONDUCTED.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 241 20/12
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

ELECTRON EMISSION STUDIES OF THE IIU-VIA
SEMICONDUCTOR COMPOUNDS. (U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,
JUN 71 10UP VESELY, CHARLES JOSEPH ;
REPT. NO. DS/PH/71-2

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTORS, PHOTOELECTRIC
EFFECT), X-RAY ABSORPTION ANALYSIS, BAND THEORY OF
SOLIDS, ATOMIC ENERGY LEVELS, ELECTRON TRANSITIONS,
ZINC SULFIDES, ZINC COMPOUNDS, OXIDES,
TELLURIDES, SELENIDES, CADMIUM COMPOUNDS,
CADMIUM SULFIDES, CADMIUM SELENIDES, MERCURY
COMPOUNDS, ULTRAVIOLET RADIATION, THESES (U)

IDENTIFIERS: ELECTRON EMISSION, EMISSION SPECTRA,
ZINC OXIDES, ZINC SELENIDES, ZINC TELLURIDES,
CADMIUM OXIDES, MERCURY SULFIDES, MERCURY
SELENIDES, MERCURY TELLURIDES, CADMIUM TELLURIDES,
ORTHOGONALIZED PLANE WAVE THEORY (U)

X-RAY INDUCED ELECTRON EMISSION MEASUREMENTS WERE
USED TO DETERMINE THE ENERGY LEVELS OF CORE ELECTRONS
IN ZNO, ZNS, ZNSE, ZNTE, CDO,
CUS, CDSE, CDTE, HGS, HGSE AND
HGTE. THE INVESTIGATED ENERGY RANGE EXTENDS
FROM THE BOTTOM OF THE VALENCE BAND (6-8 EV BELOW
THE FERMI LEVEL) TO ABOUT 1200 EV BELOW THE
FERMI LEVEL. CHEMICAL SHIFTS WERE DETERMINED BY
COMPARING THE RESULTS OF THESE MEASUREMENTS WITH
EXPERIMENTAL VALUES FOR THE PURE ELEMENTS. THESE
SHIFTS ARE PLOTTED AS A FUNCTION OF THE FRACTIONAL
IONICITY VALUES DETERMINED BY PHILLIPS AND VAN
VECHTEN, PAULING AND COULSON. CORE LEVEL
VALUES FOR ZNSE AND CDTE ARE COMPARED WITH
SELF-CONSISTENT RELATIVISTIC ORTHOGONALIZED PLANE
WAVE CALCULATIONS FOR THE EXCITATION ENERGIES OF
THESE COMPOUNDS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 462 2U/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

BOUND-PHONON QUASIPARTICLE IN CDS. (U)

APR 71 WP REYNOLDS, D. C. ; LITTON, C.
W. ; COLLINS, T. C. ;
PROJ: AF-7885
TASK: 788500
MONITOR: ARL 71-0247

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V4 N6
P1868-1872, 15 SEP 71.

DESCRIPTORS: (•CAD. • SULFIDES, PHONONS),
SEMICONDUCTORS, LUMINESCENCE, MAGNETO-OPTIC
EFFECT, WAVE FUNCTIONS, CRYOGENICS, EXCITONS (U)
IDENTIFIERS: ELECTRON PHONON INTERACTIONS,
ELEMENTARY EXCITATIONS, EMISSION SPECTRA (U)

BOUND OPTICAL PHONONS ASSOCIATED WITH THE PHONON-
ASSISTED Γ_1 ($4B_8A$) TRANSITION IN CDS
HAVE BEEN OBSERVED. THESE STATES ARISE FROM THE
BONDING OF AN LO PHONON TO A NEUTRAL ACCEPTOR,
WHICH PROVIDES AN ATTRACTIVE INTERACTION FOR THE
PHONON. THE INTERACTION IS WITH LO PHONONS OF
SMALL WAVE VECTOR. BOTH THE Γ_1 AND Γ_2
LO PHONONS, WHICH RESULT FROM A SPLITTING DUE TO
ANISOTROPIC SHORT-RANGE INTERATOMIC FORCES, ARE
OBSERVED IN THE BOUND STATES. THE OPTICAL
TRANSITIONS DESCRIBED IN THIS PAPER ARE SIMILAR TO
THOSE DESCRIBED BY DEAN ET AL., WHICH INVOLVED
OPTICAL PHONONS BOUND TO NEUTRAL DONORS IN GAP.
THE OBSERVED BOUND STATES WERE IDENTIFIED AS $2S$,
 $2P$, AND $3D$ STATES WITH MEASURED BINDING ENERGIES
OF 26.4, 21.6, AND 11.6 PER CM., RESPECTIVELY.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-734 464 -20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

EDGE EMISSION BANDS IN HIGH-PURITY
CADMIUM SULFIDE,

(U)

DEC 70 7P GREENE, LAWRENCE C.; WILSON,
HENRY A. ;
PROJ: AF-7885
TASK: 788500
MONITOR: AHL 71-U201

UNCLASSIFIED REPORT

AVAILABILITY: PUB. IN JNL. OF APPLIED PHYSICS,
V12 N7 P2758-2761 JUN 71.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 10 AUG
70.

DESCRIPTORS: (*SEMICONDUCTORS, SPECTRA (VISIBLE +
ULTRAVIOLET)), (*CADMIUM SULFIDES, BAND
SPECTRUM), PHONONS, SINGLE CRYSTALS, CRYOGENICS,
CARRIERS (SEMICONDUCTORS), BAND THEORY OF SOLIDS
IDENTIFIERS: EMISSION SPECTRA

(U)

(U)

IT IS SHOWN THAT THERE ARE NINE CLEARLY DEFINED
SERIES OF LOW-TEMPERATURE PHONON-ASSISTED EDGE
EMISSION BANDS IN PURE CADMIUM SULFIDE CRYSTALS. OF
THESE NINE SERIES, FOUR HAVE NOT BEEN PREVIOUSLY
DISCUSSED. IT IS SHOWN THAT EIGHT OF THE SERIES
CAN BE EXPLAINED AS ARISING FROM TRANSITIONS
INVOLVING A BAND MODEL WITH TWO DONOR LEVELS AND
THREE ACCEPTOR LEVELS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 466 20/12
AEROSPACE RESEARCH LABS WRIGHT-PATTERSON AFB OHIO

NUCLEAR-MAGNETIC-RESONANCE STUDIES OF THE
SEMICONDUCTOR-TO-METAL TRANSITION IN
CHLORINE-DOPED CADMIUM SULFIDE;

(U)

MAY 71 12P ADAMS, FRANK D. ; LOCK, DAVID
C. ; BROWN, L. CARLTON ; LOCKER, DONALD R. ;
PROJ: AF-7885
TASK: 7885UD
MONITOR: ARL 71-U238

UNCLASSIFIED REPORT
AVAILABILITY: PUB. IN PHYSICAL REVIEW B, V4 N7
P2115-2123, 1 OCT 71.

