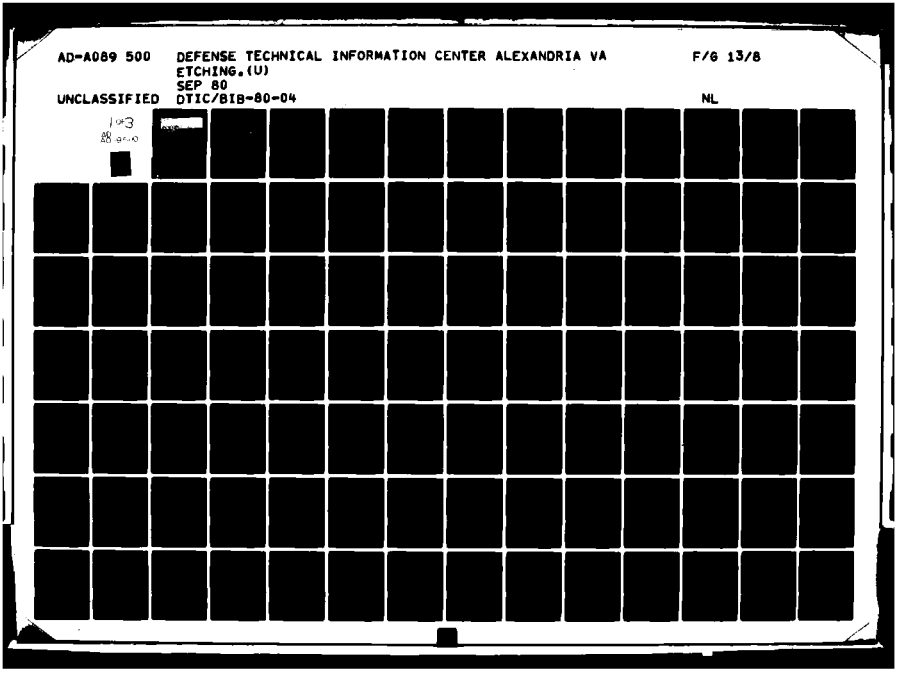
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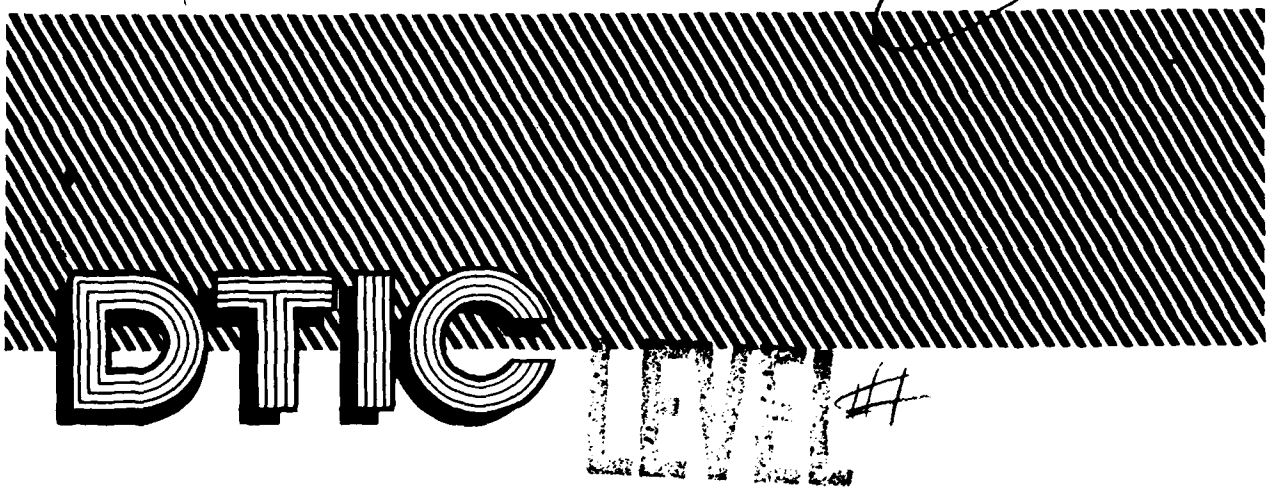

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Supersedes AD-763 100

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* Etching
* Bibliographies
Chemical Milling
Surface Properties
Etched Crystals

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This bibliography is a compilation of unclassified/unlimited reports on etching. The collection of references primarily deal with the capabilities and limitation of etching techniques, materials for which they are suitable, and the different etchants and solutions used in the process. The four computer-generated indexes provided are Corporate Author-Monitoring Agency, Subject, Title, and Personal Author.

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F O R E W O R D

This bibliography contains 263 unclassified-unlimited citations on *Etching*.

Entries have been selected from references processed into the Defense Technical Information Center data bank from January 1959 through February 1980.

This report supersedes DDC report bibliography on *Etching*, AD-763 100, DDC-TAS-73-78, dated July 1973.

Individual entries are arranged in AD number sequence under the heading bibliographic references. Computer-generated indexes of Corporate Author-Monitoring Agency, Subject, Title and Personal Author are provided.

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HUBERT E. SAUTER
Administrator
Defense Technical Information Center

C O N T E N T S

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD-B008 190 13/8 13/5

NORTHROP CORP HAWTHORNE CALIF AIRCRAFT DIV

Development of Corrosion Resistant Surface Treatments for Aluminum Alloys for Spot-Weld Bonding. (U)

DESCRIPTIVE NOTE: Final rept. 1 Feb 74-1 Feb 75, MAR 75 125P Bowen,B. B. ;Herfert,R. E. ;Wu,K. C. ;
REPT. NO. NOR-75-51
CONTRACT: F33615-74-C-5027
PROJ: AF-7340
TASK: 734002
MONITOR: AFML TR-75-69

UNCLASSIFIED REPORT

DESCRIPTORS: (*Spot welding, Bonding), (*Spot welds, Bonding), (*Adhesive bonding, Spot welds), (*Aluminum alloys, *Corrosion inhibition), Adhesives, Surfaces, Treatment, Alumina, Hydrates, Corrosion resistance, Etching, Sealing compounds, Strength(Mechanics), Formulations, Microstructure, Aircraft, Airframes (U)
IDENTIFIERS: FPL etch, Boehmite, A-13968 adhesives (U)

IAC ACCESSION NUMBER: MCIC-096582
IAC DOCUMENT TYPE: MCIC -HARD COPY--

The objective of this program was to develop a corrosion resistant spot-weld bonding system for aluminum aircraft primary structures. Anodizing and chemical surface treatment were investigated. Chemical and microscopic techniques indicated that the most suitable corrosion resistant surface on aluminum should be a boehmite surface, alpha Al2O3.H2O. Many anodizing and chemical treatment systems were able to produce this surface oxide; however, most of these systems produced surfaces that either showed poor corrosion resistance or could not be spot-welded. A treatment consisting of the standard FPL etch followed by 90-minute sealing in boiling sodium dichromate solution gave a weldable surface with good corrosion resistance. The best adhesive found was B.F. Goodrich A-13968. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD-B002 612 9/5 13/8

UNITED AIRCRAFT RESEARCH LABS EAST HARTFORD CONN

Sputtering Technology for Improved Electron Devices. (U)

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 74, DEC 74 135P Grantham,D. H. ;Swindal,J. L. ;
REPT. NO. UARL-N921820-4
CONTRACT: N00019-74-C-0256

UNCLASSIFIED REPORT

DESCRIPTORS: (*Semiconductor devices, Manufacturing), (*Sputtering, Semiconductor devices), (*Integrated circuits, Manufacturing), Semiconducting films, Thin films, Circuit interconnections, Beryllium oxides, Silicon dioxide, Heat sinks, Radiofrequency, Vapor deposition, Amorphous materials, Etching, Substrates, Gallium, Aluminum, Argon, Copper, Thermal properties, Electrical properties, Masking (U)

A viable process for multilevel interconnects was developed. Silicon dioxide sputtered at a substrate temperature of 200 C controlled by gallium heat sinking to a heater block, at argon pressure of 5 millitorr, and at a power density of 14 watts/sq. in. was demonstrated to have appropriate etching characteristics and to be virtually free of pinholes. Pure aluminum and 4% copper in aluminum were shown to be compatible with the silicon dioxide process and to give good level-to-level electrical contact at feedthroughs sputter cleaned just prior to the metal deposition. Beryllium oxide was deposited by rf sputtering from a beryllium oxide target and by reactive rf sputtering from a beryllium target using oxygen-argon mixtures. In both cases stress levels in the films deposited were very high, producing pronounced bowing of substrates. Layers on the order of 2 micrometers thick shattered silicon substrates 5 centimeters in diameter and 325 micrometers thick. Reactively sputtered films deposited at about 3000A/hr, while films rf sputtered from a beryllium oxide target deposited at a rate of about 6500A/hr for 500 watts into a 3.5 inch diameter target. (U)

AD-A084 171 11/6 7/4

UNIVERSAL ENERGY SYSTEMS INC DAYTON OHIO

Surface Characterization of Chemically Treated Titanium and Titanium Alloys. (U)

DESCRIPTIVE NOTE: Interim rept. May-Nov 79, FEB 80 180P Roche,Alain A. ;
CONTRACT: F33615-79-C-5129
MONITOR: AFWAL TR-80-4004

UNCLASSIFIED REPORT

DESCRIPTORS: *Titanium alloys, *Surface chemistry, *Surface finishing, *Adhesive bonding, Test and evaluation, Auger electron spectroscopy, Mass spectroscopy, Secondary, Ions, Electron spectroscopy, Photoelectron spectra, Scanning, Sputtering, Etching (U)
IDENTIFIERS: Surface characterization, Secondary ion mass spectroscopy, Surface treatment (U)

A thorough knowledge of adherend surfaces is necessary to adequately evaluate adhesive bond joint performance. Auger Electron Spectroscopy (AES), Secondary Ion Mass Spectroscopy (SIMS), SCanning Electron Microscopy (SEM), and X-Ray Photoelectron Spectroscopy (XPS) were used to characterize the surface topography (roughness, selective etching) composition (relative concentration of alloyed element on surface, contaminated overlayer...) chemical state (titanium or alloy surface oxide, oxy-fluoride...) and oxide thickness of different chemically treated titanium alloys. Seven alloys and the metal were conditioned with seven different chemical treatments. Data from each treated alloy has been compiled to show physical and chemical effects of each treatment on each alloy. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A082 873 11/6 7/4

SASKATCHEWAN UNIV SASKATOON

A Double-Etching Technique for Microstructural Analysis of Steel, (U)

74 13P Lui,M. -W. ;Le May,I. ;
MONITOR: DRB REPRINT-4073

UNCLASSIFIED REPORT

Availability: Pub. in Microstructural Science, v2 p35-47 1974 (No copies furnished by DTIC).
DESCRIPTORS: *Steel, *Microstructure, *Etching, Electron microscopy, Reprints (U)
IDENTIFIERS: Microstructural analysis (U)

Reprint: A Double-Etching Technique for Microstructural Analysis of Steel.

AD-A082 237 9/3 9/5

TEXAS INSTRUMENTS INC DALLAS

IC Fabrication Using Electron-Beam Technology. (U)

DESCRIPTIVE NOTE: Final rept. 1 Jul 76-30 Jun 79, FEB 80 70P Varnell,Gilbert L. ;Bartelt, John ;Reynolds,Jack ;
REPT. NO. TI-03-79-57
CONTRACT: DAAB07-76-C-8105
PROJ: 1L162705AH94
TASK: 04
MONITOR: DELET TR-76-8105-F

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, *Electron beams, Lithography, Etching, Plasma control, Specifications, Cross sections, Chips(Electronics), Sizes(Dimensions), High density, Random access computer storage, Bipolar systems, Transistor transistor logic, Schottky barrier devices (U)
IDENTIFIERS: VLSI(Very Large Scale Integration), PE62705A, ASH94, WU33 (U)

The object of this program was to develop a manufacturing capability for standard bipolar circuits of conventional design using existing e-beam direct writing equipment. In particular, a pilot-line demonstration of significant yields of conventional 4-5-micrometer design rule integrated circuits which were fully tested to military specifications for performance, quality and reliability was of paramount importance. Achievement of this objective then establishes a baseline for direct e-beam writing in production and provides a significant stepping stone for implementation of e-beam technology in VLSI circuit fabrication. The vehicle used for this demonstration was a standard TTL 256-bit bipolar RAM (SN74S201A) using a single-level metal, junction isolated, Schottky clamped bipolar process. Emphasis was placed on utilizing a new class of high-speed electron resist (TI-309 and TI-313) in combination with selective plasma etching techniques in order to establish economical next generation VLSI processes. (U)

AD-A081 729 8/7 7/1 13/8

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND FORT MONMOUTH NJ ELECTRONICS TECHNOLOGY/DEVICES LAB

Etching Studies on Singly and Doubly Rotated Quartz Plates. (U)

DESCRIPTIVE NOTE: Research and development rept., JAN 80 12P Vig,John R. ;Brandmayr, Ronald J. ;Filler,Raymond L. ;
REPT. NO. DELET-TR-80-5
PROJ: 1L162705AH94
TASK: 10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the Annual Symposium on Frequency Control (33rd), 30 May-1 Jun 79, Atlantic City, NJ.
DESCRIPTORS: *Quartz, *Plates, *Polishing, *Surface chemistry, *Etching, Rotation, Quartz resonators, Solutions(Mixtures), Ammonium compounds, Fluorides, Experimental data, Chemical composition, Surface roughness, Electron microscopy (U)
IDENTIFIERS: Quartz crystals, Rotated quartz plates, Chemical polishing, Etching studies, Etchants, Ammonium bifluorides, Surface morphologies, Scanning electron microscopy, ASH94, PE62705A (U)

Experiments aimed at finding a chemical polish for the doubly rotated SC-cut have been performed with a variety of etchants. The surface morphologies of etched SC-cut plates depend strongly on the composition of the etching solutions. Some of the solutions evaluated did not produce chemical polishing on either side of the SC-cut plates, some produced chemical polishing on one side but not the other, and some were able to polish both sides. It has also been shown that at least up to 10 MHz, the chemical polishing does not produce a significant Q degradation for AT-cut quartz crystal resonators. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD-A081 728 11/6

AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OH

Failure Mechanisms and Interphase Chemistry of Gold Films on Ti6Al4V. Part II. Etching of Ti6Al4V and its Effect on Evaporated Gold and Commercial Adhesive Adhesion. (U)

DESCRIPTIVE NOTE: Final rept. Jul 78-Oct 79, JAN 80 39P Baun,W. L. ;
REPT. NO. AFML-TR-79-4178-PT-2
PROJ: 2419
TASK: 02

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 1, AD-A081 727.
DESCRIPTORS: *Titanium alloys, *Etching, *Gold alloys, *Metal films, Failure, Adhesion, Adhesive bonding, Evaporation, Diffusion, Surface finishing, Surface chemistry, Degradation, Selection, Vapor deposition, Boundary layer, Models (U)
IDENTIFIERS: Titanium alloy 6Al4V, Interphase chemistry, Surface treatment (U)

This work is part of a program which looks at the effects of surface treatments on surface chemistry and morphology of titanium alloys with reference to adhesive bonding. Here gold is vapor deposited on Ti6Al4V which was prepared to simulate conditions of etching and aging which might be encountered during processing and use. Although this model system of gold on Ti6Al4V is not a direct analogy to adhesive bonding, certain similarities do exist and the system provides interesting information on bond failure mechanisms. Surface chemistry changes suggest selective etching of the alpha phase and subsequently larger influence of the alpha phase in bonding. Heating of the gold on Ti6Al4V resulted in improved adhesion, probably by diffusion mechanisms. Exposure to steam resulted in bond degradation in both gold/Ti6Al4V and in adhesive/Ti6Al4V systems. The adhesive bonding results for the etched specimens were compared to expected performance based on 'attachment site' theory. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD-A081 727 11/6 13/8

AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OH

Failure Mechanisms and Interphase Chemistry of Gold Films on Ti6Al4V. Part I. Surface Chemistry of Failure Surfaces. (U)

DESCRIPTIVE NOTE: Final rept. Jul 78-Oct 79, JAN 80 53P Baun,W. L. ;
REPT. NO. AFML-TR-79-4178-PT-1
PROJ: 2419
TASK: 02

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 2, AD-A081 728.
DESCRIPTORS: *Titanium alloys, *Metal films, *Etching, *Gold alloys, *Failure(Mechanics), Chemical bonds, Adhesive bonding, Bonded joints, Test methods, Surface chemistry, Surface finishing, Models, Boundary layer, Interactions, Interfaces, Locus, Layers (U)
IDENTIFIERS: Interphase chemistry, PE62102F, WUAFML24190244 (U)

This work is part of a program which looks at the effects of surface treatments on surface chemistry and morphology of titanium alloys with reference to adhesive bonding. Here gold is vapor deposited on Ti6Al4V which was prepared to simulate conditions of etching and aging which might be encountered during processing and use. Although this model system of gold on Ti6Al4V is not a direct analogy to adhesive bonding, certain similarities do exist and the system provides interesting information on bond failure mechanisms. Surface chemical analysis using ISS/SIMS showed that the gold on titanium alloy could model the failure mechanisms on surfaces prepared by methods similar to that in adhesive bonding. ISS/SIMS was found to be a sensitive chemical method to determine locus of failure and the change of composition at interfaces following humid aging and bond testing. Several types of failures appeared to be observed. Fractures which appeared to have occurred by interfacial failure were actually found to be mixed mode failures or failures in a weak boundary layer. (U)

AD-A080 144 20/12 9/1

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

The Implantation of Impurity Ions and Proton Bombardment in Indium Phosphide. (U)

DESCRIPTIVE NOTE: Final rept. 1 Jan 75-31 Mar 79, AUG 79 152P Eldridge,G. W. ;
CONTRACT: F44620-75-C-0034
PROJ: 2306
TASK: B1
MONITOR: AFOSR TR-80-0044

UNCLASSIFIED REPORT

DESCRIPTORS: *Indium phosphides, *Gallium arsenides, *Semiconductors, *Ion implantation, *Proton bombardment, *Field effect transistors, Gates(Circuits), Transport properties, Beryllium, Chromium, Iron, Sulfur, Etching, Annealing, Glass, Encapsulation, Substrates, Mobility, Impurities, Efficiency, Activation (U)
IDENTIFIERS: Phosphosilicate glasses, Silicon dioxide, Silicon nitride, WUAFOSR2306B1, PE61102F (U)

Ion Implantation of InP has been studied from qualification of substrates through characterization of the electrical transport properties of the resulting layers. InP(Fe) is found to have sufficient resistivity for typical device applications in contrast to InP(Cr). Residual damage from grit polishing compromised mobility and activation efficiency; a bromine-methanol etch polish yields superior surfaces and reduced residual damage. This etch-polish reveals either FeP precipitates or In inclusions in available InP(Fe) wafers. In contrast to GaAs(Cr), InP(Fe) has never exhibited anomalous compensation or conversion phenomena. Qualification consists of eliminating ingots with excessive precipitate or inclusion counts; consistent activation and mobility data are achieved using only this qualification. Acceptable activation and mobility can be achieved via 700 C annealing. Phosphosilicate glass deposited by the CVD technique provides effective encapsulation to this temperature. (U)

AD-A080 119 20/12

COLORADO STATE UNIV FORT COLLINS DEPT OF PHYSICS

Sputter Damage in GaAs Exposed to Low Energy Argon Ions. (U)

DESCRIPTIVE NOTE: Technical rept., NOV 79 15P Schmidt,H. E. ;Jensen,P. E. ;Sites,J. R. ;
REPT. NO. SF26
CONTRACT: N00014-76-C-0976
PROJ: RR02102
TASK: RR0210203

UNCLASSIFIED REPORT

DESCRIPTORS: *Sputtering, *Gallium arsenides, *Damage assessment, Ion beams, Argon, Low energy, N type semiconductors, Schottky barrier devices, Barrier coatings, Etching (U)
IDENTIFIERS: PE61153N, WUNR243015 (U)

Substrates of n-type GaAs were exposed to charge neutralized argon ion beams of energy ranging from 50 to 500 eV. Exposure times were 10-30 minutes with a beam density of 1 ma/sq cm. Schottky barrier diodes were formed on the sputtered surfaces using gold films. Capacitance and current measurements showed a marked decrease in barrier height for samples sputtered surfaces using gold films. Capacitance and current measurement showed a marked decrease in barrier height for samples sputtered with energies > 150 eV, though rectification persists to higher beam energies. Chemical etching of the damaged layer to restore the Schottky barrier height showed that the characteristic depth of heavy damage was 20-50 A, increasing with ion beam energy. (Author) (U)

AD-A080 106 20/6

WASHINGTON UNIV ST LOUIS MO LAB FOR APPLIED ELECTRONIC SCIENCES

Fresnel Lens and Beam Control in Optical Waveguide. (U)

DESCRIPTIVE NOTE: Final rept. 1 Jun-30 Sep 79,
OCT 79 38P Chang,William S. C. ;
CONTRACT: F49620-79-C-0145
PROJ: 2306
TASK: C2
MONITOR: AFOSR TR-80-0042

UNCLASSIFIED REPORT

DESCRIPTORS: *Fresnel lenses, *Optical waveguides, Beams(Radiation), Beam steering, Control, Phase shift, Lithium compounds, Niobates, Fabrication, Sputtering, Etching, Low costs (U)
IDENTIFIERS: Lithium niobates, WUAFOSR2306C2, PE61102F (U)

Fresnel Lenses have the potential to out-perform other waveguide lenses. In this project, preliminary design parameters for etched Fresnel lenses in LiNb03 waveguide has been obtained. Optimum diffused LiNb03 waveguide structures for the realization of a Fresnel lens have been identified. Reactive sputter etching has been experimentally investigated as a submicron etching technique. Theoretical analyses of the chirped grating as a Fresnel lens have been formulated. (Author) (U)

AD-A080 031 9/1 20/12

RENSSELAER POLYTECHNIC INST TROY N Y

Research on Microwave Junction Gate Field Effect Transistors. (U)

DESCRIPTIVE NOTE: Final rept. 1 Jun 76-31 May 79,
DEC 79 15P Ghandhi,S. K. ;
CONTRACT: DAAG29-76-G-0172
MONITOR: ARO 13586.5-EL

UNCLASSIFIED REPORT

DESCRIPTORS: *Field effect transistors, *Gates(Circuits), *Epitaxial growth, *Semiconductor junctions, Microwave equipment, Gallium arsenides, Indium phosphides, Crystal lattices, Arsenic, Overpressure, Etching, Diffusion, Substrates (U)
IDENTIFIERS: Gallium indium arsenide, Indium arsenides, Channel layers, Lattice matching (U)

This program has considered basic problems in the fabrication of junction-gate FET devices. We have shown that Ga(x)In(1-x)As layers can be grown of the appropriate composition (x = 0.468 + or - 3%) required to obtain a good lattice match to indium phosphide substrates. Additionally, techniques have been developed for in-situ etch of substrates prior to epitaxial growth. Diffusion and masking techniques have been developed for making junctions with no enhanced lateral diffusion. These diffusions are carried out in the absence of an arsenic overpressure, and are limited to n-type layers at the present time. (Author) (U)

AD-A079 812 9/1 13/8

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

Indium Phosphide for High Frequency Power Transistors. (U)

DESCRIPTIVE NOTE: Annual technical rept. 21 Feb 78-21 Mar 79,
SEP 79 95P Wrick,V. L. ;Eldridge,G. W. ;Clarke,R. C. ;Driver ,M. C. ;
REPT. NO. 243-023-T1
CONTRACT: N00014-78-C-0254, DARPA Order-3535

UNCLASSIFIED REPORT

DESCRIPTORS: *Indium phosphides, *Field effect transistors, *High frequency, *Power equipment, Microwaves, Fabrication, Processing, Etching, Epitaxial growth, Layers, Ion implantation, Vapor phases, Benefits, Insulation (U)
IDENTIFIERS: Gate studies, High frequency power transistors, PE61101E (U)

This report covers the first year of studies aimed at determining the utility of InP for fabricating power microwave field effect transistors (FET). The initial phase of the work was concentrated on developing the technology necessary to complete a power FET based on current design philosophy. Ion implantation and vapor phase epitaxy (VPE) results are presented as a means for providing an active channel for the device. Further work is planned for VPE channels because of the potential benefits of buffer layers under development. Processing technology (etching, ohmic contacts) is reviewed. In addition, a review of gate technology is provided since this is the largest technology issue for the InP FET. The results of the gate studies has been a concentration of effort on developing a JFET during the conclusion of the program. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD-A079 528 19/6 11/6 13/8

ROCK ISLAND ARSENAL IL ENGINEERING DIRECTORATE

Automated Chromium Plating Line for Gun Barrels. (U)

DESCRIPTIVE NOTE: Technical rept.,
SEP 79 32P Bish,Joseph M. ;Rowe,John D. ;
REPT. NO. SARRI-EN-TR-79-04

UNCLASSIFIED REPORT

DESCRIPTORS: *Gun barrels, *Chromium alloys, *Electroplating, Electrolytic polishing, Automation, Prototypes, Small arms, Production, Loading(Handling), Etching, Tanks(Containers), Processing (U)
IDENTIFIERS: Chromium plating, Gun tubes, LPN-PRON-A1-2-60517-03-M2-M2 (U)

This project was undertaken to establish a prototype automated chromium plating line for processing small caliber gun tubes. The automated line consists of a loading rack, electropolish tank, cold water rinse tanks, hot water rinse tank, chromium reverse etch tank and a chromium plating tank. The process involves automatic transference of racks containing the gun tubes to the various tanks in accordance to a programmed cycle. Parameters selected for the automated process were 2 asi and 4.5-minute process time to remove approximately 1.0 mil of stock during electropolish; and 2.5 asi and 50-minute plating time to deposit 1.0 mil of chromium plate. The feasibility of the automated process was shown and 12 out of 24 processed gun tubes were within the acceptable internal dimension range. Six additional gun tubes were within 0.1 to 0.2 mil of the acceptable bore diameter range. The quality of the chromium plate was satisfactory in all cases. The major difficulty in the automated process is the control of stock removal during the electropolish cycle. The elimination of the electropolish sequence is recommended with the use of rotary swaged gun tubes sized to pre-plating dimensions. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD-A078 202 20/6 13/8

CINCINNATI UNIV OH SOLID STATE ELECTRONICS LAB

A Geodesic Optical Waveguide Lens Fabricated by Anisotropic Etching, (U)

APR 79 4P Naumaan ,A. ;Boyd,J. T. ;
CONTRACT: AFOSR-76-3032
PROJ: 2305
TASK: B1
MONITOR: AFOSR TR-79-1123

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Physics Letters, v35 n3 p234-236, 1 Aug 79.
DESCRIPTORS: *Optical lenses, *Optical waveguides, Etching, Reprints (U)
IDENTIFIERS: Anisotropic etching, Glass reflow, PE61102F, WUAFOSR2305B1 (U)

Reprint: A Geodesic Optical Waveguide Lens Fabricated by Anisotropic Etching.

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MC8

AD-A077 561 20/8

COLORADO STATE UNIV FORT COLLINS DEPT OF PHYSICS

Broad Beam Ion Source Operation with Four Common Gases. (U)

DESCRIPTIVE NOTE: Technical rept.,
SEP 79 21P Pak ,Sung-Jae ;Sites,James R. ;
REPT. NO. SF24
CONTRACT: N00014-76-C-0976
PROJ: RR02102
TASK: RR0210203

UNCLASSIFIED REPORT

DESCRIPTORS: *Ion beams, *Ion sources, Gases, Krypton, Argon, Oxygen, Nitrogen, Sputtering, Etching, Flow rate, Gas flow (U)
IDENTIFIERS: PE61153N, WUNR243015 (U)

A Kaufman-type broad beam ion source, used for sputtering and etching purposes, has been operated with Ar, Kr,O2 and N2 gas inputs over a wide range of beam energies (200-1200 eV) and gas flow rates (1-10 sccm). The maximum ion beam current density for each gas saturates at about 2.5 mA/sq. cm. as gas flow is increased. The discharge threshold voltage necessary to produce a beam and the beam efficiency (beam current/molecular current), however, varied considerably. Kr had the lowest threshold and highest efficiency, Ar next, then N2 and O2. The ion beam current varied only weakly with beam energy for low gas flow rates, but showed a factor of two increase when the gas flow was higher. (Author) (U)

AD-A076 950 11/6 11/1 13/8

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

Surface Treatment for Aluminum Bonding. (U)

DESCRIPTIVE NOTE: Final technical rept. 28 Jul 78-15 Jul 79,
OCT 79 204P Smith,Tennyson ;
REPT. NO. SC5180.17FTR
CONTRACT: DAAK10-78-C-0274

UNCLASSIFIED REPORT

DESCRIPTORS: *Aluminum alloys, *Adhesive bonding, *Surfaces, *Surface chemistry, *Processing, Shear strength, Corrosion, Endurance(General), Wedges, Etching, Chromates, Experimental design, Fracture(Mechanics), Bonded joints, Surface finishing, Input, Systems analysis, Room temperature, Water (U)
IDENTIFIERS: Surface treatment, Wedge tests, Shear tests, Sulfochrom, Nonchromate, Water soak tests (U)

At present the most widely used method for treating aluminum prior to bonding is the sulfochrom etch process (FPL, etch). Due to the carcinogenic nature of chromates, various companies and government agencies have been attempting to find new durable nonchromate-containing systems which can be used to treat aluminum prior to bonding. The objective of this project was to discover a nonacid (nonchromate) surface treatment for Al 2024-T3 that would be both strong and durable. Initial studies indicated that a simple degrease and water soak process (STAB(1)) would provide strong durable joints. However, further testing revealed this process to be hard to reproduce on a consistent basis. A second process (STAB(2)) was discovered that was equally as simple but was also difficult to reproduce. A third process, even more simple (STAB(3)) was discovered which did prove reproducible. This process eliminates the degrease step and involves no energy input (room temperature dip in super-concentrated sodium hydroxide). There are only three steps involved, a sodium hydroxide solution dip, a rinse and dry. This report gives the details of these three processes, (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD-A076 864 11/6 20/11 13/8

AUSTRALIAN DEFENCE SCIENTIFIC SERVICE MELBOURNE

The Nature of the White-etching Surface Layers Produced During Reaming Ultra-high Strength Steel, (U)

OCT 74 9P Turley,D. M. ;

UNCLASSIFIED REPORT

Availability: Pub. in Materials Science and Engineering, v19 p79-86 1975 (No copies furnished by DTIC).
DESCRIPTORS: *Etching, *Holes(Openings), *Steel, *Plastic deformation, High strength alloys, Martensite, Abrasion, Friction, Grinding, Layers, Surfaces, Reamers, Microstructure, Australia, Reprints (U)
IDENTIFIERS: White etching (U)

Reprint: The Nature of the White-etching Surface Layers Produced During Reaming Ultra-high Strength Steel.

AD-A075 975 9/1 13/8 11/3

HUGHES AIRCRAFT CO FULLERTON CALIF

Semi-Additive Processes for Fabrication of Printed Wiring Boards. (U)

DESCRIPTIVE NOTE: Final rept. 1 Jul 76-31 Dec 78,
JUN 79 140P Quintana,Jack ;
REPT. NO. FR 79-12-190
CONTRACT: DAAK01-[illegible]-C-110C

UNCLASSIFIED REPORT

DESCRIPTORS: *Printed circuit boards, *Fabrication, *Processing, Adhesives, Coatings, Laminates, Foils(Materials), Additives, Test and evaluation, Requirements, Thin films, Copper compounds, Etching, Charge carriers (U)
IDENTIFIERS: Semiadditive process (U)

Printed wiring boards fabricated by semi-additive processes from four laminate types have met the requirements of MIL-P-13949, MIL-P-5110, and selected tests of MIL-P-55640. Laminate types consisted of ultra-thin copper with peelable carrier, ultra-thin copper with etchable carrier, sacrificial foil, and adhesively-coated nonclad. (Author) (U)

AD-A075 541 13/5 20/11

MATERIALS RESEARCH LAB INC GLENWOOD ILL

Fracturing Characteristics of Adhesive Joints. (U)

DESCRIPTIVE NOTE: Final rept. 1 Feb 77-15 Sep 78,
SEP 78 124P Mostovoy ,Sheldon ;Ripling, E. J. ;
CONTRACT: N00019-77-C-0256

UNCLASSIFIED REPORT

DESCRIPTORS: *Bonded joints, *Adhesive bonding, *Fracture(Mechanics), Cracking(Fracturing), Crack propagation, Stress corrosion, Anodic coatings, Etching, Adhesives, Finite element analysis, Mathematical models (U)

IAC ACCESSION NUMBER: PL-034931
IAC DOCUMENT TYPE: PLASTC -MICROFICHE-
Test methods were developed by MRL for evaluating the fracture mechanics parameters of adhesive joints. These tests, were designed for measuring crack resistance under Mode I, combined Mode I and II, and combined Mode I and and III loading. All of the tests can be applied to monotonically increasing loads, static loads in an environment, i.e., stress corrosion cracking, or to crack growth rate under fatigue loading. There does not appear to be a general 'law' for describing the effect of adding some shear (Mode II or III) onto opening mode loads; rather, the difference between pure and mixed mode loading depends on the load-time profile. Hence, mixed-mode loading must be treated differently for each type of loading. A section on bond manufacturing and testing details compares the phosphoric acid anodizing (PAA) aluminum adherend treatment to the chromic acid etch (FPL) on the basis of resistance to stress corrosion cracking in the wedge test. Application of linear elastic fracture mechanics to the prediction of structural life based on the use of finite element as well as an energy analysis are also discussed. (U)

IAC SUBJECT TERMS: P--(U)Joint strength, Test methods, Fracture mechanics, Bonded joints, Crack propagation, Stress corrosion, Stress analysis, Anodized surfaces, Surface treatments, Adhesives, Finite element analysis, Cantilever beams, Acid

AD-A075 514 20/2 11/4 20/8 14/5

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Enhanced Heteroepitaxy. (U)

DESCRIPTIVE NOTE: Semiannual technical summary 1 Jul-31 Dec 78,
DEC 78 13P McWhorter,Alan L. ;
CONTRACT: F19628-78-C-0002, ARPA Order-3336
MONITOR: ESD TR-79-193

UNCLASSIFIED REPORT

DESCRIPTORS: *Crystallography, *Silicon, *Films, *Epitaxial growth, Metal films, Amorphous materials, Lasers, Single crystals, Substrates, Fused silica, Thin films, Crystallization, X ray photography, Lithography, Holography, Etching, Heterojunctions (U)
IDENTIFIERS: Silicon films, Graphoepitaxy, Single crystal films, Heteroepitaxy, Laser crystallization, Holographic lithography, Ion etching, PE61101E (U)

Uniform crystallographic orientation of silicon films, 500 nanometers thick, has been achieved on amorphous fused silica substrates by laser crystallization of amorphous silicon deposited over surface-relief gratings etched into the substrates. The gratings had a square-wave cross section with a 3.8 micrometers spatial period and a 100-nanometers depth. The less than 100 more than directions in the silicon were parallel to the grating and perpendicular to the substrate plane. We propose that orientation of overlayer films induced by artificial surface patterns be called graphoepitaxy. (Author) (U)

AD-A074 282 11/6 7/1

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

Preferrential Chemical Etching of Blazed Gratings in (110)-Oriented GaAs, (U)

JUN 78 3P Shams,Mohammad Kazem ;Botez, Dan ;Wang,Shyh ;
CONTRACT: DAAG29-74-G-0070, NSF-ENG76-08292
MONITOR: ARO 11833.33

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v4 n3 p96-98 Mar 79 (No copies furnished by DDC).
DESCRIPTORS: *Gallium arsenides, *Etching, *Chemical engineering, Gratings(Spectra), Reprints (U)
IDENTIFIERS: Blazing, Blazed gratings (U)

Reprint: Preferential Chemical Etching of Blazed Gratings in (110)-Oriented GaAs.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A071 158 20/6 9/1

LASER DIODE LABS INC METUCHEN N J

Light Emitting Diodes for Fiber Optic Communications. (U)

DESCRIPTIVE NOTE: Quarterly rept. nos. 6 and 7, 1 Jan-30 Jun 78,
JUN 78 36P Gennaro,Albert ;
CONTRACT: DAAB07-76-C-8135

UNCLASSIFIED REPORT

DESCRIPTORS: *Fiber optics, *Light emitting diodes, *Optical communications, Aluminum gallium arsenide, Heterojunctions, Etching, High velocity, Wafers, Fabrication, Industrial production, Chips(Electronics), Test and evaluation, Life tests, Test equipment (U)
IDENTIFIERS: LPN-DA-2769778 (U)

The design and fabrication of high speed etched-well light emitting diodes for fiber optic communications is discussed with regard to materials synthesis via LPE, wafer fabrication, and device assembly in a manufacturing environment. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A071 064 6/5 6/12

ARMY INST OF DENTAL RESEARCH WASHINGTON D C

Criteria for Successful Composite Restorations. (U)

DESCRIPTIVE NOTE: Rept. for Feb-Jun 79,
JUN 79 16P Lorton,Lewis ;Brady,John ;

UNCLASSIFIED REPORT

DESCRIPTORS: *Dentistry, *Oral health, *Dental prostheses, Dental caries, Etching, Military medicine, Teeth (U)

Composite resin restorations, while not as munipulation-sensitive as some other restorative materials, must be handled correctly for maximum adaptation, and marginal seal. This article discusses criteria for cavity finishing, marginal form, etching, and dentin protection which are vital for success. (Author) (U)

AD-A068 656 9/5 20/7

TEXAS INSTRUMENTS INC DALLAS

IC Fabrication Using Electron-Beam Technology. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 9, 1 Sep-1 Dec 78,
APR 79 13P Varnell,Gilbert L. ;Chiang, Shang-Yi ;Reynolds,Jack ;
REPT. NO. TI-03-79-01
CONTRACT: DAAB07-76-C-8105
MONITOR: DELET TR-76-8105-9

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, *Electron beams, Writing, Etching, Plasma control, Random access computer storage, Bipolar systems, Fabrication, Direct current, Alternating current, Oxides, Specifications, Cross sections, Semiconductors, Chips(Electronics), Sizes(Dimensions) (U)
IDENTIFIERS: LPN-DA-2769631 (U)

A significant number (117) of 256-bit bipolar RAMs have been fabricated utilizing all e-beam direct slice writing and plasma etching. These devices pass all dc and ac electrical specifications including operating speed. A previous lot had device characteristics that were slower than specification due to an improper oxide thickness. One slice yielded 40% at dc probe compared to a high of 26% on one slice for a parallel photoresist lot. However, the lot yield for the e-beam slices was only 74% compared to 17% for the parallel photoresist lot. The reduced e-beam yield was attributed to an operator error during plasma etching of the contact O.R. and was not due to e-beam direct slice writing. Another lot of material is in progress (at metal) with tighter plasma etching control to complete the device quantity (500) required for completion of the contract. (Author) (U)

AD-A068 348 9/1 20/6 17/2

LASER DIODE LABS INC METUCHEN N J

Light Emitting Diodes for Fiber Optic Communications. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 5, 1 Oct-31 Dec 77,
77 35P Gennaro,Albert ;
CONTRACT: DAAB07-76-C-8135

UNCLASSIFIED REPORT

DESCRIPTORS: *Light emitting diodes, *Fiber optics, *Optical communications, Gallium arsenides, Aluminum arsenides, Heterojunctions, Etching, High velocity, Wafers, Fabrication, Industrial production, Chips(Electronics), Test and evaluation, Life tests, Test equipment (U)

The design and fabrication of high speed etched-well light emitting diodes for fiber optic communications is discussed with regard to materials synthesis via LPE, wafer fabrication, and device assembly in a manufacturing environment. (Author) (U)

AD-A068 165 9/1 20/12

TRW INC LAWNDALE CALIF SEMICONDUCTOR DIV

Monolithic 20W 2GHz Transistor and Monolithic 5W 4GHz Transistor. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 6, 14 Sep-13 Dec 78,
FEB 79 20P Schreyer,George ;
CONTRACT: DAAB07-77-C-0431

UNCLASSIFIED REPORT

DESCRIPTORS: *Transistors, *Transistor amplifiers, *Monolithic structures(Electronics), Fabrication, Photolithography, Wafers, Etching, Grooving, Passivity, Platinum, S band (U)
IDENTIFIERS: Vee Grooves, Metalization, Ohmic Contacts, Photoresist Processing, LPN-DA-2779811 (U)

A lot of L-10 devices was fabricated and provided 8 watts in saturation, only 1dB less the contract goal. A new passivation process was developed to provide an excellent etch mask against hydrazine. (Author) (U)

AD-A066 978 11/2 20/11

RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF MATERIALS ENGINEERING

Chemical Durability Improvement and Static Fatigue of Glasses. (U)

DESCRIPTIVE NOTE: Annual rept. no. 1. 1 Apr 78-28 Feb 79,
MAR 79 33P Tomozawa,Minoru ;
CONTRACT: N00014-78-C-0315

UNCLASSIFIED REPORT

DESCRIPTORS: *Glass, *Fatigue(Mechanics), *Static loads, Surfaces, Heat treatment, Boron compounds, Silicates, Hydrogen fluoride, Etching, Aluminum oxides, Concentration(Chemistry), Stress corrosion, Moisture content, Zirconium compounds, Coatings (U)

IAC ACCESSION NUMBER: MCIC-105369
IAC DOCUMENT TYPE: MCIC -HARD COPY--
The Surface layer of heat-treated borosilicate glasses exhibited lower HF etching rate compared with the bulk. The chemical analysis of the same glass indicated an excess Al2O3 concentration in the surface layer. The low HF etching rate was attributed to the lowering of the immiscibility dome by the excess Al2O3 and the consequent shift of the composition. A prolonged heat-treatment of glasses produced a surface stress layer. This surface stress was found to change its sign when the glass was heat-treated in wet atmosphere. The surface stress was attributed to the different water content in the surface layer from that in the bulk. Chemical durability, especially the etching rate of a glass in hot NaOH solution was found to be reduced by coating the glass with Zr alcoxide. The Zr compound appears to deposit on the etched surface continuously protecting the glass. Direct confirmation of the stress corrosion, i.e., the stress- accelerated reaction of glass with aqueous solution was attempted. Preliminary investigation showed that reactions are accelerated by tensile stress and retarded by compressive stress. (Author) (U)

IAC SUBJECT TERMS: M--(U)GLASSES, BOROSILICATE GLASS, HEAT TREATING, SURFACE LAYERS, ETCHING, CHEMICAL REACTIONS, AD-A066 978