DESCRIPTORS: (*CADMIUM SULFIDES, NUCLEAR MAGNETIC
RESONANCE), SEMICONDUCTORS, DOPING, CHLORINE,
HALL EFFECT, PHOTOCONDUCTIVITY, FREQUENCY SHIFT,
CRYOGENICS

(U)

IDENTIFIERS: SPIN LATTICE RELAXATION,
*SEMICONDUCTOR METAL TRANSITION

(U)

SPIN-LATTICE RELAXATION TIMES AND KNIGHT SHIFTS
WERE MEASURED FOR CD113 NUCLEI IN 12 CDS
CRYSTALS DOPED WITH VARIOUS AMOUNTS OF CHLORINE.
HALL COEFFICIENTS WERE MEASURED IN ORDER TO
ESTIMATE CONDUCTION-ELECTRON CONCENTRATIONS. DATA
WERE OBTAINED FOR ALL SAMPLES AT 300K AND FOR SOME
HIGHLY DOPED SAMPLES AT 77, 4.2, AND 2.13K.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-734 536 2U/12 10/2
HUGHES AIRCRAFT CO CULVER CITY CALIF ELECTRONIC PROPERTIES
INFORMATION CENTER

CUPROUS SULFIDE AND CUPROUS SULFIDE-CADMIUM
SULFIDE HETEROJUNCTIONS. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,
SEP 71 62P NEUBERGER, M. I
REPT. NO. EPIC-IR-69-REV
CONTRACT: USA900-72-C-1182

UNCLASSIFIED REPORT

DESCRIPTORS: (+SEMICONDUCTORS, PHYSICAL
PROPERTIES), (+SOLAR CELLS, SULFIDES), COPPER
COMPOUNDS, CADMIUM SULFIDES, SEMICONDUCTING FILMS,
ELECTRICAL PROPERTIES, THERMAL PROPERTIES, OPTICAL
PROPERTIES, PHOTOELECTRIC EFFECT, BAND THEORY OF
SOLIDS (U)

IDENTIFIERS: SEMICONDUCTOR JUNCTIONS,
HETEROJUNCTIONS, PHOTOVOLTAIC EFFECT, COPPER
SULFIDES (U)

56 EXTRACTS OF DOCUMENTS WHICH PROVIDE INFORMATION ON
CUPROUS SULFIDE AND CUPROUS SULFIDE-CADMIUM
SULFIDE FROM THE ELECTRONIC PROPERTIES
INFORMATION CENTER STORAGE AND RETRIEVAL SYSTEM
ARE PROVIDED. CONSIDERABLE MINERALOGICAL
INFORMATION AS WELL AS PHASE DIAGRAMS, PHYSICAL
PROPERTIES AND PHOTOVOLTAIC PROPERTIES ARE INCLUDED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-735 097 2U/12
SPERRY RAND RESEARCH CENTER SUDBURY MASS

MAGNETOELASTIC SURFACE WAVES. (U)

DESCRIPTIVE NOTE: ANNUAL REPT.,
NOV 71 67P MATTHEWS, H. ; VAN DE VAART, H.

REPT. NO: SRRC-CR-71-14
CONTRACT: N00014-69-C-0027
PROJ: NR-017-502

UNCLASSIFIED REPORT

DESCRIPTORS: (•ULTRASONIC RADIATION, SURFACES),
DELAY LINES, YTTRIUM COMPOUNDS, FERRATES,
CADMIUM SULFIDES, SEMICONDUCTING FILMS, EPITAXIAL
GROWTH, LITHIUM COMPOUNDS, NIOBATES, ANISOTROPY,
DIELECTRICS, RAYLEIGH WAVES (U)
IDENTIFIERS: •MAGNETOELASTIC WAVES, SURFACE WAVES,
LITHIUM NIOBATES, YTTRIUM IRON GARNETS, SIGNAL
PROCESSING, MAGNETOSTATIC WAVES (U)

THE PROPERTIES OF MAGNETOELASTIC SURFACE WAVES IN A
VARIETY OF PROPAGATING STRUCTURES ARE PRESENTED.
THE CHARACTERISTICS OF MAGNETOSTATIC SURFACE WAVES
IN A THIN MAGNETIC PLATE ARE DISCUSSED INCLUDING SOME
NEW FEATURES INTRODUCED WHEN A CONDUCTING LAYER IS ON
OR NEAR THE SURFACE OF THE PLATE, AND WHEN
MAGNETOCRYSTALLINE ANISOTROPY IS TAKEN INTO ACCOUNT.
CONVOLUTION AND PULSE COMPRESSION SIGNAL PROCESSING
IS POSSIBLE WHEN THE NEW FEATURES ARE EMPLOYED.
OPERATING PRINCIPLES ARE DISCUSSED. A
DEMONSTRATION OF PULSE COMPRESSION BY 325 MHZ
SURFACE WAVES IN CDS LAYERED LINBO3 IS
DISCUSSED AND RESULTS ARE PRESENTED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-735 342 9/5
RCA LABS PRINCETON N J

DC-ELECTROLUMINESCENT FLAT PANEL
DISPLAY.

(U)

DESCRIPTIVE NOTE: QUARTERLY REPT. NO. 9, 1 JUL-30 SEP
71,

JAN 72 29P HANAK, JOSEPH J. (YUCOM, P.
NEIL DAVY, J. GURDON ;
REPT. NO. PRRL-71-CR-36
CONTRACT: DAAB07-69-C-0290
PROJ: DA-1-H-662705-A-055
TASK: 1-H-662705-A-05503
MONITOR: ECOM 029U-9

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO QUARTERLY REPT. NO. 8,
AD-889 911L.

DESCRIPTORS: (*DISPLAY SYSTEMS,
ELECTROLUMINESCENCE), ZINC SULFIDES, ZINC
COMPOUNDS, SELENIDES, CADMIUM SULFIDES,
SEMICONDUCTING FILMS, SPUTTERING, SINGLE
CRYSTALS

(U)

IDENTIFIERS: *ELECTROLUMINESCENT PANELS,
HETEROJUNCTIONS, ZINC SELENIDES

(U)

THE OBJECT IS TO DEVELOP EFFICIENT
ELECTROLUMINESCENT (EL) HETEROJUNCTIONS HAS BEEN
INTENSIFIED. IN THE HETEROJUNCTION APPROACH
SEVERAL CONCEPTS WERE STUDIED. THE MAIN EFFORT WAS
ON THE SEMI-PERMEABLE BARRIER CONCEPT IN WHICH HIGH
BANDGAP MATERIALS ARE SANDWICHED BETWEEN THE EL
FILM AND THE METAL ELECTRODE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-736 033 20/12
PARIS UNIV (FRANCE) LABORATOIRE DE PHYSIQUE DES
SOLIDES

BAND STRUCTURE AND DISPERSION RELATIONS IN
II-VI COMPOUNDS AND THEIR ALLOYS. (U)

DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT. 1 OCT 67-31
MAR 71,

MAR 71 7P BALKANSKI, M. I
CONTRACT: EDOAR-68-0016
PROJ: AF-7885
MONITOR: ARL 71-0301

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH CENTRE
NATIONAL DE LA RECHERCHE SCIENTIFIQUE, PARIS
(FRANCE).