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMOB

AD-A065 360 11/1 11/6 13/13

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND DOVER NJ LARGE CALIBER WEAPON SYSTEMS LAB

A Round-Robin Evaluation of Adhesive Bonding Processes Related to the Shelter Industry. (U)

DESCRIPTIVE NOTE: Technical rept., NOV 78 87P Wegmen,Raymond F. ;Russell, William J. ;Garnis,Elizabeth A. ;Levi,David W. ;
REPT. NO. ARLCD-TR-78047
MONITOR: GIDEP,SBIE E146-0330,AD-E400 268

UNCLASSIFIED REPORT

DESCRIPTORS: *Adhesives, *Adhesive bonding, *Aluminum alloys, *Metal metal bonds, Surfaces, Cleaning, Etching, Thickness, Honeycomb structures, Shelters, Humidity, Stress testing, Shear strength, Statistical analysis, Interfaces, Stress corrosion (U)
IDENTIFIERS: *Primers(Coatings), Aluminum alloy 6061, Aluminum alloy 5052 (U)

IAC ACCESSION NUMBER: PL-031972
IAC DOCUMENT TYPE: PLASTC -HARD COPY--
Metal parts of 5052 H 34 and 6061 T-6 aluminum alloys were supplied to five companies with the request to treat the parts in their production cleaning facilities. A portion of the parts were to be bonded as prepared and others were to be primed and then bonded. The standard cleaning method was the FPL etch. The primer used was BR 127, with two companies supplying extra panels bonded with FM 47. The adhesive used was Reliabond 7114, with the exception of one set which was bonded with Hysol En 9601 adhesive. Both lap shear and wedge test panels were prepared, bonded, and supplied for testing Lap shear tests were run at 23 C(73F), 60 C(140F) and 93 C(200F). Lap shear tests at 60 C after 100 hr and 1000 hr immersion in 60 C water were run to predict durability. ASTM D 2919 durability tests at 60 C/95%RH and wedge tests at 60 C/95-100%RH were also carried out. The results indicate that the FM 47 primer is not as thickness- sensitive as the BR 127 primer. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMOB

AD-A064 770 9/2 13/8 9/5

TEXAS INSTRUMENTS INC DALLAS

IC Fabrication Using Electron-Beam Technology. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 8, 1 Jun-1 Sep 78, JAN 79 35P Varnell,Gilbert L. ;Chiang, Shang-Yi ;Reynolds,Jack ;
REPT. NO. TI-03-78-51
CONTRACT: DAAB07-76-C-8105
MONITOR: DELET TR-76-8105-8

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, *Electron beams, *Bipolar transistors, *Random access computer storage, Monolithic structures(Electronics), Pilot plants, Plasmas(Physics), Fluorides, Costs, Reduction, Etching, Oxides, Silicon (U)
IDENTIFIERS: Operating speeds, Electron beam resists, Plasma etching, LPN-DA-2769631 (U)

All of the required environmental and electrical tests of the first article 256-bit Bipolar RAM devices (50) were completed this quarter. These units passed all of the electrical measurements at 0 C, 25 C, and 70 C. However, the maximum operating speed of the units was about 20% slower than desired due to the electron resist being inadvertently removed during the contact oxide etch step. Fabrication of the pilot production units has begun and these units should pass all specifications including operating speed. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A064 431 10/2 20/12 22/2

SOLAREX CORP ROCKVILLE MD

Nonreflecting Vertical Junction Silicon Solar Cell Optimization. (U)

DESCRIPTIVE NOTE: Final rept. 15 May 76-31 Aug 78,
NOV 78 71P Wohlgemuth,John H. ;Wrigley, C. Y. ;
CONTRACT: F33615-[illegible]-C-2058
PROJ: 3145
MONITOR: AFAPL TR-78-9[illegible]

UNCLASSIFIED REPORT

DESCRIPTORS: *Solar cells, *Semiconductor diodes, *Photovoltaic effect, Charge carriers, Photolithography, Radiation hardening, Silicon, Grooving, Wafers, Mobility, Etching, Spaceborne (U)
IDENTIFIERS: High efficiency, Vertical junction solar cells, Spectral response, PE62203F (U)

This research program has resulted in the development of high conversion efficiency radiation resistant vertical junction silicon solar cells. New techniques of oxidation growth and the use of photolithography enable the use of an orientation dependent etch to produce grooves 5 - 10 microns wide and up to 100 microns deep. These silicon wafers have been processed into solar cells with all processes performed at temperatures compatible with producing high efficiency solar cells. Theoretical calculations of the expected current as a function of radiation dose have been performed. An explanation of the observed open-circuit voltage is provided. Vertical junction solar cells have been fabricated with AM0 conversion efficiencies greater than 14%. These cells have shown superior radiation resistance. Vertical junction cells have been fabricated in 2cm x 2cm, 2cm x 4cm and 2cm x 6cm sizes with no size dependence on efficiency or yield. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A064 373 13/8 11/6

BELL HELICOPTER TEXTRON FORT WORTH TEX

Evaluation of Non-Chromated Etch for Aluminum Alloys (P-Etch). (U)

DESCRIPTIVE NOTE: Quarterly technical rept. no. 1, 27 Sep-30 Dec 78.
NOV 78 7P
REPT. NO. BHT-699-099-104
CONTRACT: DAAK10-78-C-0398

UNCLASSIFIED REPORT

DESCRIPTORS: *Aluminum alloys, *Etching, *Adhesive bonding, Solutions(Mixtures), Anodic coatings, Phosphoric acids, Chromic acid, Chromates, Sulfuric acid, Iron compounds, Sulfates (U)
IDENTIFIERS: P etch (U)

The purpose of the work performed under this program is to evaluate the new chromate free etchant developed by US Army (ARRADCOM) for use in the preparation of aluminum alloys for adhesive bonding. The objective of the program is to generate data which will determine the suitability of the etchant for production use. It will establish the operational control procedures necessary for scale-up to production size and the impact of the solution on existing state-of-the-art waste disposal techniques will be studied. The surfaces produced will be studied to establish their chemical and physical nature. Selected adhesives will be used to explore the effects of solution concentration limits, solution life and storage time prior to bonding, as well as resistance to water immersion, high humidity, salt spray, heat, and cold, and immersion in fuel, lubricating oil and hydraulic fluid. In each case where applicable, panels prepared by the standard FPL etch treatment will be used as controls. The P-Etch will be used as a pretreatment prior to chromic acid and phosphoric acid anodize, and the resultant anodic treated surfaces will be tested for bondability and durability of the bonded joints. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD-A061 758 13/8 11/1

BOEING COMMERCIAL AIRPLANE CO SEATTLE WASH

Anodize Optimization and Adhesive Evaluations for Repair Applications. (U)

DESCRIPTIVE NOTE: Final rept. 1 Dec 76-30 Jul 78,
JUL 78 123P Locke,M. C. ;Horton,R. E. ;McCarty,J. E. ;
CONTRACT: F33615-73-C-5171
PROJ: 7381
TASK: 06
MONITOR: AFML,GIDEP TR-78-104,E146-1186

UNCLASSIFIED REPORT

DESCRIPTORS: *Adhesive bonding, *Phosphoric acids, *Anodic coatings, Aluminum alloys, Surfaces, Adhesives, Preparation, Etching, Repair, Vacuum apparatus, Autoclaves, Curing (U)
IDENTIFIERS: PANTA(Phosphoric Acid Non-Tank Anodizing), Aluminum alloy 2024, WUAFML73810677, PE62102F (U)

IAC ACCESSION NUMBER: MCIC-104390 PL-030967
IAC DOCUMENT TYPE: MCIC -HARD COPY-- PLASTC -HARD COPY--
This report covers a two-task follow-on program to investigate phosphoric acid non-tank anodize process optimization and evaluation of adhesive/surface preparation combinations. Work completed in Task I included investigating non-tank anodizing process variables of voltage, time, temperature, and rinse delay. Other parameters studied included the effect of anodizing over titanium and aluminum fasteners, battery anodizing, anodizing mode, and identification of common errors occurring in non-tank anodizing. Following the anodizing variable investigation, bond verification tests were conducted to assess bondability of representative RT,250 F, and 350 F cure adhesive systems. This work served as a basis for selecting the phosphoric acid non-tank anodize process parameter/conditions for Task II. The Task I work is reported in AFML-TR-78-7. Task II was aimed at developing a data base to facilitate repair bonding. Surface preparation methods including optimized FPL etch, and two hand-clean procedures, phosphoric acid non-tank anodize (PANTA) and Pasadell 105, were evaluated. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD-A061 721 9/5 20/7

TEXAS INSTRUMENTS INC DALLAS

IC Fabrication Using Electron-Bean Technology. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 7, 1 Mar-1 Jun 78,
AUG 78 20P Varnell,Gilbert L. ;Bartelt, John L. ;Owens,Robert A. ;Reynolds,Jack ; Robbins,Roger A. ;
REPT. NO. TI-03-78-32
CONTRACT: DAAB07-76-C-8105

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, *Etching, *Electron beams, Random access computer storage, Memory devices, Bipolar systems, Plasmas(Physics), Oxides, Removal, Defects(Materials), Industrial production, Yield (U)

A New positive electron resist (TI-313) has been implemented for fabrication of 256-bit bipolar RAMs. This TI-313 resist has allowed plasma etching at each oxide removal step in the process. The pinhole data on this resist after oxide etch is comparable with that measured on the best standard negative photoresists. Previous attempts at fabricating the 256-bit bipolar RAMs have failed due to the high number of defects in the oxide caused by an inherent problem with PBS electron resist during wet etching. In addition, a change was made from the double-level metal 256-bit bipolar RAM (54S300) to the single-level metal 256-bit bipolar RAM (74S301A). This change was made because the TI-Houston production facility was achieving extremely low yields on the 54S200/300 and had discontinued production. These changes have allowed fabrication of functional devices during this quarter. (Author) (U)

AD-A061 460 9/2 9/3 13/8

TEXAS INSTRUMENTS INC DALLAS

IC Fabrication Using Electron-Beam Technology. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 6, 1 Dec 77-1 Mar 78,
MAY 78 23P Varnell,Gilbert L. ; Williamson,Ronald A. ;Bartelt,John L. ;Owens, Robert A. ;Reynolds,Jack ;
REPT. NO. TI-03-78-21
CONTRACT: DAAB07-76-C-8105

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, *Electron beams, *Fabrication, *Memory devices, Etching, Oxides, Defects(Materials), Random access computer storage (U)
IDENTIFIERS: TI-313 positive electron resist, E-beam writing, Bipolar RAM, RAM(Random Access Memories) (U)

A new positive electron resist (TI-313) has been implemented for fabrication of 256-bit bipolar RAMs. This TI-313 resist has allowed plasma etching at each oxide removal step in the process. The pinhole data on this resist after oxide etch is comparable with that measured on the best standard negative photoresists. Previous attempts at fabricating the 256-bit bipolar RAMs have failed due to the high number of defects in the oxide caused by an inherent problem with PBS electron resist during wet etching. In addition, a change was made from the double-level metal 256-bit bipolar RAM (54S300) to the single-level metal 256-bit bipolar RAM (74S301A). This change was made because the TI-Houston production facility was achieving extremely low yields on the 54S200/300 and had discontinued production. These changes should allow fabrication of working devices during the next quarter. (Author) (U)

AD-A061 427 11/2 7/4 9/1

NORTH CAROLINA UNIV AT CHAPEL HILL WILLIAM R KENAN JR LABS OF CHEMISTRY

Chemically Modified Electrodes. XIV. Attachment of Reagents to Oxide-Free Glassy Carbon Surfaces. Electroactive RF Polymer Films on Carbon and Platinum Electrodes. (U)

DESCRIPTIVE NOTE: Technical rept.,
OCT 78 20P Nowak,R. ;Schultz,F. A. ; Umana,M. ;Abruna,H. ;Murray,Royce W. ;
REPT. NO. TR-6
CONTRACT: N00014-76-C-0817

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-A049 660.
DESCRIPTORS: *Carbon, *Surface chemistry, *Electrodes, Polymeric films, Radiofrequency, Plasmas(Physics), Platinum, Ruthenium, Ferrocenes, Vinyl radicals, Deoxygenation, Glassy carbon, Surface finishing, Abrasion, Etching, Nitrogen, Argon (U)
IDENTIFIERS: WUNR359623 (U)

Reactive, deoxygenated glassy carbon surfaces prepared by mechanical abrasion under nitrogen or argon plasma etching react with selected molecules to yield surfaces with immobilized molecular surface states. Vinyl ferrocene and a ruthenium pyridine complex are immobilized on glassy carbon in this way. Introduction of vinyl ferrocene directly into an RF plasma discharge leads to electroactive ferrocene polymer deposition on glassy carbon and Pt surfaces. Surface waves corresponding to 3 x ten to the minus 8th power moles/sq cm ferrocene are obtained in this way. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD-A060 363 20/12 20/2

NAVAL RESEARCH LAB WASHINGTON D C

Electronic Materials Technology (Semiconductors). (U)

DESCRIPTIVE NOTE: Summary rept. 1 Jul 76-30 Apr 78,
AUG 78 66P Swiggard,Edward M. ;Lessoff, Howard ;
REPT. NO. NRL-MR-3845
PROJ: F54581
TASK: ZF5458100;

UNCLASSIFIED REPORT

DESCRIPTORS: *Semiconductors, *Crystal growth, *Epitaxial growth, Gallium arsenides, Indium phosphides, Pyrolytic graphite, Boron nitrides, Liquid crystals, Encapsulation, Purity, Etching (U)
IDENTIFIERS: WU52P0208, PE62762N (U)

High purity GaAs has been compounded in pyrolytic boron nitride (PBN) ware. Semi-insulating GaAs single crystals have been grown by the liquid encapsulation technique. High purity InP has been compounded in PBN boats and single crystals of InP have been grown by the high pressure liquid encapsulation technique. Liquid phase epitaxial layers of GaAs have been grown on a semi-insulating substrate that has been etched with an in-situ gallium etch prior to growth. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD-A060 127 7/2 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

The Adsorption of CO on Planar and Oxygen-Etched Silicon Surfaces, (U)

FEB 77 29P Dylla,H. Frederick ;King, John G. ;Cardillo,Mark J. ;
CONTRACT: DAAB07-74-C-0630, PHS-14322

UNCLASSIFIED REPORT

Availability: Pub. in Surface Science, v74 p141-167 1978.
SUPPLEMENTARY NOTE: Prepared in cooperation with Bell Laboratories, Murray Hill, NJ.
DESCRIPTORS: *Carbon monoxide, *Absorption spectra, *Silicon, *Surface active substances, Electron microscopy, Auger electron spectroscopy, Desorption, Etching, Planar structures, Oxygen, Reprints (U)

Reprint: The Adsorption of CO on Planar and Oxygen-Etched Silicon Surfaces.

AD-A057 197 11/1

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND DOVER NJ LARGE CALIBER WEAPON SYSTEMS LAB

A Technique for Assessing the Durability of Structural Adhesives. (U)

DESCRIPTIVE NOTE: Technical rept., MAY 78 45P Wegman,Raymond F. ;Ross, Marie C. ;Garnis,Elizabeth A. ;Slota,Stanley A. ;
REPT. NO. ARLCD-TR-77010
MONITOR: GIDEP,SBIE E123-0228,AD-E400 171

UNCLASSIFIED REPORT

DESCRIPTORS: *Adhesives, *Adhesive bonding, *Test methods, Endurance(General), Aluminum alloys, Titanium, Titanium alloys, Phosphates, Fluorides, Etching, Anodic coatings, Water, Immersion (U)
IDENTIFIERS: Aluminum alloy 2024-T3, Titanium alloy 5Al 4V (U)

IAC ACCESSION NUMBER: PL-029847
IAC DOCUMENT TYPE: PLASTC -HARD COPY--
A new method for inexpensively evaluating the durability of a large number of adhesives was developed and evaluated. This test method enables an investigator to simultaneously evaluate many adhesive-adherend variations and to estimate the durability of the variations under conditions of load, temperature, and humidity. The method will save time and money in the screening process used to select the best adhesives and adherend surface treatments for a particular application. The method involves determining the residual strength after the bonded joints are immersed in 60 C water for prescribed periods of time. Data are presented for twelve structural adhesives which are 121 C (250 F) curing systems. The adherends used were 2024T3 aluminum, either acid-dichromate (FPL) etched or anodized, 6 Al-4V titanium and commercially pure (CP) titanium, both phosphate-fluoride etched. (Author) (U)

IAC SUBJECT TERMS: P--(U)Anodized surfaces, Durability, Structural adhesives, Test methods, Residual strength, Temperature effects, Aluminum, Titanium, Surface treatment, Adherends, Bonded
AD-A057 197

AD-A056 809 9/5 20/1

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Modal Analysis of SAW Convolver. (U)

DESCRIPTIVE NOTE: Technical rept., JAN 78 40P Wang,Karl L. ;
REPT. NO. TR-526
CONTRACT: F19628-78-C-0002, ARPA Order-2929
MONITOR: ESD 78-3

UNCLASSIFIED REPORT

DESCRIPTORS: *Electroacoustic materials, *Surface waves, *Acoustic waves, *Delay lines, *Semiconductors, Silicon, Waveguides, Etching (U)
IDENTIFIERS: *SAW convolvers, *Convolvers, Ion beam etching, Air gaps, Acoustic waveguides, Lithium niobates, Laser scanning, PE62708F (U)

The gap-coupled acoustoelectric convolver developed at Lincoln Laboratory is a surface-acoustic-wave (SAW) device consisting of a LiNbO3 delay line and a silicon strip supported on a series of spacer rails (or posts) which have been ion-beam etched into the LiNbO3 surface. The silicon/air-gap/LiNbO3 structure forms an over-moded acoustic waveguide. A theoretical model has been developed which analyzes the perturbing effect of rails and predicts the mode structure and beating phenomena between modes. The scattering by support posts is also analyzed. (Author) (U)

AD-A056 809

AD-A056 241 13/8 11/6

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND DOVER NJ LARGE CALIBER WEAPON SYSTEMS LAB

Chromate-Free Method of Preparing Aluminum Surfaces for Adhesive Bonding. An Etchant Composition of Low Toxicity. (U)

DESCRIPTIVE NOTE: Technical rept. Oct 76-30 Sep 77, MAY 78 25P Russell,William J. ;Garnis, Elizabeth A. ;
REPT. NO. ARLCD-TR-78001
MONITOR: GIDEP,SBIE E102-0129,AD-E400 160

UNCLASSIFIED REPORT

DESCRIPTORS: *Aluminum alloys, *Surface finishing, *Adhesive bonding, Etching, Sulfuric acid, Iron compounds, Sulfates, Nitric acid, Removal, Chromates, Toxicity, Electrochemistry, Strength(Mechanics) (U)
IDENTIFIERS: Aluminum alloy 2024, Aluminum alloy 6061, Iron(III) sulfate, FPL etch (U)

IAC ACCESSION NUMBER: MCIC-104457 PL-029848
IAC DOCUMENT TYPE: MCIC -HARD COPY-- PLASTC -HARD COPY--

In a continuing effort to minimize the use of toxic and hazardous materials for the adhesive bonding of aluminum, a suitable alternative for the standard chromate-containing FPL etchant is being sought. This has resulted in the development of a chromate-free etchant of minimal toxicity (etchant P2) which consists of an aqueous solution of sulfuric acid and ferric sulfate. Surfaces produced with the new etchant composition when adhesively bonded result in joint strengths comparable to those obtained with the standard chromated etchant. Adhesively bonded 6061-T4 alloy specimens prepared with the new etchant exhibited stress durabilities superior to those prepared with the standard FPL etchant. No difficulties are expected to result from the use of the new etchant under production conditions. (Author) (U)

IAC SUBJECT TERMS: M--(U)Aluminum Alloys, 6061-T4, 2024-T3, Adhesive Bonding, Etchants, Toxicity, Shear Test, Durability, Temperature Effect, Humidity, Wedge Test, Adhesives, Surface Layers, Finishing.; P--(U)Instrumentation,

AD-A056 241

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A055 071 11/9 11/5 7/3

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERING

Oxidative Stabilization of Acrylic Fibers. I. Oxygen Uptake and General Model. (U)

DESCRIPTIVE NOTE: Technical rept., APR 78 35P Warner,S. B. ;Peebles,L. H. , Jr.;Uhlmann,D. R. ;
REPT. NO. TR-10
CONTRACT: N00014-75-C-0542

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also report dated 10 Jan 78, AD-A048 746.
DESCRIPTORS: *Acrylic resins, *Fibers, *Oxidation resistance, Carbon fibers, Graphite, Filaments, Reaction kinetics, Polymerization, Nitriles, Oxygen, Diffusion, Etching, Microstructure, X rays (U)
IDENTIFIERS: WUNR356534 (U)

The mechanism of oxidative stabilization of acrylic fibers is characterized by two limiting cases which are determined by the fiber chemistry, the reaction conditions, and the diameter of the filament. These limiting cases correspond to diffusion-limited and reaction-limited kinetic processes. Although the chemistry of stabilization is too complex to specify, the various reactions are separated into two categories: those which occur prior to or concurrently with polymerization of the nitrile groups, called prefatory reactions; and those which occur subsequent to nitrile polymerization, called sequent reactions. Under conditions which allow the prefatory reactions to occur significantly before the sequent reactions, the diffusion of oxygen to reactive sites is limited by previously oxidized material; and the fiber shows a typical two-zone morphology. Under conditions where the prefatory and sequent reactions occur sequentially, the overall stabilization process is limited by the rate of the prefatory reactions; but a skin is established at the fiber surface which acts as an oxygen barrier. Data from a variety of sources, including oxygen analysis, microscopic examination, fiber residue after etching, tension developed in fibers held at constant length, (U)

AD-A055 071

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A054 670 20/5 20/12 13/8

RCA LABS PRINCETON N J

III-V Heterojunction Structures for Long-Wavelength Injection Laser. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 5 (Interim), 16 Aug-15 Nov 77,
MAY 78 12P Nuese,C. J. ;Olsen,G. H. ;Enstrom,R. E. ;Ettenberg,M. ;
REPT. NO. PRRL-78-CR-22
CONTRACT: DAAB07-76-C-0872, ARPA Order-3137
MONITOR: ECOM 76-0872-5

UNCLASSIFIED REPORT

DESCRIPTORS: *Injection lasers, Heterojunctions, Indium phosphides, Gallium arsenide lasers, Vapor deposition, Epitaxial growth, Group III compounds, Group V compounds, Near infrared radiation, Etching (U)

Several double heterostructure injection lasers were fabricated from vapor-grown InGaAs P/InP. Laser wavelength was 1.4 micrometer. The lowest threshold current density observed was 2385 A/sq.cm. The etching characteristics of bromine-methanol-phosphoric acid solutions on InP were tabulated. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A052 932 9/3 9/2

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

Line-Profile Resist Development Simulation Techniques, (U)

77 5P Jewett,R. E. ;Hagouel,P. I. ;Neureuther,A. R. ;Van Duzer,T. ;
CONTRACT: F44620-71-C-0087, AFOSR-71-2113
PROJ: 2305
TASK: A9
MONITOR: AFOSR TR-78-0653

UNCLASSIFIED REPORT

Availability: Pub. in Polymer Engineering and Science, v17 n6 p381-384 Jun 77.
DESCRIPTORS: *Etching, *Lines(Geometry), Simulation, Algorithms, Time studies, Evolution(General), Two dimensional, Surface properties, Optical processing, Printed circuits, Microelectronics, Silicon dioxide, Ion implantation, Reprints (U)
IDENTIFIERS: WUAFOSR2305A9, PE61102F (U)

The relative advantages and disadvantages of three different algorithms are compared for simulating the time evolution of two-dimensional line-edge profiles produced by a locally rate dependent surface etching phenomenon. Simulated profiles typical of optical projection printing and electron-beam and X-ray lithography of micron-sized lines in resist and etching of ion-implanted SiO2 are used as a basis of comparison. (Author) (U)

AD-A051 568 7/4

RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF ELECTRICAL AND SYSTEMS ENGINEERING

Vapor-Phase Etching and Polishing of GaAs Using Arsenic Trichloride, (U)

MAY 77 4P Bhat,Rajaram ;Ghandhi,Sorab K. ;

CONTRACT: DAAG29-76-G-0127
MONITOR: ARO 13586.2-EL

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the Electrochemical Society, v124 n9 1447-1448 Sep 77.
DESCRIPTORS: *Gallium arsenides, *Etching, *Vapor phases, Polishing, Arsenic compounds, Chlorides, Substrates, Hydrogen chloride, Doping, Tellurium, Chromium, Reprints (U)

The etching reaction of AsCl3 with GaAs in a hydrogen ambient at temperatures above 700 C has been shown to be identical to that of HCl gas. The ability to obtain equally good specular etched surfaces for both Te- and Cr-doped GaAs substrates makes AsCl3 more attractive than HCl gas in the choice of an etchant. (Author) (U)

AD-A050 677 9/1 20/3

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

Reliability Study of Doped Aluminum Conductor Films. (U)

DESCRIPTIVE NOTE: Final technical rept. May 76-Aug 77,
DEC 77 112P Black,James ;
CONTRACT: F30602-76-C-0300
PROJ: 2338
TASK: 01
MONITOR: RADC TR-77-410

UNCLASSIFIED REPORT

DESCRIPTORS: *Electric conductors, *Thin films, *Metal films, Aluminum, Corrosion resistance, Migration, Silicon, Reliability, Doping, Etching, Current density, Glass, Alloys (U)
IDENTIFIERS: Electromigration, Activation energy, PE62702F, WURADC23380115 (U)

A reliability study of silicon doped aluminum conductor films for semiconductor device use is presented. The solid state dissolution process of silicon in aluminum is discussed and the morphology of etch pits that can form in silicon due to these processes are described. Processes for depositing Al/Si alloy films are briefly montioned and the structure of the films as deposited and after various heat treatments is studied. The electromigration failure mode of metal induced by high current densities and temperatures is presented along with the results of previous studies of pure aluminum, other aluminum alloys and aluminum silicon alloys. Current results on low temperature (< 210 C) studies of small grained and glassed Al/Si alloys indicate that they fail by an electrical open circuit due to the growth of voids resulting from the electromigration of Al in Al. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

-A049 763 9/5 20/12 13/8

RCA SOLID STATE TECHNOLOGY CENTER SOMERVILLE N J

High-Reliability, Low-Cost Integrated Circuits. (U)

DESCRIPTIVE NOTE: Quarterly development rept. no. 7, 3 Aug-3 Nov 77.
NOV 77 35P
CONTRACT: N00039-76-C-0240
PROJ: F54586
TASK: XF54586002

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, *Complementary metal oxide semiconductors, *Sputtering, *Etching, Wafers, High reliability, Low costs, Metallizing, Platinum, Passivity, Silicon nitrides, Copper, Chips(Electronics), Automation, Packaging (U)
IDENTIFIERS: Sputter etching, Trimetallization, Tape automated assembly, Automated packaging, Metal tapes, PE62762N (U)

Wafer fabrication is nearly completed. COS/MOS circuits have been successfully fabricated utilizing sputter etch technology for platinum definition. Trimetallization technology with silicon nitride overcoat passivation, copper beam-tape automated assembly, and silicone molding compound has proven to be the best system for fabrication of high reliability low cost integrated circuits. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A049 204 20/2 20/3

INTERACTIVE RADIATION INC NORTHVALE NJ

High Performance Pyroelectric Materials. (U)

DESCRIPTIVE NOTE: Final rept. Feb 75-Jun 77,
JUN 77 86P Ruderman,Warren ;
CONTRACT: DAAK02-75-C-0131

UNCLASSIFIED REPORT

DESCRIPTORS: *Single crystals, *Pyroelectricity, Crystal growth, Glycine, Sulfates, Fluorine compounds, Beryllium compounds, Alanines, Doping, Deuterium compounds, Production, Polishing, Etching, Dielectric properties, Constants, Coefficients (U)
IDENTIFIERS: Triglycine fluoroberyllate, Triglycine sulfate (U)

Single crystals of triglycine sulfate (TGS), triglycine fluoberyllate (TGFB), deuterated triglycine fluoberyllate (D-TGFB), triglycine selenate (TGSe), mixed crystals of TGS and TGSe and l-alanine doped TGS and TGFB were grown and characterized. Optimum crystal growth conditions were established. In particular, for D-TGFB which has the highest figure of merit, best crystal growth was obtained at a starting saturation temperature of 45 degrees, a seed rotation rate of 15 rpm, a pH of 3.6, a growth rate of 0.1 degrees per day for a volume of 10 liters, and a seed orientation in which the cleavage plane was parallel to the horizontal plane. Careful measurements were made of the pyroelectric coefficient and dielectric constant of a large number of samples of these homologs of TGS and consistent values were obtained. The superior figure of merit of D-TGFB was confirmed. The production of thin pyroelectric crystal targets by optical polishing and cup-etching was investigated. (Author) (U)

AD-A048 578 9/1 20/12 13/8

RAYTHEON CO WALTHAM MASS SPECIAL MICROWAVE DEVICES

Manufacturing Methods and Technology Engineering High-Efficiency, High-Power Gallium Arsenide Read-Type IMPATT Diodes. Volume I. (U)

DESCRIPTIVE NOTE: Final rept. 30 Jun 75-30 Jun 77, AUG 77 187P Claifour,H. R. ;Steele,S. R. ;
REPT. NO. 0877-1393-VOL-1
CONTRACT: DAAB07-75-C-0045

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A048 579.
DESCRIPTORS: *IMPATT diodes, *Microwave equipment, *Microwave oscillators, High power, Gallium arsenides, Schottky barrier devices, Heat sinks, Plating, X band, Ku band, Epitaxial growth, Wafers, Metallizing, Etching, Precision finishing (U)
IDENTIFIERS: Read diodes, Lapping (U)

A design review of Read profile IMPATT diodes is presented. Work performed on this program to achieve the target specifications for high power X-band and Ku-band diodes is summarized. This includes development of specifications, processes, and characterization techniques for the Gallium Arsenide epitaxial wafer, as well as assembly and test procedures for the diode. Areas of investigation included epitaxial wafer growth processes, methods of controlling layer axial and radial uniformity, and techniques for testing the completed wafer. Schottky-barrier metallization and dimensional control techniques during plating, lapping and etching were the principal areas of investigation in the dice processing area. Several novel techniques were applied to the manufacturing processes to improve the production rates of Read IMPATT diodes. This included spray dicing of the wafers, and new thermal resistance and noise measuring techniques. Environmental test results are summarized, including storage and operating life test results during the program and on the final production units. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A048 077 11/2 20/2

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

Chemically Polished Quartz. (U)

DESCRIPTIVE NOTE: Technical rept. Jan 76-Sep 77, NOV 77 43P Vig,John R. ;LeBus,John W. ;Filler,Raymond L. ;
REPT. NO. ECOM-4548
PROJ: 1L162705AH94

UNCLASSIFIED REPORT

DESCRIPTORS: *Quartz, *Surface finishing, *Etched crystals, Ammonium compounds, Fluorides, Surface properties, Polishing, Polishes, Solutions(Mixtures), Quartz resonators, Degradation, Etching, Synthetic materials, Test equipment, Quality control, Electron microscopes, Microphotography (U)
IDENTIFIERS: Ammonium bifluoride, ASH94, PE62705A (U)

IAC ACCESSION NUMBER: MCIC-101753
IAC DOCUMENT TYPE: MCIC -HARD COPY--

Etching in a saturated solution of ammonium bifluoride is shown to be capable of producing chemically polished AT-cut quartz surfaces over a broad range of conditions. The quality of chemical polish depends primarily on the surface finish prior to etching, the depth of etch and the quality of quartz used. The speed of polishing depends primarily on the temperature of the etching bath. In an 88 degree C etching bath, starting with 3 micrometers lapped blanks, chemically polished blanks with a surface roughness of 0.1 micrometer and a roughness angle of 1 degree can be produced in 15 minutes. Starting with a finer surface finish can produce a smoother chemically polished surface. Chemically polished blanks are shown to be extremely strong. Fundamental mode 20 MHz resonators made with chemically polished natural quartz blanks showed no Q degradation with increasing depth of etch. (U)

IAC SUBJECT TERMS: M--(U)QUARTZ, CHEMICAL POLISHING, ETCHING, ETCH PITTING, POLISHING, DISLOCATIONS, SURFACE ROUGHNESS, SEM, CRYSTALLOGRAPHY, ETCHING, TEMPERATURE EFFECT, AMMONIUM BIFLUORIDE SOLUTION.;

AD-A047 522 9/1 20/12 20/2

RCA LABS PRINCETON N J

Hyperabrupt Varactor Voltage-Controlled Oscillators. (U)

DESCRIPTIVE NOTE: Final rept. 30 Jun 75-30 Nov 76, OCT 77 79P Mawhinney,D. D. ;Napoleon, J. J. ;
REPT. NO. 9RRL-77-R-45
CONTRACT: N00039-75-C-0474

UNCLASSIFIED REPORT

DESCRIPTORS: *Voltage controlled oscillators, *Varactor diodes, *Microwave oscillators, Gallium arsenides, Wafers, Capacitance, Epitaxial growth, Vapor deposition, Doping, Etching, Ku band, X band, S band (U)
IDENTIFIERS: Doping profiles, Hyperabrupt varactors (U)

A method for fabricating and processing plated heat sink hyperabrupt gallium arsenide varactors for use in microwave voltage-controlled oscillators was developed and evaluated during this program. VCOs fabricated with these varactors demonstrated considerably improved linearity and reduced tuning voltage requirements as compared with VCOs fabricated with conventional abrupt junction varactors. During the program, hyperabrupt gallium arsenide varactor wafers were grown in which values of gamma from 0.5 to 2.0 were obtained and capacitance ratios as high as 30:1 were measured. In most cases, the carrier concentration profiles necessary to obtain the various hyperabrupt characteristics obtained were grown epitaxially by the hydride vapor synthesis technique using a programmed controller to introduce dopant at the required rates. The process was proven to have the capability to grow wafers which closely matched a desired profile. Because of the versatility of this controlled back-doping process, complicated structures can be grown such as the p(+)-n(o)-n(+)-n-p(+) GaAs wafers which were used to produce electrolytically etched varactor diodes with integral heat sinks. (U)

AD-A047 108 9/1 20/12

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

Gallium Arsenide Vertical Channel Insulated Gate Field-Effect Transistor. (U)

DESCRIPTIVE NOTE: Annual technical rept. Jan-Dec 76, FEB 77 67P Driver,M. C. ;Tremere,D. A. ;Barrett,D. L. ;
REPT. NO. 77-9F7-VMIST-R1
CONTRACT: N00014-75-C-0418
PROJ: F54581
TASK: RF54581001

UNCLASSIFIED REPORT

DESCRIPTORS: *Field effect transistors, *Gallium arsenides, N type semiconductors, Channels, Gates(Circuits), Electrical insulation, Planar structures, Ion implantation, Fabrication, Vapor deposition, Epitaxial growth, Etching, Wafers (U)
IDENTIFIERS: PE62762N, WUNR251019 (U)

The technologies necessary to fabricate a power, microwave frequency, vertical channel, gallium arsenide insulated gate field-effect transistor have been further developed. Planar devices that show FET action have been fabricated. The etching technology for a V-groove version of the vertical channel device has been explored. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A045 389 14/5

CALIFORNIA INST OF TECH PASADENA

Linearity and Enhanced Sensitivity of the Shipley AZ-1350B Photoresist. (U)

NOV 76 4P Livanos,A. C. ;Katzir,A. ; Shellan,J. B. ;Yariv,A. ;
CONTRACT: AFOSR-76-2874
PROJ: 2305
TASK: C1
MONITOR: AFOSR TR-77-1109

UNCLASSIFIED REPORT

Availability: Pub. in Applied Optics v16 n6 p1633-1635 Jun 77.
DESCRIPTORS: *Photolithography, *Photographic developers, Etching, High sensitivity, High resolution, Gratings(Spectra), Reprints (U)
IDENTIFIERS: PE61102F, WUAFOSR2305C1 (U)

The properties of the Shipley AZ-1350-B positive photoresist used with the Shipley AZ-303A developer were investigated. It was found that the use of AZ-303A developer results in a significant improvement of the sensitivity and the linearity of the photoresist. The unexposed etch rate of the photoresist was 35 A tor- 5 A/sec. Gratings of high efficiency have been successfully fabricated using the above combination of photoresist and developer. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A045 362 14/5

ARMY MATERIALS AND MECHANICS RESEARCH CENTER WATERTOWN MASS

Radiography with the Fission Neutrons from Californium-252. (U)

DESCRIPTIVE NOTE: Final rept.,
JUL 77 14P Antal,John J. ;Becker, Robert L. ;
REPT. NO. AMMRC-TR-77-18
PROJ: 1T161102AH42

UNCLASSIFIED REPORT

DESCRIPTORS: *Radiography, *Fast neutrons, *Californium, Images, Nitrocellulose, Chemicals, Etching (U)
IDENTIFIERS: Californium-252, ASH42, PE61102A (U)

IAC ACCESSION NUMBER: NT-015241
IAC DOCUMENT TYPE: NTIAC -MICROFICHE--
Fission neutron radiography, with images formed on thin sheets of cellulose nitrate, has been investigated using neutrons from Cf-252. A polyethylene converter provides recoil protons from neutron elastic scattering by hydrogen, which in turn create damage in the cellulose nitrate. Chemical etching then produces a frosted etch-track image which can be reproduced photographically by either scattered or transmitted light. The most readily available cellulose nitrate sheets were found to contain undesirable internal defects and thus films are recast in thicknesses of several mils. The images are of high resolution, as expected from a computer calculation which considered the direction and ranges of the recoil protons in polyethylene. All materials, including those of low atomic weight, may be radiographed with good penetration. The technique is simple and employs inexpensive materials. (Author) (U)

IAC SUBJECT TERMS: N--(U)RADIOGRAPHY, NEUTRONS, CALIFORNIUM, IMAGES, CHEMICALS, ETCHING, COST EFFECTIVENESS, RESOLUTION, PENETRATION, TECHNIQUE, TEST METHODS;

AD-A045 089 9/5 13/8

RCA SOLID STATE TECHNOLOGY CENTER SOMERVILLE N J

High-Reliability, Low-Cost Integrated Circuits. (U)

DESCRIPTIVE NOTE: Quarterly development rept. no. 6, 3 May-3 Aug 77.
AUG 77 25P
CONTRACT: N00039-[illegible]-C-024C
PROJ: F54586
TASK: XF54586002

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, *Fabrication, Wafers, Titanium, Complementary metal oxide semiconductors, Silicon nitrides, Platinum, Gold, Sputtering, Etching, Masks, Reliability(Electronics), Low costs, Salt spray tests, Environmental tests, Packaging, Plastics, Ceramic materials (U)
IDENTIFIERS: PE62762N (U)

IAC ACCESSION NUMBER: PL-027679
IAC DOCUMENT TYPE: PLASTC -MICROFICHE--
Wafer fabrication is proceeding as scheduled. The technology development for platimum sputter etching using gold as the etch mask has progressed sufficiently to allow conversion of the COS/MOS circuits to sputter etching. Reliability data to date obtained on CA741 devices shows a 0.0044% per 1000 hours failure rate at 120 C at the 60-percent confidence level. Copper migration in epoxy packages at 125 C has not been observed as a failure mode. Salt atmosphere resistance tests to date have produced excellent results. All required life-test sockets for Phase II and some of the sockets for Phase III of the program have been ordered. (U)

IAC SUBJECT TERMS: P--(U)Printed circuits, Reliability, Encapsulation, Failure modes, Epoxy, Packaging, Passivation, Semiconductors, Silicon nitride, Gold, Ceramics, Copper, Migration, Electronic applications, Salt spray tests, ZZ Unlimited.;

AD-A044 951 19/1 19/4 11/6

MATERIALS RESEARCH LABS MARIBYRNONG (AUSTRALIA)

Gas Washing of Fracture Surfaces by Explosive Detonation Products, (U)

MAR 77 15P Bedford,A. J. ;
REPT. NO. MRL-R-681

UNCLASSIFIED REPORT

DESCRIPTORS: *Fragments, *Surface properties, *Explosive gases, *Steel, Fragmentation warheads, Detonations, High explosives, Fracture(Mechanics), Etching, Martensite, Porosity, Layers, Melting, Masking, Explosion effects, Electron microscopy, Cross sections, Australia (U)
IDENTIFIERS: Scanning electron microscopy, Composition B explosive (U)

Experiments have been carried out to study the nature of features produced on fracture surfaces after washing with the gaseous products of detonation of a high explosive. White-etching, essentially untempered martensite layers are produced. A porous outer layer indicative of melting may form, masking features of the original fracture surface. It is concluded that most fragments from a detonated body are ejected before these effects can occur. (Author) (U)

AD-A043 668 9/5 13/8

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF PHYSICS

Preparation of Variable Thickness Microbridges Using Electron Beam Lithography and Ion Etching. (U)

DESCRIPTIVE NOTE: Technical rept. 31 Jul-31 Nov 76,
JUN 77 6P Sandell,R. D. ;Dolan,G. J. ;Lukens,J. E. ;
CONTRACT: N00014-75-C-0769

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the International Conference on Superconducting Quantum Devices, Oct 76, Berlin (Germany).
DESCRIPTORS: *Electron beams, *Ion beams, *Microcircuits, Printed circuits, Circuit interconnections, Bridges, Etching, Thickness, Indium, Films, Superconductivity, Electric contacts, Reprints (U)
IDENTIFIERS: *Electron bean lithography, *Microbridges, LPN-NR-319-062 (U)

Techniques have been developed for the fabrication of variable thickness constriction (VTC) microbridges. The bridges produced by these techniques display the superior characteristics found by others in VTC bridges made by scratching techniques. The EBL techniques described have the advantage of being easily applicable to fabrication of large arrays of nearly identical bridges. (Author) (U)

AD-A042 019 14/5 20/8

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

Modeling Validation, Techniques and Applications for X-Ray Lithography. (U)

DESCRIPTIVE NOTE: Interim rept.,
76 9P Hagouel,P. I. ;Neureuther, A. R. ;
CONTRACT: F44620-76-C-0100
PROJ: 2305
TASK: A9
MONITOR: AFOSR TR-77-0252

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the Electron and Ion Beam Science and Technology International Conference (7th), 1976.
DESCRIPTORS: *Lithography, *X rays, *Diffraction gratings, Masks, Gold, Etching, Wafers, Interferometry, Fabrication, Silicon, Boron (U)
IDENTIFIERS: WUAFOSR2305A9, PE61102F (U)