DESCRIPTORS: (*SEMICONDUCTORS, *BAND THEORY OF
SOLIDS), (*PHONONS, DISPERSION RELATIONS),
CADMIUM SULFIDES, CADMIUM SELENIDES, ZINC
SULFIDES, CADMIUM COMPOUNDS, ZINC COMPOUNDS,
MERCURY COMPOUNDS, TELLURIDES, SELENIDES,
SPECTRA (INFRARED), RAMAN SPECTROSCOPY,
FRANCE (U)

IDENTIFIERS: RAMAN SPECTRA, CADMIUM TELLURIDES,
MERCURY TELLURIDES, ZINC SELENIDES, ZINC
TELLURIDES, LATTICE VIBRATIONS (U)

THE WORK DEALS WITH THE PHONON DISPERSION RELATIONS
AND BAND STRUCTURES OF II - VI COMPOUNDS.
AMONG THE MATERIALS INVESTIGATED ARE CDS,
ZNS, MN DOPED ZNS, CDSE, CDTE,
ZNTE, ZNSE, HGTE. EXPERIMENTAL STUDIES
INCLUDED RAMAN SCATTERING, INFRARED SPECTRA AND
ASSOCIATED TECHNIQUES. THEORETICAL INVESTIGATIONS
WERE ALSO UNDERTAKEN. (AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-B01 243 9/1 20/12
GENERAL TELEPHONE AND ELECTRONICS LABS INC BAYSIDE N
Y

FREE CARRIER MICROWAVE SEMICONDUCTOR DEVICES. (U)

DESCRIPTIVE NOTE: SEMI-ANNUAL REPT. NO. 4, 15 JAN-15
JUL 66,

OCT 66 37P HARRISON, R. I.; ZUCKER, J.
; CONWELL, E. M.; FLERI, D.; ZEMON, S. A. I

REPT. NO. TR-66-731.7
CONTRACT: DA-28-J43-AMC-01876(E)
PROJ: DA-1E6-22001-A-056
TASK: U4
MONITOR: ECOM 01876-4

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTOR DEVICES,
CARRIERS (SEMICONDUCTORS)), MICROWAVE EQUIPMENT,
EXTREMELY HIGH FREQUENCY, PIEZOELECTRIC CRYSTALS,
CADMIUM COMPOUNDS, SULFIDES, DIRECT CURRENT,
ELECTRIC FIELDS, ELECTRICAL IMPEDANCE, SOUND,
MEASUREMENT, VOLTAGE, ELECTRONS, PHONONS,
PHOTUELASTICITY, PHOTONS, LIGHT SCATTERING,
MAGNETIC FIELDS (U)
IDENTIFIERS: CADMIUM SULFIDE, ELECTRON-PHONON
INTERACTIONS, BRILLOUIN SCATTERING (U)

A SMALL SIGNAL ANALYSIS IS PRESENTED BY THE BULK
TERMINAL IMPEDANCE OF A CDS BAR IN WHICH THE
DRIFTING CHARGE CARRIERS AND VIBRATING LATTICE
INTERACT VIA THE PIEZOELECTRIC COUPLING. IT WAS
SHOWN THROUGH A SAMPLE CALCULATION THAT FOR PRACTICAL
RANGES OF APPLIED DRIFT VOLTAGE, MATERIAL PARAMETERS,
AND SEMICONDUCTOR DIMENSIONS A NEGATIVE REAL PART TO
THE TERMINAL IMPEDANCE COULD BE ACHIEVED AT ROOM
TEMPERATURES. THE MAGNITUDE OF THIS NEGATIVE REAL
PART OF THE TERMINAL IMPEDANCE MAKES POSSIBLE THE
DESIGN OF PRACTICAL BULK AMPLIFIERS AND OSCILLATORS
IN 50 OHM TEM MODE TRANSMISSION LINE.
EXPERIMENTS ON LOW RESISTIVITY (SEMICONDUCTING)
CDS INDICATE THAT ACOUSTOELECTRIC INTERACTION
TAKES PLACE IN THE CRYSTAL FOR APPLIED PULSE DRIFT
ELECTRIC FIELDS ABOVE A THRESHOLD FIELD CORRESPONDING
TO THE SYNCHRONOUS CARRIER VELOCITY. MICROWAVE
MEASUREMENTS SHOW THAT RF RADIATION EMANATES FROM THE
BULK CDS SAMPLE AND IS ASSOCIATED WITH THE
ACOUSTO-ELECTRIC INTERACTION.

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UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-815 881 9/1
GENERAL TELEPHONE AND ELECTRONICS LABS INC BAYSIDE N
Y

FREE CARRIER MICROWAVE SEMICONDUCTOR DEVICES. (U)

DESCRIPTIVE NOTE: REPT. NO. 13 (FINAL), 15 JAN 66-14
JAN 67,

JUN 67 101P HARRISON, R. I.; ZUCKER, J.
; CONWELL, E. M.; FLERI, D.; WASKO, J. I
CONTRACT: DA-28-U4J-AMC-U1876(E)
PROJ: DA-1E6-22001-A-056
TASK: 1E6-22001-A-U56-04
MONITOR: ECOM 01876-F

UNCLASSIFIED REPORT

DESCRIPTORS: (•SEMICONDUCTOR DEVICES, •MICROWAVE
EQUIPMENT), CADMIUM SULFIDES, PIEZOELECTRIC
CRYSTALS, ACOUSTIC PROPERTIES, ELECTRIC FIELDS,
MICROWAVES, PARTIAL DIFFERENTIAL EQUATIONS,
BRILLOUIN ZONES, SCATTERING, PHOTOELASTICITY,
PHOTOELECTRIC MATERIALS, TEST METHODS, X BAND,
OSCILLOSCOPES (U)

A SMALL-SIGNAL ANALYSIS IS PRESENTED OF THE BULK
TERMINAL IMPEDANCE OF A CDS BAR IN WHICH THE
DRIFTING CHARGE CARRIERS AND VIBRATING LATTICE
INTERACT BY MEANS OF THE PIEZOELECTRIC COUPLING.
EXPERIMENTS ON LOW-RESISTIVITY (SEMICONDUCTING)
CDS INDICATE THAT ACOUSTOELECTRIC INTERACTION
TAKES PLACE IN THE CRYSTAL FOR APPLIED PULSE DRIFT
ELECTRIC FIELDS ABOVE A THRESHOLD FIELD CORRESPONDING
TO THE SYNCHRONOUS CARRIER VELOCITY. ACOUSTO-
ELECTRIC INTERACTION OCCURRING IN A CDS OBSTACLE
IN A MICROWAVE TRANSMISSION LINE IS SHOWN TO PRODUCE
AMPLITUDE MODULATION ON AN X-BAND CARRIER. LASER
BEAM PROBING IS SHOWN TO BE AN EXCELLENT TECHNIQUE
FOR THE INVESTIGATION OF ACOUSTO-ELECTRIC EFFECTS IN
PIEZOELECTRIC SEMICONDUCTORS. IT WAS SHOWN THAT
THE ACOUSTIC WAVES COULD ORIGINATE FROM
PIEZOELECTRICALLY INDUCED SHOCK AT INHOMOGENEITIES
AND ALSO FROM THERMAL NOISE DISTRIBUTED THROUGHOUT
THE SAMPLE. THE RELATIONSHIP BETWEEN UHF AND
MICROWAVE CURRENTS AND THE ACOUSTIC FLUX WAS
ELUCIDATED. (AUTHOR) (U)