The experimental development of soft X-ray lithography in conjunction with fabrication of blazed diffraction gratings is discussed. Interferometically produced gold masks on thin silicon windows and a technique for protecting the mask during etching of the window are described. Images resulting from a multiple source angle exposure technique are shown in support of this technique as a workable concept. Prints of Ni grids and sub-micron period Au gratings on thin silicon windows are also shown. The constructive use of thermal effects during both exposure and development are also considered. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A044 282 11/9 13/8 9/5

NAVAL WEAPONS CENTER CHINA LAKE CALIF

Electron Resists. (U)

DESCRIPTIVE NOTE: Final rept. Jan 76-Jan 77,
APR 77 29P Ordung,P. F. ;Applebaum,J.
;Blazek,H. F. ;
REPT. NO. NWC-TP-5929
MONITOR: GIDEP E085-1600

UNCLASSIFIED REPORT

DESCRIPTORS: *Polymeric films, *Masks, *Integrated circuits, *Silicon, *Etching, *Electron beams, Microelectronics, Lithography, Fabrication, Polymers, Copolymers, Polymethyl methacrylate (U)
IDENTIFIERS: Electron resists, Photoresists (U)

This report is a survey of the work on electron-beam resist materials as reported in the open literature. The period surveyed does not go beyond 1 January 1977. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M09

AD-A043 727 9/1 13/8

LASER DIODE LABS INC METUCHEN N J

Light Emitting Diodes for Fiber Optic Communications. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 2, 1 Jan-31 Mar 77,
JUN 77 39P Gennaro,Albert ;
CONTRACT: DAAB07-76-C-8135

UNCLASSIFIED REPORT

DESCRIPTORS: *Light emitting diodes, *Epitaxial growth, *Etching, Fiber optics, Optical communications, High velocity, Wafers, Industrial production, Gallium arsenides, Aluminum arsenides, Heterojunctions, Liquid phases, Chips(Electronics), Packaging, Test methods, Test equipment, Life tests (U)
IDENTIFIERS: LPN-DA-2769778 (U)

The design and fabrication of high speed etched-well light emitting diodes for fiber optic communications is discussed with regard to materials synthesis via LPE, wafer fabrication, and device assembly in a manufacturing environment. (Author) (U)

AD-A041 620 13/8

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Ion Beam Etching. (U)

DESCRIPTIVE NOTE: Journal article,
76 12P Smith,Henry 1. ;
REPT. NO. MS-4169
CONTRACT: F19628-76-C-0002
PROJ: 7X263304D21C
MONITOR: ESD TR-76-386

UNCLASSIFIED REPORT

Availability: Pub. in Etching for Pattern Definition, p133-143 1976.
DESCRIPTORS: *Etching, Ion beams, Fabrication, Current density, Reprints (U)
IDENTIFIERS: *Ion beam etching, Surface relief structures, AS215, PE63304A (U)

The application of ion beam etching to the fabrication of surface relief structures will be reviewed. For maximum energy efficiency a bombarding energy near 500 eV is optimum. Above this energy the sputtering yield curve increases slower than linear. Low energy is also preferred to minimize surface damage (of the order of 20 A depth at 500 eV). Kaufman type ion sources, originally developed for ion engine applications, have proven to be most suitable for low energy etching of high resolution relief structures in substrates several cm in diameter and for varying the depth of etching as a function of position. Current densities up to 2 ma/sq cm have been achieved. By proper choice of the diameters and spacings of the screen and accelerator grid apertures, one can optimize beam collimation (<5 deg), and/or minimize forward sputtering of the grids. (Author) (U)

AD-A040 230 9/5 13/8 20/4

HARRY DIAMOND LABS ADELPHI MD

A Study of Fineblanking for the Manufacture of Flueric Laminar Proportional Amplifiers. (U)

DESCRIPTIVE NOTE: Technical memo.,
MAY 77 19P Phillippi,R. Michael ;
REPT. NO. HDL-TM-77-8
PROJ: 1T161102AH44

UNCLASSIFIED REPORT

DESCRIPTORS: *Flueric devices, *Fluid amplifiers, Manufacturing, Fabrication, Metals, Etching, Metalworking (U)
IDENTIFIERS: *Fineblanking, *Laminar proportional amplifiers, Metal etching, ASH41, PE61102A (U)

A nonconventional stamping process, known as fineblanking, is investigated for use in high-volume production of flueric laminar proportional amplifiers. The investigation includes the standard deviation of critical dimensions, supply and control flow measurements for a constant pressure, amplifier gain, common-mode rejection ratio (CMRR), and cost breakdown. The present study indicates that fineblanking yields a significant improvement over metal photochemical etching (a widely used fabrication technique) in the repeatability of geometric parameters. Typical standard deviations of a nozzle width are less than 0.5 percent. Further, a 61.3-percent improvement of the mean CMRR was observed. (Author) (U)

AD-A039 647 11/6 11/2

ARMY INST OF DENTAL RESEARCH WASHINGTON D C

High Temperature Microscopy of Porcelain-Precious Alloys. (U)

APR 77 13P Huget,Eugene F. ;De Simon, Laszlo B. ;

UNCLASSIFIED REPORT

DESCRIPTORS: *Precious metals, *Dental prostheses, *Microstructure, *High temperature, Microscopy, Porcelain enamels, Gold alloys, Palladium alloys, Silver alloys, Metastable alloys, Quenching, Heat treatment, Etching, Fusion(Melting), Castings, Disks, Grain boundaries (U)

This study traced changes in the microstructures of five alloys over the range of temperatures employed in the application of dental porcelain. Specimens were 1/16 x 1/4-inch cast discs. A microscope that provided hot-stage and vacuum capabilities was used to monitor microstructures of the alloys between 800 F and 1,950 F. Heating rate of the cast pieces was 100 F per minute. Visualization of grain boundaries was made possible by selective thermal etching. Two alloys showed crystallographically dependent striated contours at temperatures in excess of 1,700 F. These markings appeared to result from nonuniform expansion of neighboring grains and slip. At 1,950 F., all alloys showed pronounced grain distortion and incipient melting. Changes in surface architecture of the test alloys that occur at high temperatures may enhance the micromechanical interlocking of a fused veneer. However, such changes would appear to be detrimental to the fit of precision cast restorations. (Author) (U)

AD-A038 996 20/12

AEROSPACE CORP EL SEGUNDO CALIF IVAN A GETTING LABS

Metal-Insulator-Semiconductor Studies of Lead Telluride. (U)

DESCRIPTIVE NOTE: Interim rept.,
APR 77 23P Lilly,David A. ;Joslin, David E. ;Kan,H. K. Alan ;
REPT. NO. TR-0077(2270-20)-1
CONTRACT: F04701-76-C-0077
MONITOR: SAMSO,GIDEP TR-77-72,E081-0133

UNCLASSIFIED REPORT

DESCRIPTORS: *Lead compounds, *Tellurides, *Semiconductors, Zirconium oxides, Capacitors, Thin films, Surfaces, Charge coupled devices, Frequency response, Substrates, Etching (U)
IDENTIFIERS: *Metal insulator semiconductors (U)

The capacitance and conductance-voltage characteristics were measured on metal-insulator-semiconductor capacitors fabricated with zirconium dioxide films on single-crystal lead telluride. At 77 K, on both n- and p-type substrates, evidence of surface potential control was obtained. Comparison of the measured capacitance-voltage characteristics with those calculated from the equilibrium solution of the one-dimensional Poisson equation indicates qualitative agreement, although the slope (dC/dV) of the measured capacitance in the region near the capacitance minimum is less steep than calculated. The high-frequency response of the capacitance and position of the capacitance minimum were used to deduce the presence of an inversion layer on some n-type substrates of charge density approximately 5.0 times 10 to the 13th power per sq cm2. This layer was found to be dependent on surface preparation treatment prior to insulator deposition. Results of surface chemical studies indicate that inversion may be due to oxide formation during chemical etching. Conductance data obtained confirm the existence of a large interfacial state density. (U)

AD-A038 674 21/5 11/6

AIRESEARCH MFG CO OF ARIZONA PHOENIX

Integral, Low-Cost, High-Temperature Turbine Feasibility Demonstrator (Small Laminated Axial Turbine Program). (U)

DESCRIPTIVE NOTE: Final rept. Mar 74-Sep 76,
FEB 77 192P Furst,D. G. ;Vershure,R. W. ;Pyne,J. A. ;Clark,J. J. ;
REPT. NO. 74-210841 (29)
CONTRACT: F33615-74-C-2034
PROJ: 3066
MONITOR: AFAPL TR-77-2

UNCLASSIFIED REPORT

DESCRIPTORS: *Axial flow turbines, *Turbine wheels, Laminates, Turbofan engines, Low costs, High temperature, Etching, Photomasking, Feasibility studies, Computer graphics, Computer aided design, Diffusion bonding, Nickel alloys (U)
IDENTIFIERS: Nickel alloy waspaloy, PE62203F (U)

IAC ACCESSION NUMBER: MCIC-099582
IAC DOCUMENT TYPE: MCIC -HARD COPY--
The Integral Low-Cost, High-Temperature Turbine Feasibility Demonstrator Program was conducted to establish the feasibility of constructing a small, integral, cooled turbine using photoetched laminates bonded together to form a complete wheel. A turbine design was established utilizing a cooling scheme compatible with operation at 2600 F. Methods were established for making the laminate photoetch tooling with the use of computer graphic design techniques. Photoetching and bonding parameters were optimized through the use of small bonded stacks. The photoetch and bonding methods were further optimized by bonding full-size wheel blanks, and the successful construction of a complete integral, cooled, laminated turbine. The wheel integrity was established by subjecting it to a 115-percent design speed spinpit test. It is recommended that this method of turbine construction be further developed because of the great potential for both cost-reduction and achieving high operating temperature capability through this approach. (Author) (U)

AD-A036 266 9/5 20/4

VON KARMAN INST FOR FLUID DYNAMICS RHODE-SAINT-GENESE (BELGIUM)

Study of the Switching Mechanism in Bistable Amplifiers with Application to Their Development, Optimization and Construction. (U)

DESCRIPTIVE NOTE: Final technical rept. Nov 75-Nov 76,
NOV 76 173P Carbonaro,M. ;
CONTRACT: DA-ERO-75-G-073
PROJ: 1T161102B35E
TASK: 00

UNCLASSIFIED REPORT

DESCRIPTORS: *Bistable devices, *Fluidic amplifiers, Flow fields, Turbulent flow, Laminar flow, Mathematical models, Fabrication, Etching, Chemical milling (U)
IDENTIFIERS: *Bistable amplifiers, WU294, AS35E, PE61102A (U)

A detailed experimental and theoretical study of the flow field in the interaction region of a fluidic wall-attachment amplifier was made. Velocity profiles were measured using a laser doppler velocimeter. A mathematical model of the flow was also established, using an integral method. Reasonable agreement between theory and experiments was obtained. As a continuation of previous work, the design of two bistable amplifiers, operating respectively with turbulent and with laminar flow, was optimized. A simplified chemical etching technique was established for the manufacture of such fluidic elements. (Author) (U)

AD-A034 863 22/2 20/13 20/6

GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

Second Surface Thermal Control Mirrors for Reflection Control. Volume I. (U)

DESCRIPTIVE NOTE: Final technical rept. Mar 74-Mar 75,
JAN 77 67P Neu,J. T. ;Dorian,M. F.
;
CONTRACT: F04701-74-C-0316
PROJ: 2132
MONITOR: SAMSO TR-76-93-Vol-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A034 864.
DESCRIPTORS: *Temperature control, *Spacecraft, *Reflectivity, Surface properties, Specular reflection, Solar radiation, Etching, Hydrogen fluoride, Tetrafluoroethylene resins, Far infrared radiation, Diffuse reflection, (U)
IDENTIFIERS: Fused silica, Second surface mirrors, Infrared mirrors, PE63438F (U)

This final report documents the results of a theoretical and experimental program to investigate ways to make second surface mirrors (e.g., thermal control surfaces, composed of thin transparent materials such as fused silica and FEP Teflon with a reflective backing, which are used on space vehicles) which are diffusely reflective but which retain the high solar reflectance of commercial specularly reflecting second surface mirrors. A number of designs were surveyed and four designs were fully evaluated. Three of these designs employed fused silica substrates with front or front and back surfaces ground with grinding compounds and then etched in a hydrogen fluoride solution. When suitably silvered on the back sides, these specimens met design goals. One of these designs employed a FEP Teflon substrate with front and back surfaces contoured by compression of Teflon sheet between quartz plates in a vacuum oven. When silvered on the back side, good diffuseness was obtained but solar reflectance was slightly degraded over the reflectance of commercial Teflon second surface mirrors. (Author) (U)

AD-A033 803 20/5

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

Thin-Film Dye Laser with Etched Cavity, (U)

JUL 76 5P Hu,Chenming ;Kim,Seihee ;
CONTRACT: DAAB07-76-C-1400

UNCLASSIFIED REPORT

Availability: Pub. in Applied Physics Letters, v29 n9 p582-585 Nov 76.
DESCRIPTORS: *Dye lasers, *Thin films, *Laser cavities, Etching, Polyurethane resins, Silicon, Nitrogen lasers, Reprints (U)

We describe a thin-film laser with a Fabry-Perot cavity. The cavity is chemically etch into a (100)-cut silicon substrate and filled with rhodamine 6G doped polyurethane. Overfilling of the cavity provides the passage for the output. A nitrogen laser serves as pump source. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A032 954 11/6

AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO

Surface Characterization of Titanium and Titanium Alloys. Part III. Effect on Ti (c.p.) and Ti-8Mn of Laboratory Chemical Treatments. (U)

DESCRIPTIVE NOTE: Internal rept. Jul 75-Apr 76, SEP 76 62P Baun,William L. ;McDevitt, Neil T. ;Solomon,James S. ;
REPT. NO. AFML-TR-76-29-Pt-3
PROJ: 7340
TASK: 02
MONITOR: GIDEP E140-0572

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 2, AD-A027 134.
DESCRIPTORS: *Titanium alloys, *Surfaces, Etching, Cleaning, Adhesive bonding, Titanium, Phosphates, Chromates, Fluorides, Oxides, Sodium compounds, Mass spectrometry, Morphology, Electron microscopy, Chemical analysis, Treatment (U)
IDENTIFIERS: Titanium alloy 8 Mn, PE62102F, WUAFML73400221 (U)

IAC ACCESSION NUMBER: MCIC-099219 PL-033308
IAC DOCUMENT TYPE: MCIC -HARD COPY-- PLASTC -HARD COPY--
This investigation is part three of a program which looks at the effects of surface treatments on surface chemistry and morphology of titanium and titanium alloys. This part discusses the effects of six laboratory surface treatments on titanium, commercially pure, and Ti-8Mn alloys. (Author) (U)

IAC SUBJECT TERMS: P--(U)Electron spectroscopy, Auger spectroscopy, Surface treatment, Morphology, Titanium, Alloys, Spectroscopy, Bonding, Adhesion, Joints, Mass spectrometry, SEM, ZZ Unlimited.; M--(U)SURFACE STUDIES, UNALLOYED TITANIUM, TITANIUM ALLOYS, TI-8MN, SURFACE TOPOGRAPHY, FINISHING, SEM, AUGER ELECTRON SPECTROSCOPY, MASS SPECTROSCOPY, SURFACE FINISH, CHEMICAL REACTIONS, ACETONE, SODIUM HYDROXIDE, NITRIC ACID, HYDROFLUORIC ACID, SODIUM ORTHOPHOSPHATE, SODIUM FLUORIDE, AMMONIUM BIFLUORIDE, AD-A032 954

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A032 619 20/2

CLEMSON UNIV S C DEPT OF PHYSICS AND ASTRONOMY

The Growth and Characterization of Potassium and Rubidium Azide Single Crystals, (U)

MAY 75 5P Foster,D. L. ;Wagner,K. A. ;Lasker,A. L. ;
CONTRACT: DA-ARO-D-31-124-72-G120
MONITOR: ARO 9603.1-P

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Crystal Growth, 32 p33-36 1976.
DESCRIPTORS: *Crystal growth, *Potassium compounds, *Rubidium compounds, *Azides, *Single crystals, Reprints, Evaporation, Ionic current, Tracer studies, Diffusion, Dislocations, Etching (U)

Large single crystals have been grown of potassium azide from the melt by the Kyropolus technique and rubidium azide from solution by evaporation. These materials have been characterized by the direct observation of dislocations by a new etching technique and preliminary experiments of ionic conductivity and tracer diffusion of Rb in RbN3. (Author) (U)

-A031 719 9/5 9/3 20/1 20/12

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Techniques for Making Gap-Coupled Acoustoelectric Devices. (U)

DESCRIPTIVE NOTE: Journal article, SEP 75 4P Smith,Henry I. ;
REPT. NO. MS-4105
CONTRACT: F19628-73-C-0002
MONITOR: ESD TR-76-267

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Proceedings of Ultrasonic Symposium (1975), IEEE Catalog No. 75, CHO 994-4SU.
DESCRIPTORS: *Electroacoustics, *Semiconductor devices, Assembly, Inspection, Amplifiers, Silicon, Lithium alloys, Niobium alloys, Oxides, Convolution, Ion beams, Etching, Memory devices, Correlators, Lithography, Spacers, Fabrication, Packaging, Dust control (U)
IDENTIFIERS: *Acoustoelectric devices, Gap-coupled structures (U)

The techniques recently developed for fabricating, inspecting, assembling and packaging silicon-on-LiNbO3 acoustoelectric devices, such as amplifiers, convolvers and memory correlators, will be presented. This will include: description of the lithographic and ion beam etching techniques employed in making the spacer posts, demonstration of the techniques used for eliminating dust and achieving uniform gaps, inspection methods, and several examples of packages. Experience to date indicates that the techniques for making gap-coupled structures are reliable, and lend themselves to widespread application. (Author) (U)

AD-A031 106 20/5 20/7

FRANKFORD ARSENAL PHILADELPHIA PA

Ion Beam Superpolishing of Metal Mirrors for High Energy Lasers. (U)

DESCRIPTIVE NOTE: Final engineering rept., DEC 75 23P Lester,J. D. ;Gelles,H. ; Cook,R. T. ;
REPT. NO. FA-TR-75090

UNCLASSIFIED REPORT

DESCRIPTORS: *Lasers, *Ion beams, *Mirrors, High energy, Surface roughness, Metals, Patterns, Etching, Polishes, Finishes, Sputtering, Metallurgy (U)
IDENTIFIERS: *High energy lasers, Super polishing (U)

A new process has been developed which employs a low energy ion beam to superpolish metal surfaces. The process is applicable in principle to all metals. This technique overcomes the tendency of metal surfaces to develop etch patterns and other surface irregularities during ion beam bombardment. The process produces superpolished optical surfaces significantly superior to those formed by conventional optical polishing or metallurgical techniques. Because ions of inert gases are employed for the superpolishing process the resultant surface is uncontaminated in contrast to conventional optical, chemical or metallurgical methods which result in diffusion of abrasion contamination or bronzed surfaces. In addition, this process may be employed for final figuring of optical surfaces. (Author) (U)

AD-A030 777 11/2 20/2

ROCKWELL INTERNATIONAL ANAHEIM CALIF ELECTRONICS RESEARCH DIV

Investigation of Defects and Impurities in Silicon-on-Sapphire. (U)

DESCRIPTIVE NOTE: Interim technical rept. 15 Jul 75-31 Jan 76,
JUL 76 52P Peel,John L. ;Barry, Michael D. ;
REPT. NO. C76-142/501, Scientific-2
CONTRACT: F19628-75-C-0108
PROJ: AF-672A
MONITOR: RADC TR-76-208

UNCLASSIFIED REPORT

DESCRIPTORS: *Silicon, *Sapphire, *Defects(Materials), *Impurities, Electrical properties, Radiation tolerance, Complementary metal oxide semiconductors, Ions, Mass spectrometers, Substrates, Radiation hardening, Epitaxial growth, Films, Leakage(Electrical), Etching, X rays, Topography, Dislocations (U)
IDENTIFIERS: *SOS(Silicon on sapphire), *IMMA(Ion microprobe mass analyzer) (U)

This report covers the second six months of a program to investigate the effects of defects and impurities in SOS materials on the electrical characteristics and radiation tolerance of CMOS/SOS devices. Additional chemical surface-etch experiments and IMMA analyses were completed during this phase of the program. This phase of the study focused on fabricating CMOS/SOS devices on the various substrate groupings examined in the first phase of this study. Electrical parameter data and radiation hardness data were obtained for the CMOS/SOS devices and correlated with SOS material characteristics. (Author) (U)

AD-A029 510 9/1 20/1

TEXAS INSTRUMENTS INC DALLAS CENTRAL RESEARCH LABS

Acoustic Ridge Waveguide Technology. (U)

DESCRIPTIVE NOTE: Final technical rept. 6 Jan 75-30 Jun 76,
AUG 76 94P Wagers,Robert S. ;
REPT. NO. TI-08-76-41
CONTRACT: N00014-75-C-0317, ARPA Order-2827

UNCLASSIFIED REPORT

DESCRIPTORS: *Waveguides, *Acoustic equipment, Acoustic waves, Surface waves, Ultrasonics, Etching, Single crystals, Lithium compounds, Niobates, Quartz, Transducers, Filters (U)
IDENTIFIERS: *Acoustic ridge waveguides (U)

The feasibility of etching single-crystal lithium niobate and alpha-quartz to produce wedge-shaped acoustic waveguides has been examined. The primary etchant considered was boiling hydrofluoric acid. Etch masks of sputtered chrome/gold were employed. Highly uniform small (approximately 0.001 inch high) waveguides could be produced in quartz substrates. LiNbO3 waveguide fabrication was not possible due to the high defect density in the material. Spurious mode excitation problems were examined and found to be minimal in unapodized transducers on mechanically lapped waveguides with large transverse dimensions. Smaller transverse dimensions or apodization of the transducers introduced interfering modes. Apodization of interdigitated transducers on wedge waveguides was evaluated as a means of achieving bandpass shaping. The entire coupling range was found to be controlled by the first wavelength of apodization. Thus, impulse response weighting by apodization will require control of electrode geometry to within fractions of a wavelength from the apex of the waveguide. (Author) (U)

AD-A029 196 11/6

PICATINNY ARSENAL DOVER N J

A Chromate-Free Process for Preparing Aluminum Substrates for Adhesive Bonding -- A Preliminary Study. (U)

DESCRIPTIVE NOTE: Technical rept.,
JUL 76 57P Russell,William J. ;
REPT. NO. PA-TR-4861
MONITOR: GIDEP,GIDEP E063-0094,085.45.40.30-N5-01

UNCLASSIFIED REPORT

DESCRIPTORS: *Aluminum alloys, *Etching, *Adhesive bonding, Electron microscopy, Electrochemistry, Surface finishing, Nitric acid, Sodium sulfates (U)
IDENTIFIERS: Aluminum alloy 2024, Aluminum alloy 6061, Iron sulfates (U)

IAC ACCESSION NUMBER: MCIC-097430 PL-024491
IAC DOCUMENT TYPE: MCIC -HARD COPY-- PLASTC -HARD COPY--

A new, non-chromated etchant for preparation of aluminum surfaces for adhesive bonding has been developed. The standard chromated sulfuric acid (FPL) treatment of aluminum alloy surfaces for adhesive bonding was studied using etching rate determinations, electrochemical monitoring of the reaction, surface resistance measurements, and transmission electron microscopy. The results of these studies were used to develop the new etchant. Limited tests were conducted using a thermosetting film adhesive to bond specimens prepared with a new, non-chromated etchant on two different aluminum alloys, 2024-T3 and 6061-T4. These were subjected to hot water soak and stressed durability testing. These preliminary tests indicate that the new etchant composition resulted in joints with bond strength and short term durability essentially equal to those produced using the standard chromated etchant. The new etchant consisted of an aqueous solution of nitric acid, sodium sulfate, and ferric sulfate. (U)

IAC SUBJECT TERMS: M--(U)ADHESIVE BONDING, ETCHING, ETCHANTS, TRANSMISSION MICROSCOPY, MICROSTRUCTURE, 6061-T4, ALUMINUM ALLOYS, 2024-T3, 7075-T6, WEIGHT CHANGE, SURFACE PROPERTIES.; P--(U)Nitric acid-Surface treatment, AD-A029 196

AD-A027 134 11/6

AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO

Surface Characterization of Titanium and Titanium Alloys. Part II. Effect on Ti-6Al-4V Alloy of Laboratory Chemical Treatments. (U)

DESCRIPTIVE NOTE: Final rept. Jul 75-Feb 76,
MAY 76 57P Baun,William L. ;McDevitt, Neil T. ;
REPT. NO. AFML-TR-76-29-Pt-2
PROJ: AF-7340
TASK: 734002
MONITOR: GIDEP E146-1128

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 1, AD-A025 334.
DESCRIPTORS: *Titanium alloys, *Surfaces, Treatment, Etching, Cleaning, Phosphates, Chromates, Fluorides, Sodium compounds, Oxides, Mass spectrometry, Adhesive bonding, Morphology (U)
IDENTIFIERS: Titanium alloy 6Al 4V (U)

IAC ACCESSION NUMBER: MCIC-097432
IAC DOCUMENT TYPE: MCIC -HARD COPY--

This investigation is part two of a program which looks at the effects of surface treatments on surface chemistry and morphology of titanium and titanium alloys. This part considers the effect of six surface treatments on the alloy titanium-6 aluminum-4 vanadium. (Author) (U)

IAC SUBJECT TERMS: M--(U)TI-6AL-4V, TITANIUM ALLOYS, FINISHING, SURFACE PROPERTIES, DEGRESSING, CLEANING, ETCHING, AUGER ELECTRON SPECTROSCOPY.;

AD-A026 852 6/5

ARMY INST OF DENTAL RESEARCH WASHINGTON D C

Enhancing Retention of Acid Etch Resin Restorations in Primary Teeth. (U)

MAY 76 16P Mueller,Brett ;Tinanoff, Norman ;

PROJ: DA-3-A-161102-B-71-R
TASK: 3-A-161102-B-71-R-04

UNCLASSIFIED REPORT

DESCRIPTORS: *Teeth, Dental enamel, Bonding, Replacement, Acids, Etching, Electron microscopy, Retention(General) (U)
IDENTIFIERS: Cutting burrs, Sandpaper disks, Tag formation, Prismless enamel, Primary teeth (U)

The scanning electron microscope was used to determine the usefulness of cutting burs, sandpaper disks, and increased acid etch time on enhancing retentive tag formation in primary teeth. Planning the surface with a small round bur was found to be the most beneficial procedure. (Author) (U)

AD-A026 428 20/6 13/8

CALIFORNIA UNIV BERKELEY

Profile and Groove-Depth Control in GaAs Diffraction Gratings Fabricated by Preferential Chemical Etching in H2SO4-H2O2-H2O System, (U)

SEP 75 4P Tsang,Won-Tien ;Wang,Shyh ;

CONTRACT: DAHC04-74-G-0070, NSF-ENG-74-03579
MONITOR: ARO 11833.18-EL

UNCLASSIFIED REPORT

Availability: Pub. in Applied Physics Letters, v28 n1 p44-46, 1 Jan 76.
DESCRIPTORS: *Diffraction gratings, *Gallium arsenides, Chemicals, Etching, Substrates, Fabrication, Reprints, Sulfuric acid, Peroxides (U)
IDENTIFIERS: *Chemical etching (U)

The fabrication of diffraction gratings in GaAs by preferential chemical etching is studied and it demonstrated that different grating profiles can be obtained by proper choice of substrate orientation and direction of grating-mask groove openings or by controlling the width of these groove openings and/or etching time. Experimental curves relating the etched groove depth to etching time for gratings with different periodicities at different etchant temperatures were obtained. In the experiments, the H2SO4-H2O2-H2O system was used as the preferential etchant together with Shipley AZ-1350J as the resist. This combination enables the use of the resist grating directly as a protective mask during chemical etching. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A026 425 20/12 20/2

CALIFORNIA UNIV BERKELEY

Growth Characteristics of GaAs-Ga(1-x)Al(x)As Structures Fabricated by Liquid-Phase Epitaxy Over Preferentially Etched Channels, (U)

SEP 75 5P Botez,Dan ;Tsang,Won-Tien ;Wang,Shyh ;

CONTRACT: N00014-75-C-0420, DAHC04-74-G-0070
MONITOR: ARO,AFOSR 11830.27-EL,TR-76-0971

UNCLASSIFIED REPORT

Availability: Pub. in Applied Physics Letters, v28 n4 p234-237, 15 Feb 76.
DESCRIPTORS: *Semiconductors, *Epitaxial growth, *Optical waveguides, Liquid phases, Heterojunctions, Structures, Etching, Channels, Substrates, Reprints (U)
IDENTIFIERS: Heterostructures, Aluminum arsenides, Liquid phase epitaxy (U)

In this paper, we report our studies of the liquid-phase epitaxy of GaAs and Ga(1-x)Al(x)As single- and double-layered structures over preferentially etched channels in GaAs substrates. Results obtained indicate that various optical waveguide structures providing lateral optical confinement can be fabricated by this etch-and-fill technique. Further, it is found that the filling of the channels is dictated by surface tension of the melt rather than by preferential growth. This growth characteristic lessens the dependence of the final profile of the grown layer on the initial etched profile and makes the etch-and-fill technique particularly suitable for the fabrication of optical bends. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A025 922 10/3

SPECTROLAB INC SYLMAR CALIF

Low Reflectivity Solar Cells. (U)

DESCRIPTIVE NOTE: Final rept. 31 May 74-4 Jan 76,
JAN 76 83P Stella,Paul ;Avery,James ;
Scott-Monck,John ;
REPT. NO. 380-4686F
CONTRACT: F33615-74-C-2044
PROJ: AF-3145
TASK: 314519
MONITOR: AFAPL TR-75-98

UNCLASSIFIED REPORT

DESCRIPTORS: *Solar cells, *Antireflection coatings, Reflectivity, Reflection, Reflectance, Etching, Silicon, Quartz, Sodium, Potassium compounds, Hydroxides (U)
IDENTIFIERS: *Silicon solar cells, Solar energy conversion, Photovoltaic conversion (U)

Techniques for both reducing and changing specular reflectance from silicon solar cell assemblies (cell and cover) were developed. Mechanical and chemical treatments of quartz cell covers yielded surfaces that acted like nearly perfect diffusers of incoming visible radiation. A four order of magnitude reduction in specular reflectivity was achieved in this manner. Selective etches and multiple antireflection (AR) coatings were used to reduce the total reflection from the cell. Etches such as sodium and potassium hydroxide reduced the total reflection over the entire silicon cell spectrum (350-1100 nm) to below one percent, with a corresponding increase in output current of nearly eight percent over conventionally prepared surfaces. Some degradation in fill factor was observed with the etched surface so that the current increase at the load voltage was somewhat less than at short circuit. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A025 507 9/5

STANFORD UNIV CALIF STANFORD ELECTRONICS LABS

Advanced Integrated-Circuit Technology for Micropower ICs. (Integrated Circuits). (U)

DESCRIPTIVE NOTE: Final rept. 5 Jun 72-4 Dec 74,
DEC 75 235P Rodgers,Thurman John ;
REPT. NO. SU-SEL-75-034
CONTRACT: DAAB07-72-C-0229
MONITOR: ECOM 72-0229F

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, Fabrication, Bipolar transistors, Metal oxide semiconductors, Deposition, Etching, Micropower circuits, Silicon, Logic circuits (U)
IDENTIFIERS: V-groove n-channel metal oxide silicon logic (U)

A four-mask epitaxial v-groove (EVG) bipolar IC fabrication process uses a nonuniform N/N(+)/i layer and anisotropic etching of 1-0-0 silicon to eliminate conventional buried layer and isolation diffusions and to permit the use of an unmasked base diffusion. A five-mask EVG process permits fabrication of lateral pnp devices. The EVG structure offers simpler processing, smaller isolation capacitors, lower parasitic collector resistances, and larger packing densities than conventional processing. Reduced isolation capacitance provides good micropower performance. Process details are described. An epitaxial v-groove n-channel MOS (VMOS) logic structure suitable for 5-volt high-speed random logic was fabricated. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A024 730 6/5

WALTER REED ARMY MEDICAL CENTER WASHINGTON D C

Acid Etch Characteristics of Prismless Enamel, (U)

JUL 76 19P Tinanoff,Norman ;Mueller, Bret ;
PROJ: DA-3-A-161102-B-71-R
TASK: 3-A-161102-B-71-R-04

UNCLASSIFIED REPORT

DESCRIPTORS: *Teeth, *Dental enamel, *Dental prostheses, Etching, Filling, Dental caries, Crystal chemistry, Crystal structure, Epoxy resins, Replacement, Orientation(Direction), Hydrochloric acid, Electron microscopy, Scanning, Prismatic bodies, Dissolving, Surface properties (U)
IDENTIFIERS: Prismless tooth enamel, Primary teeth (U)

Electron microscopy was used to describe acid etch characteristics of prismless enamel. Large variations in etching of surface enamel was seen and this was considered to correspond to orientation of the enamel crystallites in relation to the surface of the enamel. (Author) (U)

D-A022 970 20/12

TEXAS INSTRUMENTS INC DALLAS CENTRAL RESEARCH LABS

Semiconductor-Insulator Structures for the 1- to 2-Micrometers Region. (U)

DESCRIPTIVE NOTE: Interim technical rept., FEB 74 44P Bate,R. T. ;Caywood,J. M. ;Hewes,C. R. ;Lawley,K. L. ;Reinberg, A. R. ;
REPT. NO. TI-08-74-09
CONTRACT: DAAK02-73-C-0093, ARPA Order-2182

UNCLASSIFIED REPORT

DESCRIPTORS: *Semiconductors, *Thin films, *Insulation, Antireflection coatings, Diffusion, Silicon, Surface properties, Masking, Tunneling(Electronics), Etching, Indium alloys, Gallium antimonides, Gallium arsenides (U)
IDENTIFIERS: *Insulators, Passivation, *Metal insulator semiconductors, Vapor phase epitaxy (U)

The goal of this contract is to develop, fabricate, evaluate, and deliver to NVL thin-film structures consisting of semiconductors having bandgaps on the order of 0.7 eV and compatible insulators. The following requirements are also goals: High-field tunneling transport, Semiconductor surface passivation, Semiconductor masking for diffusion and selective etching, Surface charge transport, Antireflection coatings. Activities of the program include semiconductor material preparation (GaInAs), insulator preparation, and characterization by both electrical and nonelectrical techniques of semiconductor-insulator structures. The primary semiconductor vehicles for this study have been GaSb and GaInAs, but early work was done on germanium; silicon was used as a control substrate for insulator depositions throughout the program. (U)

AD-A021 905 20/12 8/7

ROCKWELL INTERNATIONAL ANAHEIM CALIF ELECTRONICS RESEARCH DIV

Investigation of Defects and Impurities in Silicon-on-Sapphire, (U)

DESCRIPTIVE NOTE: Rept. for 15 Jan-15 Jul 75, JUL 75 36P Peel,John L. ;Barry, Michael D. ;
REPT. NO. C75-633/501, Scientific-1
CONTRACT: F19628-75-C-0108
PROJ: AF672A
TASK: 1
MONITOR: AFCRL TR-75-0413

UNCLASSIFIED REPORT

DESCRIPTORS: *Sapphire, *Silicon, *Semiconductors, Epitaxial growth, Substrates, Polishing, Etching, Dislocations, Defects(Materials), Concentration(Chemistry), Ions, Mass spectrometers, Impurities (U)
IDENTIFIERS: Silicon on sapphire, Selective etching, Dislocation density, IMMA(Ion Microprobe Mass Analyzer), Ion Microprobe Mass Analyzer (U)

This report covers the first six months work on a program to investigate the effects of defects and impurities in sapphire substrates and SOS material. The work to date has been directed to identifying the types and quantities of defects and impurities in the samples of material provided by selected vendors. Experiments utilizing chemical surface etch techniques and x-ray topography were performed to identify structural defects in the sapphire substrate material. An Ion Microprobe Mass Analyzer was used to make a detailed elemental analysis of the SOS materials identifying the type and concentrations of impurities present in various samples. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A021 891 20/6 11/5 11/9 11/7

NAVAL RESEARCH LAB WASHINGTON D C

Replica Techniques for Transmission Electron Microscopy. (U)

DESCRIPTIVE NOTE: Interim rept.,
FEB 76 29P McCoy,S. M. ;
REPT. NO. NRL-MR-3220
PROJ: NRL-M01-08, WR02-201
TASK: WR02-201-001

UNCLASSIFIED REPORT

DESCRIPTORS: *Electron microscopy, *Electron transfer, *Electron microscopes, *Metallography, Replicas, Surface properties, Fracture(Mechanics), Cellulose acetates, Etching, Fragments, Decontamination, Thin fil (U)
IDENTIFIERS: *Electron transmission, *Replica techniques, Substrate films, Polished surfaces, Dry stripping, TEM(Transmission electron microscope), Transmission electron microscope, Artifacts, Transparent replicas (U)

This report concentrates soley on the description of variations in replicating procedures for the transmission electron microscope. It includes techniques for cellulose acetate and direct carbon replication for rough and flat fracture surfaces, collodion dry stripped replicas of polished and etched or flat fracture surfaces, preparation of substrate films on grids for particle examination, and variations in replica wash techniques (i.e., 'fishing'; reflux unit; screen-bridge; and also wax techniques for replicas which tend to fragment badly). The appendix includes material on minimization of artifacts produced during replica preparation, salvage of scrolled replicas, edge retention during replication, and stereo effects. Throughout the text, variations in technique are discussed in order to guide the reader in the selection of an appropriate method to prepare replicas of a given structure. A variety of specialized procedures and detailed explanations are included as well as suggested replicating utensils for basic and specialized techniques. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A020 745 9/1 20/1

TEXAS INSTRUMENTS INC DALLAS CENTRAL RESEARCH LABS

Acoustic Ridge Waveguide Technology. (U)

DESCRIPTIVE NOTE: Semiannual technical rept. 30 Jun-31 Dec 75,
JAN 76 36P Wagers,Robert S. ;
REPT. NO. TI-08-76-05
CONTRACT: N00014-75-C-0317, ARPA Order-2827

UNCLASSIFIED REPORT

DESCRIPTORS: *Waveguides, *Acoustics, Signal processing, Acoustooptics, Substrates, Transducers, Etching, Microminiaturization, Interactions, Wafers, Crystal growth, Acoustic waves (U)
IDENTIFIERS: *Acoustic waveguides, Surface acoustic waves (U)

This report presents results obtained during the second six months of development of acoustic waveguides. A primary motivation for developing acoustic waveguides is to take advantage of the potential size reduction over current surface acoustic wave technology. Waveguide components represent the next step in microminiaturization of acoustic signal processing devices. Devices that may be developed include directional couplers, ring resonators, and serial memory. In addition, because of the high degree of spatial confinement of the acoustic energy, nonlinear and acousto-optic interactions become possible. The technical problems associated with this research are threefold: (1) development of suitable etching processes for waveguide formation, (2) development of fine geometry stencils for transducer fabrication, and (3) development of transducer weighting characteristics for bandpass shaping. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD-A020 670 19/1 9/5

HARRY DIAMOND LABS ADELPHI MD

Tantalum Nitride Thin-Film Ratiometer for Electronic Timer of XM732 Proximity Fuze. (U)

DESCRIPTIVE NOTE: Technical memo., NOV 75 30P Kitchman,Lester A. ;Bullis, Lauren H. ;
REPT. NO. HDL-TM-75-23
PROJ: HDL-72791

UNCLASSIFIED REPORT

DESCRIPTORS: *Proximity fuzes, *Fuze functioning elements, *Timing devices, Thin films, Deposition, Nitrides, Electrical networks, Etching, Photolithography, Tantalum, Chromium, Fixed resistors, Variable resistors (U)
IDENTIFIERS: *Electronic timers, *XM-732 fuzes, Ratiometers, Tantalum nitride (U)

This report covers the performance evaluation of commercially produced thin-film ratiometers developed for use in the electronic timer of the XM732 Proximity Fuze. The resistor network, consisting of a 432-kilohm linear variable resistor and a 3-kilohm fixed resistor, provides a means of setting a delay time of 2 to 144 s before fuze turn on. The ratiometer elements were fabricated from sputtered tantalum nitride (TaN) and vacuum-evaporated chromium/gold (Cr/Au) or Cr deposited on 99.5 percent alumina. The resistive and conductor/commutator areas were defined by photolithography and selectively etched in a batch process. The TaN films exhibited excellent properties, whereas the Au commutator pads tended to smear under the pressure of the traversing spring contact. Additional investigation found thick Cr films to have the desired wear characteristics. Improved process control successfully demonstrated conformity as to resistor-tolerance, linearity, mechanical, and environmental specifications. The ability to meet these specifications qualified the design and TaN/Cr materials combination for inclusion in the Specification Control Drawing for the Detonator Block Assembly. (Author) (U)

AD-A020 670

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO9

AD-A019 325 20/6 20/5

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

The Effects of Surface Structural Properties on Laser-Induced Damage at 1.06 Micrometers. (U)

DESCRIPTIVE NOTE: Final rept. 1973-1975, DEC 75 156P House,Richard A. , II;
REPT. NO. DS/PH/75-4
PROJ: AF-8809
TASK: 880916
MONITOR: AFWL TR-76-62

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctoral thesis.
DESCRIPTORS: *Infrared lasers, *Radiation effects, *Surface properties, Silicon dioxide, Surface finishing, Thin films, Ultrasonic cleaning, Etching, Theses, Dielectrics (U)
IDENTIFIERS: Dielectric breakdown (U)

Short-pulse, laser-induced breakdown has been correlated with several surface properties and preparation techniques, for five transparent dielectric materials: Fused Silica, BK-7, ED-2, ED-4, and Cervit. The laser parameters were: 1.06 micrometers wavelength, 40 ns pulse width, TEM sub 00 mode, and 147 micrometer spot size. Damage threshold correlated strongly with RMS surface roughness, and measurements of roughness can be used to predict the threshold. Threshold was not affected by grinding procedure. Surfaces overcoated with thin dielectric films had reduced thresholds. Flame-polished and ion-polished surfaces had greatly increased thresholds. Surface contamination by rouge polishing compound caused a drastic threshold reduction at a wavelength of 1.06 micrometers. Nitric acid etching increased damage threshold. Ultrasonic cleaning could increase surface roughness and reduce threshold. The technique of roughness-normalization facilitates the comparison of various surface preparation techniques. (U)

AD-A019 325

AD-A017 689 13/8 14/2

NORTHROP CORP HAWTHORNE CALIF AIRCRAFT DIV

Anodic Etching - A Method of Detecting Grinding Burns on Chromium Plated Steel Parts. (U)