403

UNCLASSIFIED

/ZZZHT

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /4ZZHT

AD-827 402 9/5
STANFORD RESEARCH INST MENLO PARK CALIF

DESIGN OF MICROWAVE FILTER NETWORKS. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 MAY-30 SEP 67,
JAN 68 113P CRISTAL, EDWARD G. ; COURT,
IAN N. ; ADAMS, DAVID K. ; KARP, ARTHUR ; BAHR,
ALFRED J. ;
CONTRACT: DA-28-U43-AMC-U2266(E)
PROJ: SRI-6025
MONITOR: ECOM 02266-F

UNCLASSIFIED REPORT

DESCRIPTORS: (*COMPUTER PROGRAMS, ELECTRICAL
ENGINEERING), (*STRIP TRANSMISSION LINES,
SYNTHESIS), (*TRANSDUCERS, FILMS),
(*PARAMETRIC AMPLIFIERS, BROADBAND),
(*RADIOFREQUENCY FILTERS, MICROWAVE FREQUENCY),
CADMIUM SULFIDES, ELECTROACOUSTIC TRANSDUCERS,
MICROMINIATURIZATION (ELECTRONICS), CIRCUITS,
JUNCTIONS (SEMICONDUCTOR), VACUUM APPARATUS, VAPOR
PLATING (U)
IDENTIFIERS: THIN FILMS, UP-CONVERTERS, THIN
FILMS ELECTRONICS (U)

A DETAILED DESCRIPTION OF THE COMPUTER PROGRAM FOR
THE ELECTRICAL PARAMETERS OF COUPLED AND UNCOUPLED
MICROSTRIP TRANSMISSION LINES IS PRESENTED.
EXPERIMENTAL DATA ARE ALSO GIVEN ON A TRIAL 10-DB
DIRECTIONAL COUPLER DESIGNED FROM DATA OBTAINED FROM
THE COMPUTER PROGRAM. THE DESIGN, FABRICATION, AND
LOSS CHARACTERISTICS OF THIN-FILM CDS
LONGITUDINAL-MODE TRANSDUCERS ARE DESCRIBED. INPUT
ADMITTANCE DATA FOR THESE TRANSDUCERS ARE PRESENTED.
THESE DATA ARE USED TO DEDUCE VALUES FOR THE
TRANSDUCER CAPACITANCE, THICKNESS COUPLING FACTOR,
AND SERIES RESISTANCE. DESIGN TECHNIQUES FOR
UPPER-SIDEBAND UP-CONVERTERS WITH WIDE (10:1)
TUNING RANGES ARE DISCUSSED. AN UP-CONVERTER HAS
BEEN BUILT AND TESTED THAT OPERATES FROM 200 TO 2000
MHZ WITH AN INSTANTANEOUS BANDWIDTH OF 35 MHZ.
EFFECTS OF THE LOWER SIDEBAND ARE IDENTIFIED AND
ACCOUNTED FOR IN THE DESIGN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-824 814 20/12
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

ELECTROREFLECTANCE STUDY OF CDS AND ZNO SINGLE
CRYSTALS. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
DEC 67 113P HUTCHINSON, EDWIN D. I
REPT. NO. GE/EE/675-B

UNCLASSIFIED REPORT

DESCRIPTORS: (SEMICONDUCTORS, BAND THEORY OF
SOLIDS), ELECTRIC FIELDS, SINGLE CRYSTALS,
BRILLOUIN ZONES, REFRACTIVE INDEX, DIELECTRIC
PROPERTIES, OPTICAL PROPERTIES,
CARRIERS (SEMICONDUCTORS), REFLECTIVITY,
CADMIUM SULFIDES, ZINC COMPOUNDS, OXIDES,
COMPUTER PROGRAMS, THESES (U)
IDENTIFIERS: ELECTROREFLECTANCE, ELECTROLYTE
TECHNIQUE (U)

FUNDAMENTAL EDGE ELECTROREFLECTANCE SPECTRA OF
CADMIUM SULFIDE (CDS) AND ZINC OXIDE (ZNO)
SINGLE CRYSTALS WERE MEASURED AT ROOM TEMPERATURE
USING THE ELECTROLYTE TECHNIQUE. MEASUREMENTS WERE
MADE WITH THE ELECTRIC VECTOR OF THE INCIDENT LIGHT
BOTH PARALLEL AND PERPENDICULAR TO THE HEXAGONAL AXIS
OF THE CRYSTALS. THE SPECTRA WERE INTERPRETED IN
TERMS OF THE ENERGY BAND STRUCTURE FOR DIRECT
TRANSITIONS AT THE CENTER OF THE BRILLOUIN ZONE FOR
THE WURTZITE STRUCTURES. A KRAMERS-KRONIG
ANALYSIS WAS USED TO OBTAIN THE REAL AND IMAGINARY
PARTS OF THE DIELECTRIC CONSTANT FOR CDS FROM THE
ELECTROREFLECTANCE DATA AND THE REFRACTIVE INDEX OF
THE MATERIAL. (AUTHOR) (U)

UNCLASSIFIED

UDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-835 201 2U/8
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

NUCLEAR SPIN-LATTICE RELAXATION IN SINGLE CRYSTALS OF
CADMIUM SULFIDE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 68 BIP LAMMERS, KURT M. ;
REPT. NO. GNE/PH/68-B

UNCLASSIFIED REPORT

DESCRIPTORS: (SINGLE CRYSTALS, NUCLEAR SPINS),
CADMIUM SULFIDES, NUCLEAR MAGNETIC MOMENTS,
CRYSTAL LATTICE DEFECTS, IMPURITIES, MASS
SPECTROSCOPY, CRYOGENICS, DOPING, INTERACTIONS,
SEMICONDUCTORS, MODELS(SIMULATIONS),
TEMPERATURE, RESISTANCE(ELECTRICAL), NUCLEAR
MAGNETIC RESONANCE, CHLORINE, LITHIUM, ELECTRICAL
PROPERTIES, THESES (U)

THE NUCLEAR MAGNETIC RESONANCE SPIN-LATTICE
RELAXATION (SLR) TIME $T_{SUB 1}$ OF CD_{113} IN
UNDOPED CdS , $CdS:Cl$ AND $CdS:Li$ WAS
MEASURED AS A FUNCTION OF TEMPERATURE (77K TO
500K) AT 2, 4, 7, AND 10 MHz. THE CRYSTALS
WERE N-TYPE BULK SINGLE CRYSTALS AND WERE GROWN BY
THE VAPOR-PHASE-DEPOSITION METHOD. T_1 VERSUS
TEMPERATURE DATA IS PRESENTED AND THE $CdS:Li$
SHOWS A FREQUENCY INVERSION IN THE HIGH TEMPERATURE
REGION (340K AND ABOVE). THE THEORY OF
NUCLEAR-ELECTRON MAGNETIC DIPOLAR INTERACTION WITH
NUCLEAR SPIN DIFFUSION WAS USED TO FIT THE DATA IN
THE LOW TEMPERATURE REGION. A MODEL PRESENTED
CONSISTS OF ELECTRONS 'HOPPING' BETWEEN IMPURITY
SITES MODULATING THE DIPOLAR COUPLING. THIS MODEL
PREDICTS THE FEATURES OF THE HIGH TEMPERATURE DATA.
(AUTHOR) (U)

406

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/ZZZHT

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-836 043 7/4 11/6
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

DETERMINATION OF THICKNESS AND COMPOSITION OF THIN
FILMS BY THE METHOD OF X-RAY FLUORESCENCE. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
FEB 68 7JP CARPENTER, JAMES THOMAS I
REPT. NO. GSP/PH/68-2

UNCLASSIFIED REPORT

DESCRIPTORS: (METAL FILMS, X-RAY SPECTROSCOPY),
THICKNESS, CADMIUM SULFIDES, INTENSITY, CADMIUM
SELENIDES, SUBSTRATES, MOLYBDENUM, NIOBIUM,
CRYSTALS, COPPER, GLASS, SOLIDS, CRYSTAL
LATTICES, SPECTROMETERS, X-RAY DIFFRACTION ANALYSIS,
THESES (U)

IDENTIFIERS: THIN FILMS, X RAY FLUORESCENCE (U)

X-RAY FLUORESCENCE TECHNIQUES WERE USED TO
DETERMINE THE THICKNESS AND COMPOSITION OF FILMS OF
SOLID SOLUTION CADMIUM SULFIDE/SELENIDE, USING A
G.E. XRD-6 SYSTEM. STANDARD CURVES OF SE
K LAMBDA AND CD K LAMBDA X-RAY FLUORESCENCE
INTENSITIES VERSUS FILM THICKNESS WERE ESTABLISHED
FOR FILMS (CDSE PERCENTAGES 0, 25, 50, 77, AND
100%) UP TO 10.00 MICRONS THICK ON ALUMINUM
SUBSTRATES. FILM THICKNESS ACCURACIES WERE 0.200
PLUS OR MINUS 0.05-10.00 PLUS OR MINUS 0.40 MICRONS.
SE K LAMBDA TO CD K LAMBDA INTENSITY RATIO
WAS USED TO DETERMINE FILM COMPOSITION TO WITHIN
2%. EFFECTS OF MOLYBDENUM, NIOBIUM, COPPER, AND
GLASS SUBSTRATES ON FLUORESCENCE INTENSITIES WERE
DETERMINED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-843 544 20/6 17/5
ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER WASHINGTON D
C

INDICATORS OF ULTRAVIOLET RADIATION BASED ON
TYPE FSK-M1 PHOTORESISTORS, (U)

68 7P GORDIN, V. L. ILEVITIN, A.

1. ;
REPT. NO. FSTC-HI-23-801-68
PROJ: FSTC-922362723U1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF ZHURNAL PRIKLADNOI
SPEKTROSKOPII (USSR) V6 N5 P685-686 1967, BY STEPHEN
EVANUSA.

DESCRIPTORS: (•ULTRAVIOLET DETECTORS, •PHOTOELECTRIC
CELLS(SEMICONDUCTOR)), CADMIUM SULFIDES, MERCURY
LAMPS, ULTRAVIOLET SPECTROSCOPY, SENSITIVITY,
USSR (U)
IDENTIFIERS: TRANSLATIONS (U)

USING ELECTRODELESS HIGH-FREQUENCY MERCURY-ARC
LAMPS, ALONG WITH SPECTRAL MEASUREMENTS, RAPID
DETERMINATION OF INTEGRAL INTENSITY OF ULTRAVIOLET
RADIATION MAY BE ACCOMPLISHED BY MEANS OF SPECIAL
INDICATORS PRODUCED ON THE BASIS OF MONOCRYSTALLINE
CADMIUM SULFIDE PHOTORESISTORS OF THE FSK-M1
TYPE. THESE INDICATORS CAN BE USED IN THE CONTROL
OF RADIATION OF ULTRAVIOLET RADIATION SOURCES, BOTH
IN MANUFACTURE AND APPLICATION. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-851 282 20/12
NAVAL WEAPONS CENTER CORONA LABS CALIF

SEMICONDUCTING THIN FILMS: AN ANNOTATED
BIBLIOGRAPHY, 1968 SUPPLEMENT. (U)

MAR 69 160P
REPT. NO: NWCCL-TP-842
PROJ: A31533/216/69RU0803020

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPORT NOS. NOLC-712,
DATED 15 JUN 67, AD-655 100 AND NOLC-746 DATED 1 MAR
68, AD-667 233.

DESCRIPTORS: (*SEMICONDUCTING FILMS,
BIBLIOGRAPHIES), CRYSTAL STRUCTURE, BAND THEORY
OF SOLIDS, EPITAXIAL GROWTH, VAPOR PLATING,
ELECTROLUMINESCENCE, PHOTSENSITIVITY, LASERS,
GERMANIUM, SILICON, BORON, ARSENIDES,
PHOSPHIDES, SELENIDES, SULFIDES, TELLURIDES,
CADMIUM SELENIDES, CADMIUM SULFIDES, GALLIUM
ARSENIDES, INDIUM ANTIMONIDES, SILICON CARBIDES,
ZINC SULFIDES, ALUMINUM COMPOUNDS, CADMIUM
COMPOUNDS, GALLIUM COMPOUNDS, GERMANIUM COMPOUNDS,
INDIUM COMPOUNDS, LEAD COMPOUNDS, MERCURY
COMPOUNDS, TIN COMPOUNDS, ZINC COMPOUNDS (U)
IDENTIFIERS: THIN FILMS, HETEROJUNCTIONS,
SEMICONDUCTOR JUNCTIONS, GUNN EFFECT (U)

THE 1968 SUPPLEMENT TO NOLC REPORT 712,
SEMICONDUCTING THIN FILMS, AN ANNOTATED
BIBLIOGRAPHY, 1956-1966, CONTINUES THE
COMPREHENSIVE BIBLIOGRAPHIC SURVEY ON THE
PREPARATION, PROPERTIES, APPLICATIONS, AND THEORY OF
SEMICONDUCTING THIN FILMS. IT IS COMPRISED OF 451
REFERENCES, THE MAJORITY OF WHICH WERE PUBLISHED IN
1968, FROM ENGLISH AND FOREIGN LANGUAGE PERIODICAL
LITERATURE. THE ABSTRACTS ARE ARRANGED BY AUTHOR
UNDER THE FOLLOWING CLASSES: (1) ELEMENTAL,
(2) GROUP III-V, (3) GROUP II-VI,
(4) GROUP IV-VI, (5) GROUP IV-IV,
(6) MISCELLANEOUS COMPOUNDS, AND (7) METHODS
AND TECHNIQUES. ALL OF THE MATERIALS ARE INDEXED
WITH THE EXCEPTION OF THE MISCELLANEOUS COMPOUNDS
(GROUPS I-V, I-VI, AND I-VII).
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-857 495 9/1
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

CADMIUM SULFIDE PLATELET CURRENT INJECTION
ELECTROLUMINESCENT DIODES. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAR 69 67P COLWICK, HAROLD D. ;
REPT. NO. GE/PH/69-2