FEB 75 39P Lauchner,E. A. ;Andrews,G. A. ;

REPT. NO. NOR-75-33

UNCLASSIFIED REPORT

DESCRIPTORS: *Nondestructive testing, *Etching, Anodic polarization, Chromium, Plating, Steel, High strength alloys, Inspection, Defects(Materials), Grinding (U)
IDENTIFIERS: Anodic etching (U)

IAC ACCESSION NUMBER: NT-011588
IAC DOCUMENT TYPE: NTIAC -MICROFICHE--

Anodic etching, a method for detecting abusive grinding damage on chromium plated steel parts, is evaluated. Anodic etching procedure for inspecting chromium plated steel pins was studied and the mechanism of the anodic etch burn indication is discussed. In addition, the results of magnetic particle and penetrant inspection of the pins is presented. The results indicate that abusive grinding of chromium plate can cause cracks or burns in the plate or base metal that are not detected by conventional inspection techniques. Anodic etching is a useful technique for determining if chromium plate has been burned by abusive grinding. If the plate is burned, further investigation is required to determine whether the base metal is burned or cracked. (U)

IAC SUBJECT TERMS: N--(U)*ETCHING, *STEEL, *DAMAGE, *GRINDING, CHROMIUM, PLATING, MAGNETIC PARTICLE INSPECTION, PENETRANTS;

AD-A017 356 9/1 20/6

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Surface-Wave Resonators Using Grooved Reflectors. (U)

DESCRIPTIVE NOTE: Journal article,
MAY 75 11P Li,Robert C. ;Alusow,John A. ;Williamson,Richard C. ;
REPT. NO. MS-3979
CONTRACT: F19628-73-C-0002
PROJ: AF-649L
MONITOR: ESD TR-75-288

UNCLASSIFIED REPORT

Availability: Pub. in Annual Symposium on Frequency Control (29th), p167-176 1975.
DESCRIPTORS: *Cavity resonators, *Reflectors, Etching, Grooving, Single crystals, Etched crystals, Quartz resonators, Very high frequency, Reprints (U)
IDENTIFIERS: Lithium niobate, Fabry-perot resonators, Periodic structures, Grooved reflectors (U)

The resonator described in this paper consists of a pair of reflectors, each made up of a periodic array of weakly-reflecting (shallow) grooves etched into the crystal surface, and separated by an appropriate gap on the free surface of a crystal. The theory of shallow-groove arrays, with emphasis on their stop-band behavior, is reviewed. This is then applied to an analysis of the modes of the resonator, and the relationship of resonator Q to the array parameters, such as the number and depth of grooves, etc. Theoretical limits on achievable Q, imposed by propagation and diffraction losses, are presented for the two commonly used substrates of LiNbO3 and ST-cut Quartz. Experimental results are presented for devices at 68 MHz and 170 Mhz, with Q values ranging from several thousand to over ten thousand. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

D-A015 492 17/5 9/5

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

Properties of Infrared Cat-Whisker near 10.6 Microns, (U)

FEB 75 5P Twu,Bor-long ;Schwarz,S. E. ;
CONTRACT: DAHC04-73-C-0026
MONITOR: ARO,AFOSR 8733.10-P,TR-75-1695

UNCLASSIFIED REPORT

Availability: Pub. in Applied Physics Letters, v26 n12 p672-675, 15 Jun 75.
DESCRIPTORS: *Infrared detectors, *Dipole antennas, *Crystal video receivers, Far infrared radiation, Efficiency, Metal contacts, Tungsten, Carbon dioxide lasers, Diodes, Etching, Reprints (U)
IDENTIFIERS: *Cat whisker receivers, *Infrared antennas (U)

IAC ACCESSION NUMBER: GC-752221
IAC DOCUMENT TYPE: GACIAC -HARD COPY-
Radiation patterns of 10.6 microns infrared antennas have been obtained experimentally and interpreted by means of a simple theory. It is found that the effective antenna is equal to the length of the etched portion of the sharpened cat-whisker antenna. This effective antenna length appears to be caused by decoupling of the electromagnetic field across a shape discontinuity of the antenna wire. The results suggest a simple means for defining the shape and size of infrared antenna structures. (Author) (U)

IAC SUBJECT TERMS: G--(U)RADIATION PATTERNS, INFRARED RADIATION, ANTENNAS, ANTENNA RADIATION PATTERNS, MICRONS 10-50, LENGTH, SHAPE, SIZE, DIODES, IMPEDANCE, WIRE, ETCHING;

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A014 053 11/2

ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER CHARLOTTESVILLE VA

The Work of the State Institute of Glass in the Area of Glass Hardening, (U)

APR 75 6P Botvinkin,O. K. ;Denisenko, O. N. ;
REPT. NO. FSTC-HT-23-0628-75

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Trans. of Vsesoyuznyi Nauchno-Issledovatelskii Institut Stekla. Trudy (USSR) n1 p107-109 1971.
DESCRIPTORS: *Glass, *Hardening, Heat treatment, Fused salts, Lithium compounds, Sodium, Ion exchange, Silicones, Coatings, Etching, Translations, USSR (U)

An ion exchange method of hardening glass, by treating it in molten lithium salts, replacing the sodium ions by lithium, is described. Also mentioned are developed work on chemical hardening of glass in liquids, with subsequent application of organosilicon protective coatings, use of ultrasound in chemical hardening of glass, chemical hardening and subsequent production of double sheet glass, with recycling of the etching agent, search for polymer coatings and methods of application of them to sheet and packaging glass and special purpose glass. A method now in production of horizontal tempering of automobile glass is mentioned. (U)

AD-A013 949 7/4

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Auger Spectroscopy Studies of the Oxidation of Amorphous and Crystalline Germanium. (U)

DESCRIPTIVE NOTE: Journal article, OCT 74 8P Henrich,Victor E. ;Fan, John C. ;
REPT. NO. JA-4432
CONTRACT: F19628-73-C-0002
PROJ: AF-649L
MONITOR: ESD TR-75-198

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Applied Physics, v46 n3 p1206-1213 Mar 75.
DESCRIPTORS: *Germanium, *Metal films, *Oxidation, *Electron spectroscopy, Amorphous materials, Polycrystalline, Single crystals, Sputtering, Electron beams, Ion beams, Etching, Reprints (U)

Auger-electron spectroscopy and ion-beam etching was used to study the room-temperature oxidation of sputtered and electron-beam-evaporated Ge films. Both amorphous and polycrystalline films were examined, as well as single-crystal Ge. Electron-escape-depth effects were removed by a deconvolution procedure in order to obtain the O distribution function. Large differences of O distribution were found between sputtered and e-beam amorphous films. Sputtered amorphous films oxidize in the same manner as single-crystal Ge, with the O confined to the first 5-10 A of the surface. In e-beam amorphous films, the depth of O penetration is more than 200 A, although the heavily oxidized region is still only 10-12 A thick. Polycrystalline films have heavily oxidized layers 6-9 A thick, with some O present to a depth of 100-200 A. (Author) (U)

AD-A013 666 11/5 20/2

MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR MATERIALS SCIENCE AND ENGINEERING

Heterogeneities in Carbon Fibers. (U)

DESCRIPTIVE NOTE: Technical rept., AUG 75 15P Warner,S. B. ;Uhlmann,D. R. ;Peebles,L. H. , Jr;
REPT. NO. TR-7
CONTRACT: N00014-75-C-0542
PROJ: NR-053-534

UNCLASSIFIED REPORT

DESCRIPTORS: *Carbon fibers, *Acrylic resins, Etching, Ion bombardment, Microstructure, Orientation(Direction), Transverse, Stabilization, Crystal substructure, Precursors, Crystal defects, Pyrolysis, Electron microscopy, Spatial distribution, Acrylonitrile polymers, Heterogeneity, Synthetic fibers, Argon (U)

Acrylic fibers, stabilized acrylic fibers and graphite fibers have been selectively etched by ion bombardment. After ion etching, the fibers are characterized by structures oriented transverse to the fiber axis with an average spacing ranging from 500-3000 A. These transverse structures are considered to be representative of structural inhomogeneities in the fibers, which are transmitted from the precursor fiber through the stabilization treatment to the final carbon fibers. The relation between these heterogeneities and the standard microstructural models of carbon fibers remains to be elucidated satisfactorily. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD-A013 153 20/6 20/12

CALIFORNIA UNIV BERKELEY

Optical Waveguides Fabricated by Preferential Etching, (U)

DEC 74 8P Tsang,Won-Tien ;Tseng, Cheng-Chung ;Wang,Shyh ;
CONTRACT: DAHC04-74-G-0070
MONITOR: ARO 11833.9-EL

UNCLASSIFIED REPORT

Availability: Pub. in Applied Optics, v14 n5 p1200-1206 May 75.
DESCRIPTORS: *Optical waveguides, *Etching, *Grooving, *Filling, Organic coatings, Deposition, Substrates, Silicon, Channels, Reprints (U)
IDENTIFIERS: *Organic fillers, Chemical waveguide etching (U)

We introduced a new technique of fabricating optical waveguides by first preferentially etching the waveguide grooves, which can be either cusp-shaped or cup-shaped in cross section, and then filling the grooves with organic films by solution-deposition technique. With the chemical etching technique, perfectly smooth reflecting waveguide walls and well-defined waveguide profiles can be easily produced and reproduced with an accuracy that no other existing fabrication techniques can achieve. In our experiments, silicon was chosen as the base material for possible future integration of optical and electronic components. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD-A009 776 9/1 13/8

MICROWAVE ASSOCIATES INC BURLINGTON MASS

Production Engineering Measure for Low Noise Solid-State Oscillator. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 5, 19 May 73-19 Aug 73,
OCT 73 38P Epstein,Howard ;Lee,Yongsik ;Ramachandran,T. B. ;Walline,Robert E. ;
CONTRACT: DAAB05-72-C-5861
MONITOR: ECOM 5861-5-72

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Quarterly rept. no. 4, AD-A009 775.
DESCRIPTORS: *Microwave oscillators, Production engineering, Ku band, IMPATT diodes, Gallium arsenides, Low noise, Superhigh frequency, Solid state electronics, Etching, Fabrication (U)
IDENTIFIERS: *Production engineering measures (U)

Technical problems arising in the application of the new mesa etching process for the Impatt diodes are summarized. Although this process worked satisfactorily for large diameter mesas, it has proven completely unsuitable for the small mesas required by the devices for this program. Changes devised in this process are described. The new oscillator design initiated at the beginning of the quarter has been completed except for tuning varactor feedthrough details. Electrical data illustrating the improved performance of this design over past engineering samples is presented. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A008 199 20/6 20/5

PERKIN-ELMER CORP NORWALK CONN

Diffraction Grating Development. (U)

DESCRIPTIVE NOTE: Final rept. 13 Jun 73-15 Jul 74,
JUL 74 172P Harris,J. S. ;Siomba,A.
F. ;Arnold,R. ;Bartas,J. ;Campe,G. ;
REPT. NO. PE-11991
CONTRACT: F29601-73-A-0040
PROJ: AF-317J
TASK: AF-317J08
MONITOR: AFWL TR-74-218

UNCLASSIFIED REPORT

DESCRIPTORS: *Diffraction gratings, *Laser beams, *Infrared lasers, Coherent radiation, Sampling, Lasers, Fabrication, Optical equipment components, Alignment, Holography, Interferometry, Ion bombardment, Etching, Diffraction, Efficiency, Mirrors, Optical coatings (U)

Grating samples for use as laser beam samplers were produced and tested for evaluation of various production methods and analytical solutions of grating diffraction. The grating samples were tested for scatter, absorptance, microscopic surface quality, sample wavefront quality, and variation of diffraction efficiency with polarization. Both ruling and ion etching were shown to produce good grating samples and used to produce gratings on large metal mirrors. Two large ruled gratings were experimentally evaluated as a series grating wavefront sampler. A series grating wavefront sampler was evaluated analytically for misalignment errors and high-power laser thermal effects. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A005 629 9/5

STANFORD UNIV CALIF INTEGRATED CIRCUITS LAB

Advanced Technology for Micropower Integrated Circuits. (U)

DESCRIPTIVE NOTE: Annual rept. 30 Jun 72-29 Jun 73,
JAN 75 36P Meindl,J. D. ;Rodgers,T.
J. ;
CONTRACT: DAAB07-72-C-0229
PROJ: DA-1-S-762705-AH-94
TASK: 1-S-762705-AH-9401
MONITOR: ECOM 72-0229-1

UNCLASSIFIED REPORT

DESCRIPTORS: *Integrated circuits, *Fabrication, Masking, Transistors, Resistors, Schottky barrier devices, Silicon, Epitaxial growth, Etching (U)

A new 'V-groove' process for the fabrication of bipolar integrated circuits was developed. The process requires carefully controlled deposition of epitaxial layers and anisotropic etching of silicon. The resulting structure eliminates the need for the conventional buried layer, isolation diffusion and masking for base diffusion. A four-mask process is used to make NPN transistors, resistors and Schottky diodes. A five-mask process can provide improved lateral PNP transistors. The second area of the activity was the development of vapor-phase arsenic doped polycrystalline silicon resistors of high value. These resistors result in reproducibly high resistance, low parasitic capacitance and elimination of the need for isolation. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A005 615 19/1

HARRY DIAMOND LABS WASHINGTON D C

Design and Fabrication of a Thin-Film Ratiometer for Electronic Timer of XM732 Proximity Fuze. (U)

DESCRIPTIVE NOTE: Technical memo., DEC 74 31P Kitchman,Lester A. ;Wood, Gwendolyn B. ;Swirczynski,John P. ;Bullis, Lauren H. ;Hebb,Emma Lee ;
REPT. NO. HDL-TM-74-24
MONITOR: GIDEP 661.45.51.30-N3-01

UNCLASSIFIED REPORT

DESCRIPTORS: *Proximity fuzes, *Measuring instruments, Ratios, Timing devices, Electronic equipment, Thin films, Vapor plating, Etching, Resistors (U)
IDENTIFIERS: XM-732 fuzes, Ratiometers (U)

A feasibility study was conducted on the design and fabrication of a thin-film precision ratiometer developed for use in the electronic timer of the XM732 Short Intrusion Proximity Fuze. The ratiometer network consists of a 432-kohm linear variable resistor and a 3-kohm fixed resistor that provides a means of setting a delay time of 2 to 144 sec before fuze turnon. Nichrome and gold were vacuum deposited onto a glazed ceramic substrate with the resistor-conductor pattern being selectively etched. This approach utilizes a step-like conductor/commutator design that permits settability within 0.5 sec through a movable spring contact. Resistor tolerances of plus or minus 20 percent with a linearity of plus or minus 1.5 ratio units through an angle of 324 deg were demonstrated. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A005 095 13/8 20/6

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

Grating Masks Suitable for Ion-Beam Machining and Chemical Etching, (U)

JUL 74 5P Tsang,Won-Tien ;Wang,Shyh ;
CONTRACT: N00014-69-A-0200-1063, DAHC04-74-G-0070
MONITOR: ARO 11833.3-EL

UNCLASSIFIED REPORT

Availability: Pub. in Applied Physics Letters, v25 n7 p415-418, 1 Oct 74.
DESCRIPTORS: *Gratings(Spectra), *Masks, High resolution, Substrates, Ion beams, Machining, Chemical milling, Glass, Reprints (U)

By using the simultaneous exposure and development technique, high-resolution relief gratings with periods as small as 2400 Angstroms have been produced which have grooves cleanly developed down to the substrate surface and exposing wide surface stripes with clearly defined, sharp and narrow photoresist ridges. Such gratings are suitable for use as masks in ion-beam machining and chemical etching. Results of chemically etched gratings into glass substrates with a 5000 Angstrom period are presented and prospects of obtaining chemically etched gratings with shorter periods are discussed. (Author) (U)

AD-A004 659 14/2 11/9

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF METALLURGY AND MATERIALS SCIENCE

Ion Etching of Amorphous and Semicrystalline Fibers. (U)

DESCRIPTIVE NOTE: Technical rept., FEB 75 25P Warner ,S. B. ;Uhlmann,D. R. ;Peebles,L. H. , Jr;
REPT. NO. TR-4
CONTRACT: N00014-67-A-0204-0065
PROJ: NR-053-534

UNCLASSIFIED REPORT

DESCRIPTORS: *Ion bombardment, *Etching, *Polymers, *Amorphous materials, *Fibers, Surface properties, Microstructure, Electron microscopy, Graphite, Carbon fibers, Orientation(Direction) (U)
IDENTIFIERS: Transmission electron microscopy, Scanning electron microscopy (U)

Ion etching of amorphous and semicrystalline polymeric or graphite fibers produces structures which can be observed in either the transmission electron microscope or the scanning electron microscope. The structures so produced have previously been identified as resulting from the etching process (artifacts), or as representing characteristics of the material, or both. The artifacts can be eliminated or minimized by rotating the sample during irradiation, using a low angle of incidence, and ensuring that the temperature of the sample surface remains low. When such precautions are used, amorphous fibers and semicrystalline fibers which are not oriented remain featureless after ion etching. Oriented semicrystalline fibers, however, develop a striated structure which is oriented perpendicular to the stretch direction. These transverse structural features reflect characteristic features of drawn fibers; but the relation between these features and the lamellar spacing is unclear. (U)

AD-A004 138 20/5 20/6

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

Theoretical Study and Experimental Development of Thin-Film Lasers and Modulators for use in Integrated Optics. (U)

DESCRIPTIVE NOTE: Final rept., DEC 74 7P Wang,Shyh ;
CONTRACT: AF-AFOSR-2114-71
PROJ: AF-9768
TASK: 976801
MONITOR: AFOSR TR-75-0081

UNCLASSIFIED REPORT

DESCRIPTORS: *Laser modulators, *Optical waveguides, Thin films, Wave propagation, Etching, Diffraction gratings (U)
IDENTIFIERS: Integrated optics, *Optical modulators (U)

Wave-optics analysis of thin-film modulators based on the principle of polarization conversion was completed and experimental demonstration of the principle was performed. Novel structures for Bragg lasers were proposed and analyzed. The feedback mechnisms were elucidated which made possible many possible structures for thin-film Bragg lasers. Experimental work on gratings and chemical etching showed excellent results. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A003 631 20/6 20/5 11/3

ROCKWELL INTERNATIONAL CORP ANAHEIM CALIF AUTONETICS DIV

Investigation of Advanced Protective and Antireflection Coatings for Halide Optics. (U)

DESCRIPTIVE NOTE: Final rept. 1 Jun 73-19 Apr 74, JUN 74 18P Weigand,Bernard L. ;
REPT. NO. C73-892.4/201
CONTRACT: F19628-73-C-0275, ARPA Order-2415
MONITOR: AFCRL TR-74-0551

UNCLASSIFIED REPORT

DESCRIPTORS: *Infrared windows, *Surface finishing, *Antireflection coatings, Halides, Butadienes, Polybutadiene, Etching, Hydrochloric acid, Halogenated hydrocarbons, Acetic acid, Infrared lasers, Thin films, Optical properties, Potassium compounds, Chlorides, Ultraviolet radiation, Sputtering, Glow discharges, Polymerization (U)
IDENTIFIERS: Potassium chloride, Butadiene/ hexachloro (U)

A chemical etch procedure using a solution of 91 parts of glacial acetic acid to 9 parts of concentrated hydrochloric acid was developed for polishing the potassium chloride. Thin film polymeric coatings were prepared by radio frequency glow discharge and ultraviolet techniques and proper equipment has been assigned and assembled. Hexachlorobutadiene - 1.3 was used as monomer for preparation of polymeric coatings. Glow discharge polymerization was occuring primarily in the vapor phase rather than on the substrate surface thereby establishing the proper mathematical relationship between the monomer vapor pressure, flow rate, substrate temperature, power, inert gas pressure, flow substrate to-power source spacing and deposition rate. The thin film polymeric coating showed a slight absorption at 10.6 micrometers and little or no absorption at 3 to 5 micrometers. The coating demonstrated good adhesion to the substrate. The very low coating deposition rates obtained by ultraviolet photolytic polymerization of low pressure materials make this process unattractive for this type of materials. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD-A000 502 13/8 9/1 20/6

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Ion-Beam Etching of Surface Gratings. (U)

DESCRIPTIVE NOTE: Meeting speech, NOV 73 8P Smith,Henry I. ;Melngailis, John ;Williamson,Richard C. ;Brogan,William T. ;
REPT. NO. MS-3649
CONTRACT: F19628-73-C-0002
PROJ: AF-649L
MONITOR: ESD TR-74-155

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of the Ultrasonics Symposium, p559-563 1973.
SUPPLEMENTARY NOTE: Sponsored in part by Office, Chief of Research and Development (Army), Washington, D.C.
DESCRIPTORS: *Gratings(Spectra), *Etching, Ion beams, Ultrasonic radiation, Acoustic waves, Surface waves, Sputtering, Lithium compounds, *Niobates, Silicon, Gallium arsenides*, Alumina (U)
IDENTIFIERS: *Acoustic surface waves, Integrated optics, Lithium niobates, Aluminum oxide (U)

The phenomenon of sputtering at low energies (few hundred eV) is reviewed as well as the rf and ion-beam techniques which have been developed over the last decade for sputter etching sub-micron resolution structures. The technique of varying the depth of a grating as a function of position by ion-beam etching through a fixted aperture and moving the substrate past this aperture at a variable rate is described. Ion-beam etching causes facets to form in the side walls of photoresist patterns, and as a result the profiles etched into substrates are rectangular only if etching is terminated before facets intersect the substrate surface. Ion-beam etching rates of several materials have been measured. (Modified author abstract) (U)