UNCLASSIFIED REPORT

DESCRIPTORS: (*DIODES(SEMICONDUCTOR),
*ELECTROLUMINESCENCE), (*CADMIUM SULFIDES,
DIODES(SEMICONDUCTOR)), MANUFACTURING METHODS,
THESES, ELECTRICAL PROPERTIES (U)

A SYSTEM FOR FABRICATING ELECTROLUMINESCENT CDS
DIODES FROM PLATELET MATERIAL AND ASSEMBLY EQUIPMENT
AND TECHNIQUES FOR MOUNTING THE DIODES WERE
DEVELOPED. THE NECESSARY ELECTRONIC EQUIPMENT FOR
MEASURING ELECTRICAL PROPERTIES OF THE DIODES WAS
COMPLETED. THE DIODES WERE PREPARED BY DEPOSITING
A THIN FILM OF CU AND DIFFUSING THE CU INTO THE
CRYSTAL TO FORM THE BLOCKING CONTACT AND THEN
DEPOSITING IN FOR THE OHMIC CONTACT. RESULTS
INDICATED THAT REASONABLY EFFICIENT HOLE INJECTION
WAS ACHIEVED BASED UPON THE LOW THRESHOLD VOLTAGE OF
1.7 VOLTS NECESSARY FOR THE ONSET OF
ELECTROLUMINESCENCE. CURRENT-VOLTAGE AND
DIFFERENTIAL CAPACITANCE MEASUREMENTS CONFIRMED THAT
THE DIODES WERE P-I-N STRUCTURES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-858 005 2U/12
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

COMPARISON OF ULTRAVIOLET REFLECTIVITY AND
CHARACTERISTIC ELECTRON ENERGY LOSS
MEASUREMENTS OF ZNO AND COS SINGLE
CRYSTALS.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
JUN 69 95P ALMASSY, ROBERT JOSEPH ;
REPT. NO. GNE/PH/69-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, BAND THEORY OF
SOLIDS), (*CADMIUM SULFIDES, OPTICAL
PROPERTIES), (*ZINC COMPOUNDS, OPTICAL
PROPERTIES), OXIDES, ULTRAVIOLET RADIATION,
DIELECTRIC PROPERTIES, SINGLE CRYSTALS, ELECTRON
BEAMS, CORRELATION TECHNIQUES, COMPUTER PROGRAMS,
SPECTROSCOPY, REFLECTIVITY, THESES

(U)

IDENTIFIERS: ZINC OXIDES, ULTRAVIOLET
REFLECTIVITY, KRAMERS-KRONIG DISPERSION RELATION,
ELECTRON BEAM SPECTROSCOPY, PLASMONS

(U)

AN EXPERIMENTAL STUDY WAS MADE TO DETERMINE THE
NONPOLARIZED ULTRAVIOLET REFLECTIVITY AND
CHARACTERISTIC ELECTRON ENERGY LOSS SPECTRA FOR
ZNO AND COS AND TO CORRELATE THESE DATA USING
A KRAMERS-KRONIG DISPERSION RELATION.
REFLECTIVITY MEASUREMENTS WERE MADE USING A I-M
JARHELL-ASH MONOCHROMATOR WITH LOW PRESSURE
CAPILLARY DISCHARGE SOURCE. RUTHEMANN-LANG TYPE
ENERGY LOSS MEASUREMENTS WERE MADE USING 10 KEV
TRANSMITTED ELECTRONS. ALL SAMPLES WERE SINGLE
CRYSTAL PLATELETS GROWN BY THE VAPOR PHASE TECHNIQUE.
CORRELATION WAS MADE USING A FORTRAN IV CODE
DEVELOPED FOR THE IBM 7090 SYSTEM. REPEATABLE
SPECTRA WERE OBTAINED BY BOTH TECHNIQUES, AND
PRELIMINARY CORRELATION INDICATED GOOD AGREEMENT
BETWEEN DATA. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AD-859 726 2U/12 7/4
AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
ENGINEERING

SELF CONSISTENT ORTHOGONALIZED PLANEWAVE
ENERGY BAND MODEL FOR CUBIC ZNS,
ZNSE, CDS AND CDSE. (U)

DESCRIPTIVE NOTE: DOCTORAL THESIS,
NOV 68 177P STUKEL, DONALD JOSEPH I
PROJ: AF-7885
TASK: 7885UO

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, *BAND THEORY OF
SOLIDS), (*ZINC SULFIDES, BAND THEORY OF
SOLIDS), (*CADMIUM SULFIDES, BAND THEORY OF
SOLIDS), (*CADMIUM SELENIDES, BAND THEORY OF
SOLIDS), SELENIDES, WAVE FUNCTIONS,
SYMMETRY(CRYSTALLOGRAPHY), HARTREE-FUCK
APPROXIMATION, THESES, ZINC COMPOUNDS (U)
IDENTIFIERS: GROUP 2B-6A COMPOUNDS, SELF
CONSISTANT FIELD WAVEFUNCTIONS, ZINC SELENIDES (U)

FIRST-PRINCIPLES ORTHOGONALIZED PLANEWAVE (OPW)
ENERGY BAND CALCULATIONS HAVE BEEN CARRIED OUT FOR
CUBIC ZNS, ZNSE, CDS AND CDSE WITH A
NON-RELATIVISTIC FORMALISM. THESE ARE THE FIRST
FULLY CONVERGENT, FULLY SELF-CONSISTENT ENERGY BAND
SOLUTIONS REPORTED FOR II-VI CUBIC SEMICONDUCTING
COMPOUNDS. IN ADDITION VARIOUS EXCHANGE
APPROXIMATIONS HAVE BEEN COMPARED IN THE SELF-
CONSISTENT OPW MODEL. THE ADEQUACY OF THE ENERGY
BAND MODEL WAS TESTED BY CALCULATING THE OPTICAL
SPECTRUM AND COMPARING THIS WITH THE EXPERIMENTAL
SPECTRUM. THE SPIN-ORBIT SPLITTINGS HAVE BEEN
CALCULATED USING PERTURBATION THEORY. THE CHARGE
DENSITIES HAVE BEEN CALCULATED WITH ALL THREE
EXCHANGE APPROXIMATIONS AND ARE COMPARED WITH
EXPERIMENT. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /ZZZHT

AU-875 370 20/12
AIR FORCE INST OF TECH WRIGHT-PATTENSON AFB OHIO SCHOOL OF
ENGINEERING

TUNNELING SPECTROSCOPY STUDY OF GAAS,
CDS AND ZNO SCHOTTKY BARRIER
JUNCTIONS.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,
MAR 70 79P AMOS, DAVID H. ;
REPT. NO. GE/PH-70-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS,
*TUNNELING(ELECTRONICS)), (*GALLIUM ARSENIDES,
SPECTROSCOPY), (*CADMIUM SULFIDES,
SPECTROSCOPY), (*ZINC COMPOUNDS,
SPECTROSCOPY), OXIDES, CRYSTAL LATTICES,
PHONONS, CRYOGENICS, TEST METHODS, LABORATORY
EQUIPMENT, THESES

(U)

IDENTIFIERS: *TUNNELING SPECTROSCOPY, PHONON
SPECTRA, *ZINC OXIDES, SCHOTTKY BARRIERS

(U)

AN EXPERIMENTAL STUDY WAS MADE OF PHONON SPECTRA IN
GAAS, CDS, AND ZNO BY TUNNELING
SPECTROSCOPY. RESULTS ON GAAS SHOWED STRUCTURE
IN THE dV/dI AND THE SECOND DIFFERENTIAL OF V
WITH RESPECT TO I CURVES AT THE TA , $2TA$, LO
PHONON ENERGIES. THE TA , LA , TO , AND THREE
BRANCHES OF THE TO PHONON WERE IDENTIFIED IN
CDS, AS WELL AS SEVERAL MULTI-PHONON PEAKS AND A
ZERO-BIAS CONDUCTANCE MAXIMUM ATTRIBUTABLE TO
MAGNETIC MOMENTS LOCALIZED IN THE BARRIER REGION.
THE SAME ZERO-BIAS ANOMALY, AND STRUCTURE AT THE
 LO PHONON ENERGY WERE OBSERVED IN ZNO.
(AUTHOR)

(U)

UNCLASSIFIED

CORPORATE AUTHOR - MONITORING AGENCY

•AERONAUTICAL SYSTEMS DIV WRIGHT-
PATTERSON AFB OHIO

•••
ASD-TDR-62-69

RESEARCH ON SOLAR-ENERGY
CONVERSION EMPLOYING CADMIUM
SULFIDE

AD-284 032

•••
ASD-TDR62 833

ELECTROLUMINESCENT-
PHOTOCONDUCTOR ELEMENTS

AD-286 829

•••
ASD-TDR63 223

FEASIBILITY INVESTIGATION OF
CHEMICALLY SPRAYED THIN FILM
PHOTOVOLTAIC CONVERTERS.

AD-403 053

•••
ASD-TDR-63-460

THIN FILMS FOR COMPOSITE
MOLECULAR ELECTRONICS.

AD-612 879

•••
ASD-TDR63 689

RESEARCH ON PHOTOCONDUCTIVITY
IN THIN FILMS.

AD-417 747

•••
ASD-TDR63 743

INVESTIGATION OF THIN FILM
CADMIUM SULFIDE SOLAR CELLS.

AD-423 684

•••
ASD-TR61 884

A NEW FORM OF SOLID STATE SOLAR

GENERATOR

AU-273 974

•AERONAUTICAL SYSTEMS DIV WRIGHT-
PATTERSON AFB OHIO PHYSICS LAB

•••
PHOTOCONDUCTIVITY IN CDS
CRYSTALS AS A MECHANISM FOR GAMMA
RAY DOSIMETRY

AD-261 116

•AEROSPACE MEDICAL RESEARCH LAB WRIGHT-
PATTERSON AFB OHIO

•••

AHRL-TR-67-168
DEVELOPMENT OF PHOTORESISTIVE
ELEMENTS FOR AN ANALOG MULTIPLIER.
AD-671 980

•AEROSPACE MEDICAL RESEARCH LABS
WRIGHT-PATTERSON AFB OHIO

•••
ARL-67-0032

PHONON COUPLING IN EDGE
EMISSION AND PHOTOCONDUCTIVITY OF
CDS, CDS, AND CDS SUB X 5 SUB 1-
X1.

AD-686 151

•AEROSPACE RESEARCH LABS OFFICE OF
AEROSPACE RESEARCH WRIGHT-PATTERSON
AFB OHIO

•••
ARL-68-269

A STUDY OF HOMOGENEITY OF SOLID
SOLUTIONS OF CADMIUM SULFIDE AND
CADMIUM SELENIDE BY X-RAY
FLUORESCENCE.

AD-629 493

•••
ARL-66-0060

IMPURITY CONDUCTIVITY IN SINGLE
CRYSTAL CDS.

AD-630 491

•AEROSPACE RESEARCH LABS WRIGHT-
PATTERSON AFB OHIO

•••
62 319

RESEARCH IN PURIFICATION OF
CADMIUM SULFIDE CRYSTALS AND OTHER
II-IV COMPOUNDS

AD-276 416

•••
65-67

OSCILLATORY PHOTOCONDUCTIVITY
OF CDS.

AD-618 828

•••
ARL-14

RESEARCH IN PURIFICATION OF
CADMIUM SULFIDE CRYSTALS

AD-259 883

•••
ARL-62-365

0-1

UNCLASSIFIED

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RESEARCH ON II-VI COMPOUND
SEMICONDUCTORS.
AD-281 718

• • •
ARL-62 398
FEASIBILITY STACKING
PHOTOVOLTAIC LAYERS OF CD OR
ZN SULFIDES, SELENIDES, AND
TELLURIDES FOR CONVERSION OF SUN
RADIATION INTO ELECTRICAL POWER,
PREPARATION AND GROWTH, SINGLE
CRYSTALS AND THIN FILMS; THEORY
ELECTRICAL PROPERTIES.
AD-282 040

• • •
ARL-62 433
RESEARCH IN CRYOGENICS AND
MAGNETO-OPTICS
AD-292 324

• • •
ARL-64 98
OPTICAL PROPERTIES OF
SEMICONDUCTING CRYSTALS.
AD-603 374

• • •
ARL-65-56
EXCITON STRUCTURE IN
PHOTOCONDUCTIVITY OF CDS, CDSE, AND
CDSE SINGLE CRYSTALS.
AD-617 125

• • •
ARL-65-98
RESEARCH ON II-VI COMPOUND
SEMICONDUCTORS.
AD-620 297

• • •
ARL-65-100
RESEARCH IN PURIFICATION AND
SINGLE CRYSTAL GROWTH OF II-VI
COMPOUNDS.
AD-619 279

• • •
ARL-65-111
RESEARCH ON PHOTOVOLTAIC CELLS.
AD-621 454

• • •
ARL-65-123
PHYSICAL RESEARCH ON PROPERTIES
OF II-VI COMPOUND SEMI CONDUCTORS.
AD-625 476

ARL-65-130
ANALYTICAL TECHNIQUES FOR THE
DETERMINATION OF TRACE IMPURITIES
IN CADMIUM SULFIDE.
AD-623 165

• • •
ARL-66-0078
CYCLOTRON RESONANCE
EXPERIMENTS.
AD-629 395

• • •
ARL-66-0225
PHYSICAL RESEARCH ON
FUNDAMENTAL PROPERTIES OF II-VI
COMPOUND SEMICONDUCTORS.
AD-649 242

• • •
ARL-67-0070
RESEARCH IN PURIFICATION AND
SINGLE GROWTH OF II-VI COMPOUNDS.
AD-657 545

• • •
ARL-67-0143
EFFECT OF STRESS ON CDS SINGLE
CRYSTALS.
AD-661 882

• • •
ARL-67-0145
RESEARCH ON IMPROVED II-VI
CRYSTALS.
AD-660 874

• • •
ARL-67-0174
COHERENT AND NONCOHERENT LIGHT
EMISSION IN II-VI COMPOUNDS.
AD-661 907

• • •
ARL 67-0177
RECOVERY OF ROCKSALT STRUCTURE
CDS TO ROOM PRESSURE.
AD-660 760

• • •
ARL-67-0190
RESEARCH ON THE MECHANISM OF
THE PHOTOVOLTAIC EFFECT IN HIGH-
EFFICIENCY CDS THIN-FILM SOLAR
CELLS.
AD-661 557

• • •
ARL-67-0282
FABRICATION OF CADMIUM SULFIDE

UNCLASSIFIED

THIN FILM SOLAR CELLS FOR SPACE
VEHICLE TESTING.
AD-666 437

• • •
ARL-67-0284
BAND PARAMETERS DETERMINATION
FROM FARADAY ROTATION MEASUREMENTS,
AD-664 882

• • •
ARL-67-0285
BAND STRUCTURE AND DISPERSION
RELATIONS IN II-VI COMPOUNDS.
AD-664 881

• • •
ARL-68-0007
CONVERGENCE STUDY OF A SELF-
CONSISTANT ORTHOGONALIZED-PLANE-
WAVE BAND CALCULATION FOR HEXAGONAL
CdS.
AD-667 022

• • •
ARL-68-0057
SPLITTING OF EXCITON LINES IN
WURTZITE-TYPE II-VI CRYSTALS BY
UNIAXIAL STRESS,
AD-672 467

• • •
ARL-68-0096
RESEARCH IN PURIFICATION AND
SINGLE CRYSTAL GROWTH OF II-VI
COMPOUNDS,
AD-679 636

• • •
ARL-68-0132
ANALYTICAL TECHNIQUES FOR THE
DETERMINATION OF TRACE IMPURITIES
IN CADMIUM SULFIDE.
AD-676 043

• • •
ARL-68-0153
RESEARCH ON IMPROVED II-VI
CRYSTALS,
AD-679 566

• • •
ARL-68-0184
OPTICAL STUDIES OF LATTICE
VIBRATION IN II-VI SEMICONDUCTING
COMPOUNDS,
AD-676 649

• • •
ARL-68-0231

OSCILLATORY PHASE OF
PHOTOCONDUCTIVITY OF CdS,
AD-665 676

• • •
ARL-68-0233
THE EDGE EMISSION BANDS IN
CADMIUM SULFIDE,
AD-685 673

• • •
ARL-68-0246
OSCILLATIONS IN EXCITON
EMISSION IN THE EXCITATION SPECTRA
OF ZnSe AND CdS,
AD-685 674

• • •
ARL-69-0026
INFRARED MEASUREMENTS ON CdS
THIN FILMS DEPOSITED ON ALUMINUM,
AD-684 160

• • •
ARL-69-0080
ELECTRONIC STRUCTURE AND
OPTICAL SPECTRUM OF SEMICONDUCTORS,
AD-692 745

• • •
ARL-69-0111
SOLID SOLUTIONS OF CADMIUM
SULFIDE-CADMIUM SELENIDE FILMS;
PREPARATION AND DETERMINATION BY X-
RAY FLUORESCENCE METHOD,
AD-695 110

• • •
ARL-69-0125
EMISSION FROM EXCITED TERMINAL
STATES OF BOUND EXCITON COMPLEXES,
AD-695 104

• • •
ARL-69-0155
RESEARCH ON THE MECHANISM OF
THE PHOTOVOLTAIC EFFECT IN HIGH
EFFICIENCY CdS THIN-FILM SOLAR
CELLS.
AD-702 095

• • •
ARL-69-0184
LATTICE DYNAMICS OF CdS. I.
NEAREST NEIGHBOR APPROXIMATION,
AD-701 043

• • •
ARL-69-0221
EMISSION FROM EXCITED TERMINAL

UNCLASSIFIED

STATES OF BOUND EXCITON COMPLEXES,
AD-700 555

• • •
ARL-69-0226

DISPERSIVE AND NONDISPERSIVE X-
RAY FLUORESCENCE METHODS FOR THE
MEASUREMENT OF THE THICKNESSES OF
FILMS OF CADMIUM SULFIDE AND OTHER
II-VI COMPOUNDS.

AD-700 554

• • •
ARL-70-0036

IMPROVEMENTS IN CDS THIN FILM
SOLAR CELLS.

AD-707 869

• • •
ARL-70-0055

DONOR-ACCEPTOR PAIR
RECOMBINATION SPECTRA IN CADMIUM
SULFIDE CRYSTALS.

AD-708 638

• • •
ARL-70-0099

THIN FILM CDS SOLAR CELL
FAURICATION PARAMETER STUDY.

AD-710 636

• • •
ARL-70-0106

RESEARCH IN PURIFICATION AND
SINGLE CRYSTAL GROWTH OF II-VI
COMPOUNDS.

AD-709 890

• • •
ARL-70-0169

RESEARCH ON THE OPERATING AND
FAILURE MECHANISMS IN CDS SOLAR
CELLS.

AD-722 112

• • •
ARL-70-0170

ANALYTICAL TECHNIQUES FOR THE
DETERMINATION OF TRACE IMPURITIES
IN II-VI COMPOUNDS.

AD-724 219

• • •
ARL-70-0260

LINEAR COMPRESSIBILITIES OF II-
VI COMPOUND SINGLE CRYSTALS.

AD-715 974

• • •
ARL-70-0308

CALCULATION OF THE EXCHANGE
ENERGY FOR EXCITONS IN THE TWO BODY
MODEL.

AD-716 892

• • •
ARL-70-0310

PHONON SIDEBANDS ON BOUND
EXCITON TRANSITIONS IN CDS AND ZNO.

AD-716 895

• • •
ARL-70-0311

CONDUCTION ELECTRON HYPERFINE
INTERACTION IN SEMICONDUCTING CDS.

AD-716 896

• • •
ARL-70-0348

SHORT WAVELENGTH IMPURITY
EXCITON TRANSITIONS IN CDS AT 1.2
K.

AD-717 526

• • •
ARL-71-0009

SPIN EXCHANGE IN EXCITONS, THE
QUASICUBIC MODEL AND DEFORMATION
POTENTIALS IN II-VI COMPOUNDS.

AD-721 406

• • •
ARL-71-0015

IMPROVEMENTS IN CDS THIN FILM
SOLAR CELLS.

AD-723 315

• • •
ARL-71-0017

RESEARCH ON IMPROVED II-VI
CRYSTALS.

AD-725 063

• • •
ARL-71-0045

SELF-CONSISTENT ORTHOGONALIZED-
PLANE-WAVE CALCULATIONS.

AD-723 927

• • •
ARL-71-0069

RESEARCH ON IMPROVED II-VI
CRYSTALS.

AD-727 048

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ARL-71-0064

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- AD-604 341
- RAMAN SPECTROSCOPY
REPRINT: THEORY OF ENHANCED
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AD-475 206
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REPRINT: SURFACE ELASTIC WAVES.
AD-721 786
- MICROWAVE FREQUENCY
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•DETECTORS

SOLID STATE RADIATION DETECTORS WERE CONSTRUCTED USING CRYSTAL PLATELETS OF CDS. BOTH INTRINSIC AND P-N JUNCTION DETECTORS WERE MADE AND EVALUATED.

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•DIELECTRICS

RAMAN SPECTROSCOPY
REPRINT: POLARITON THEORY OF RAMAN SCATTERING IN INSULATING CRYSTALS. II.

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- *ELECTRON TRANSITIONS
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