AD- 919 567 9/1 20/6

PERKIN-ELMER CORP NORWALK CONN

Thin Film Optical Waveguide Technology. (U)

DESCRIPTIVE NOTE: Final rept. Apr 72-Oct 73, MAR 74 56P Zernike,Frits ;
REPT. NO. PE-11934
CONTRACT: F33615-72-C-1585
PROJ: AF-2001
TASK: 200102
MONITOR: AFAL TR-74-60

UNCLASSIFIED REPORT

DESCRIPTORS: (*Waveguides, *Thin films), Integrated systems, Optics, Lasers, Lenses, Sputtering, Masking, Deposition, Passive systems, Etching, Mixtures, Coupling circuits, Three dimensional, Refractive index, Silicon dioxide, Substrates, Thickness, Propagation, Manganese, Glass, Helium, Cadmium, Gold, Barium oxides (U)
IDENTIFIERS: Photoresist, Fresnel lenses (U)

Passive thin film waveguide components investigated under this contract were: 1) coupled waveguides, 2) waveguide lenses, 3) taper couplers, 4) waveguides with more or less rectangular cross sections. The coupling between waveguides was investigated in detail, both theoretically and experimentally. Methods for making 3-dB couplers and switches are described. Different experimental methods of making waveguide lenses were attempted; however, only two were found to be useful: one produces a lens with rectangular contours but thicker in the center and the other produces a round domed lens. Different tapers were investigated. It was found that a well-defined narrow output (input) angle can be obtained by using a very slow taper. Waveguides with trapezoidal cross sections were produced by sputter-etching of slab type waveguides using photoresist masks. The necessary patterns in these masks were made by exposing the photoresist pattern with a focused beam from a He-Cd laser operating at 4416A. (Author) (U)

AD- 912 475 17/5 19/1 9/1

RCA ADVANCED TECHNOLOGY LABS CAMDEN N J

Pyroelectric/Integrated Circuit Infrared Imaging Array Development. (U)

DESCRIPTIVE NOTE: Final technical rept. 22 Feb 72 - 30 May 73, JUN 73 142P Boornard,A. ;Hall,D. ; Herrmann,E. ;Larrabee,R. D. ;Morren,W. ;
CONTRACT: F33615-72-C-1804, ARPA Order-1916
MONITOR: AFAL TR-73-258

UNCLASSIFIED REPORT

DESCRIPTORS: (*IMAGE INTENSIFIERS(ELECTRONICS), INFRARED IMAGES), (*INFRARED IMAGE TUBES, INTEGRATED CIRCUITS), (*INFRARED DETECTORS, PASSIVE SYSTEMS), FIELD EFFECT TRANSISTORS, THERMAL TARGETS, THERMAL INSULATION, SEMICONDUCTING FILMS, TEMPERATURE, INFRARED RADIATION, GAS LASERS, EVAPORATION, INFRARED LASERS, ETCHING, ORGANIC COMPOUNDS, SULFATES, GLYCINE, SILICON, SUBSTRATES, SILICON DIOXIDE (U)
IDENTIFIERS: FAR INFRARED REGION, METAL OXIDE SEMICONDUCTORS, MIDDLE INFRARED REGION, PYROELECTRICITY, Bucket brigades (U)

The development of techniques leading to the fabrication of thin polycrystalline triglycine sulfate films and their resulting characteristics as infrared detectors are described. The processing technology required to fabricate pyroelectric/integrated circuit thermal imaging arrays consisting of thin flim triglycine sulfate detectors on field effect integrated circuits is reviewed. The primary approach pursued under this program to the problem of providing the required high degree of thermal isolation between the detectors and the silicon substrate was to preferentially etch away the silicon underlying the detectors. In the resulting configuration, the thin thermally grown silicon dioxide membrane remaining after the etching process serves to support the detector. A second thermal isolation technique, in which a thin, permanently poled, single crystal section of TGS is positioned above its companion two-dimensional integrated circuit substrate, is also described.

(U)

AD- 912 287 9/1 9/5 20/12

TEXAS INSTRUMENTS INC DALLAS

Silicone Diode Target Tube Development. (U)

DESCRIPTIVE NOTE: Final technical rept. 10 Apr 72-10 Apr 73,
JUL 73 44P Lawson ,James R. ;Bean , Kenneth E. ;Ahlburn,Byron T. ;
REPT. NO. TI-03-73-41
CONTRACT: F33615-72-C-1332
PROJ: AF-6102
MONITOR: AFAL TR-73-227

UNCLASSIFIED REPORT

DESCRIPTORS: (*VIDICONS, PERFORMANCE(ENGINEERING)), (*SEMICONDUCTOR DIODES, *ELECTRON TUBE TARGETS), MANUFACTURING, ALIGNMENT, ETCHING, PHOTOENGRAVING, SILICON, SEMICONDUCTORS, CARRIERS(SEMICONDUCTORS), PHOTOCONDUCTIVITY, ELECTRON IRRADIATION, NOISE(RADIO), RESOLUTION (U)
IDENTIFIERS: BLOOMING, DARKNESS, ELECTRIC CURRENT, PHOTOELECTRICITY, ELECTRON BOMBARDED SEMICONDUCTORS, MESA DIODES (U)

Improved television blooming control in a silicon-diode-array vidicon target has been achieved using a mesa diode structure with deep valleys etched using the orientation-dependent-etch properties of silicon. A reduction from 13 to 5.6 of the ratio of the bloomed to the unbloomed spot diameters over a 100,000 light level change was accomplished in the vidicon mode. The target process is discussed along with the associated problems. The operating parameters of the targets are compared to those of conventional planar arrays in both the vidicon and the EBS modes of operation. Recommendations are made for future development and target improvement. (Author) (U)

AD- 911 088 17/7

MASSACHUSETTS INST OF TECH CAMBRIDGE CHARLES STARK DRAPER LAB

Advanced Inertial Technologies. Volume I. (U)

DESCRIPTIVE NOTE: Annual technical rept. 16 Feb 72-16 Feb 73,
MAY 73 179P
REPT. NO. R-748
CONTRACT: F33615-72-C-1335
PROJ: AF-6095
TASK: 609502
MONITOR: AFAL TR-73-124-Vol-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, Rept. no. R-820, AD-8000 382L.
DESCRIPTORS: (*INERTIAL NAVIGATION, INSTRUMENTATION), GAS BEARINGS, GYROSCOPES, SERVOMECHANISMS, PHASE LOCKED SYSTEMS, ANALOG-TO-DIGITAL CONVERTERS, DIGITAL TO ANALOG CONVERTERS, DIGITAL SYSTEMS, INTERFACES, PULSE DURATION MODULATION, MODULATORS, TRANSFORMATIONS(MATHEMATICS), SPUTTERING, DEPOSITION, ETCHING, RADAR, IMAGE MOTION COMPENSATION, PLANNING (U)
IDENTIFIERS: AVIONICS, HYPHA COMPUTATIONS, MOTION COMPENSATION, PHASE-TO-DIGITAL CONVERTERS, SIGNAL PROCESSING, SINE COSINE GENERATORS (U)

This report describes a first-year exploratory development program of study, design, fabrication, and test of advanced inertial sensing instrument technology and other navigation system technology. Activities covered include: (1) research in spin-axis gas and ball bearings, sputter-etch and sputter-deposition techniques, and ball-retainer materials and processing; (2) investigation of new techniques for signal processing and conversion which include hypha phase-locked-loop processing and the use of a microprocessor to perform attitude transformations; and (3) analysis of the problem of radar motion compensation. (Author) (U)

AD- 902 458 11/6 1/3

BOEING CO SEATTLE WASH COMMERCIAL AIRPLANE GROUP

SST Technology Follow-On Program, Phase I. Compatibility of SST Materials with Titanium Alloys. Volume I. Flyaway Materials. (U)

DESCRIPTIVE NOTE: Final rept. on Task 1, JUL 72 115P Jacobsen,P. S. ;Senear,A. E. ;
REPT. NO. D6-60208-1
CONTRACT: DOT-FA-SS-71-12
MONITOR: FAA-SS 72-08-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-902 459L.
DESCRIPTORS: (*AIRFRAMES, JET TRANSPORT PLANES), (*TITANIUM ALLOYS, STRESS CORROSION), MATERIALS, COMPATIBILITY, DEFLECTION, BENDING, SURFACE PROPERTIES, CRACK PROPAGATION, ETCHING, SURFACES, HYDROGEN EMBRITTLEMENT, SALTS, SILVER COMPOUNDS, CHELATE COMPOUNDS, CADMIUM, FATIGUE(MECHANICS), AERODYNAMIC HEATING, THERMAL STRESSES, FAILURE(MECHANICS), TEST METHODS, SUPERSONIC AIRCRAFT (U)
IDENTIFIERS: HEIMERL-BRASKI MATERIALS, SST TECHNOLOGY FOLLOW ON PROGRAM, SUPERSONIC TRANSPORTS, TITANIUM ALLOY 6AL 4V, TITANIUM ALLOY 8AL 1MO 1V (U)

IAC ACCESSION NUMBER: MCIC-084283
IAC DOCUMENT TYPE: MCIC -HARD COPY--
This document presents data on the compatibility of titanium alloys Ti-8Al-1Mo-1V and Ti-6Al-4V with flyaway materials, materials which might contact titanium in the airplane during its operation, proposed for use on the U.S.A. supersonic transport. Testing procedures are described in detail and results are tabulated. Flyaway materials were applied to two types of test specimens: Heimerl-Braski self-stressed specimens, which were subjected to a bend deflection test following exposure, and simple U-bend specimens. For the Heimerl-Braski specimen configuration, a comparative statistical analysis of bend deflection test results was conducted.

(U)

AD- 900 343 9/5

ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y

Thin Film Hybrid Pulse Width Discriminator Circuit Fabrication. (U)

DESCRIPTIVE NOTE: Technical rept., MAY 72 42P Dixon,Charles J. ;
REPT. NO. RADC-TR-72-118

UNCLASSIFIED REPORT

DESCRIPTORS: (*DISCRIMINATORS, INTEGRATED CIRCUITS), TRANSISTORS, RESISTORS, FILMS, CAPACITORS, GATES(CIRCUITS), SEMICONDUCTOR DIODES, SUBSTRATES, TANTALUM, SHEETS, MANUFACTURING, ETCHING, GOLD, NITRATES (U)
IDENTIFIERS: NAND GATES, NICHROME, *PULSE WIDTH DISCRIMINATORS, SCHOTTKY BARRIER DEVICES, SEMICONDUCTOR DIODES, THIN FILMS (U)

This report describes the in-house fabrication of a small quantity of pulse width discriminator circuits in thin film form. Special attention is given to the problems of undercutting while etching and variations in sheet resistivity of the resistive films. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 900 280 9/1 20/7

TEXAS INSTRUMENTS INC DALLAS

Production Engineering Measure for an Electron-Beam Machine and Microwave Transistors. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 3, 1 Oct 71-1 Jan 72,
JAN 72 38P Webster,Roger R. ;Varnell, Gilbert L. ;Ch'en,Daniel ;
REPT. NO. TI-03-72-25
CONTRACT: DAAB05-71-C-3715

UNCLASSIFIED REPORT

DESCRIPTORS: (*TRANSISTORS, ELECTRON BEAMS), MANUFACTURING, MICROWAVE FREQUENCY, ACRYLIC RESINS, MASKING, GOLD, ETCHING, SPUTTERING, NITRIDES, SILICON, STYRENE PLASTICS, SUBSTRATES, C BAND, OXIDES, DOPING, BORON, ARSENIC (U)
IDENTIFIERS: PRODUCTION ENGINEERING MEASURE (U)

IAC ACCESSION NUMBER: PL-017962
IAC DOCUMENT TYPE: PLASTC -MICROFICHE--

Significant steps were made toward establishing a fully computer-controlled electron-beam delineation capability for fabrication of microwave transistors. The first lot of slices (EBT-1) was processed through all the microwave transistor 'masking' levels to establish electron resist and etching processes. Significant problems were not encountered using PMMA RESIST UNTIL THE CONTACT 'MASKING' LEVEL. A CHANGE IN THE ETCH RATE OF THE SPUTTERED GOLD DUE TO ELECTRON-BEAM IRRADIATION CAUSED SEVERE UNDERCUTTING OF THE EMITTER FINGERS USING PMMA and conventional chemical etching techniques. A negative electron resist polystyrene was utilized on Lot EBT-5 to take advantage of this etch rate differential. Polystyrene enabled delineation of 0.7 m emitter contact fingers on all slices in this lot. Evaluation of the transistors from Lot EBT-5 is in progress. Excellent progress was made this quarter toward fully automating pattern registration for fabrication of 6 GHz transistors. Lots EBT-4 and EBT-5 were used to test the alignment capability of the automatic pattern registration (APR) system on wafers going through the 6 GHz transistor proce-s. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 863 068 9/1

GENERAL TELEPHONE AND ELECTRONICS LABS INC BAYSIDE N Y BAYSIDE RESEARCH CENTER

High Capacitance Thin Film Structures. (U)

DESCRIPTIVE NOTE: Quarterly progress rept. no. 2, 5 Jun-4 Sep 69,
DEC 69 6P Wasserman,Moe S. ;
Feuersanger,Alfred E. ;
REPT. NO. GT/E-TR-69-832.2
CONTRACT: DAAB07-69-C-0194
PROJ: DA-1-H-662705-A-440
TASK: 1-H-662705-A-44001
MONITOR: ECOM 0194-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Quarterly progress rept. no. 1 dated Aug 69, AD-858 382.
DESCRIPTORS: (*INTEGRATED CIRCUITS, FIXED CAPACITORS), (*FIXED CAPACITORS, FILMS), NICKEL COMPOUNDS, OXIDES, SPUTTERING, MANUFACTURING, ETCHING (U)
IDENTIFIERS: NICKEL OXIDES, THIN FILMS (U)

The deposition conditions were established for high-capacitance nickel oxide films in the new multiple-source deposition system. Preliminary life test data and information on the uniformity of characteristics were obtained, and a procedure was developed for photolithographic etching of the nickel oxide films which is expected to be adaptable to silicon integrated processing. Characterization of the film surfaces by electron microscopy was also performed. (Author) (U)

AD- 860 343 9/1 17/1

RCA ELECTRONIC COMPONENTS SOMERVILLE N J

5-Kilowatt, 1-Kilovolt, Laminated Sonar Transistor. (U)

DESCRIPTIVE NOTE: Interim engineering rept. no. 2, 1 Apr-30 Jun 69,
SEP 69 46P Becke,Hans W. ;White, Joseph P. ;
CONTRACT: N00039-69-C-2543
PROJ: XF-52-545-004
TASK: 8077

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Interim engineering rept. no. 1, AD-853 206.
DESCRIPTORS: (*TRANSISTORS, SONAR EQUIPMENT), DESIGN, SILICON, MANUFACTURING, PELLETS, ETCHING, ELECTRICAL RESISTANCE (U)
IDENTIFIERS: JUNCTION TRANSISTORS (U)

Results of 25 design IIIA pressings are discussed. Various types of base-collector structures were used. Measurements on 14 completed transistors are described. A theoretical model of thermal instability, which shows the importance of base series resistance at higher voltages, is investigated. The process is being modified to achieve additional base ballasting which should result in improved second breakdown performance without impairing other device characteristics. Further work on preferential etching, demonstrating the advantages of this method over cavitroning, is described. A package design for paralleling up to six pellets is included. (Author) (U)

AD- 841 860 11/6

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

APPLICATION OF THE POTENTIAL POLARIZATION IN THE STUDY AND IN THE METALLOGRAPHY OF CORROSION RESISTANT STEELS. (U)

NOV 67 37P Cihal,Vladimir ;
REPT. NO. FTD-HT-67-170

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited trans. of Hutnicke Listy (Czechoslovakia) n11 p817-840 1965 (sic).
DESCRIPTORS: (*CORROSION RESISTANT ALLOYS, *STEEL), (*METALLOGRAPHY, CORROSION RESISTANT ALLOYS), POLARIZATION, PHASE STUDIES, ETCHING, CZECHOSLOVAKIA (U)
IDENTIFIERS: TRANSLATIONS (U)

IAC ACCESSION NUMBER: MCIC-073802
IAC DOCUMENT TYPE: MCIC -HARD COPY--

The study describes the application of potential polarization particularly for the study of corrosion resistant steels. The advantages of this method as compared to the current classical electrochemical method are evaluated. The characteristics of a potentiostat and the potential polarization curve with its significant regions are described. The application of the potentiostat is directed toward the study of the passivity of corrosion resistant steels, toward the study of the influence of alloy elements on the corrosion resistance and toward the quality testing of corrosion resistant steels. A procedure was found for the determination of the degree of differentiation of individual phases of corrosion resistant steels in electrolytic etching based on the comparison of their potential polarization curves. Potentials suitable for a selective etching of ferrite, austenite and phase sigma were determined. From the course of the polarization curve it is possible to select not only the manner of etching but also to identify roughly the phases present in the steel. (Author) (U)

UNCLASSIFIED

C REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 833 329 9/5 11/3 13/8

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

EFFECT ON ETCH RATE OF OXIDE SURFACES AFTER ELECTRON BOMBARDMENT. (U)

DESCRIPTIVE NOTE: Master's thesis,
MAR 68 64P Howard,Joe A. ;
REPT. NO. GE/EE/6C-7

UNCLASSIFIED REPORT

DESCRIPTORS: (*INTEGRATED CIRCUITS, MANUFACTURING), (*OXIDES, ELECTRON IRRADIATION), (*ETCHING, OXIDES), METAL FILMS, SURFACES, ELECTRON MICROSCOPY, SPUTTERING, VAPOR PLATING, SILICON DIOXIDE, ALUMINA, ANODIC COATINGS, HEAT RESISTANT GLASS, TANTALUM COMPOUNDS, THESES (U)
IDENTIFIERS: SCANNING ELECTRON MICROSCOPES, TANTALUM OXIDE (U)

Effects on the etch rate of oxide films after irradiation with 10-to 20-keV electrons have been studied using the scanning electron microscope as a source of electrons. Five types of films were investigated: thermally grown SiO2, evaporated Al203, anodic Al203, anodic Ta205, and rf-sputtered Pyrex. Results verified the enhanced etch rate of SiO2 and showed a retarded etched rate for Al203 and Ta205; results of the investigation of Pyrex were inconclusive. The retardation of evaporated Al203 varied linearly with the accumulated surface charge density until saturation was reached at 2.0 C/sq cm. Evaporated Al203 exhibited a retardation factor of 1.51. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 833 283 9/1 20/12 13/8

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

AU-ZNTE SCHOTTKY BARRIER FABRICATION BY LOW-ENERGY ION ETCHING TECHNIQUES. (U)

DESCRIPTIVE NOTE: Master's thesis,
MAR 68 53P Mannex,Henry R. ;
REPT. NO. GE/EE/68-13

UNCLASSIFIED REPORT

DESCRIPTORS: (*CRYSTAL RECTIFIERS, ETCHING), SEMICONDUCTORS, MANUFACTURING, METAL FILMS, SPUTTERING, GOLD, GALLIUM ARSENIDES, SEMICONDUCTOR DIODES, BAND THEORY OF SOLIDS, SURFACES, THESES (U)
IDENTIFIERS: HETEROJUNCTIONS, ION ETCHING, SCHOTTKY BARRIER DEVICES, SCHOTTKY BARRIER DEVICES, SEMICONDUCTOR DIODES, ZINC TELLURIDES (U)

A new method for semiconductor surface preparation for fabrication of metal-semiconductor rectifying heterojunctions is proposed and junctions of gold on gallium arsenide and gold on zinc telluride have been analyzed. The barrier heights for Au-GaAs diodes fabricated by low-energy (100 eV) ion etching of GaAs surfaces immediately prior to metalization were found to be in excellent agreement with barriers height of diodes fabricated by vacuum cleaving techniques. The most probable value of barrier height for Au-ZnTe structures fabricated by the ion etching technique was determined to be 0.48 eV with a maximum deviation of 0.03 eV. (Author) (U)

AD- 829 039 13/8

GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

CHEMICAL MILLING HIGH-TEMPERATURE ALLOYS AND STEELS. (U)

DESCRIPTIVE NOTE: Final rept.,
JUN 61 60P Glenski,F. J. ;

UNCLASSIFIED REPORT

DESCRIPTORS: (*HEAT RESISTANT ALLOYS, *CHEMICAL MILLING), (*STEEL, CHEMICAL MILLING), TABLES(DATA), CHROMIUM ALLOYS, NICKEL ALLOYS, COBALT ALLOYS, MOLYBDENUM ALLOYS, TUNGSTEN ALLOYS, TEST METHODS, TITANIUM ALLOYS, ALUMINUM ALLOYS, IRON ALLOYS, NIOBIUM ALLOYS, ETCHING, (U)ETCHING (U)

A study of the etching characteristics of several stainless steels and high-temperature alloys was made using modified aqua regia etchants. Chemically milled samples were inspected, measured and results recorded. Photographs of typical chemically milled specimens are included. (Author) (U)

AD- 818 789 20/3 13/8

RAYTHEON CO WALTHAM MASS RESEARCH DIV

STUDY OF MICROWAVE GENERATION BY MEANS OF INTERACTION WITH ANISOTROPIC MEDIA. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 8, 1 Mar-31 May 67,
AUG 67 23P Osepchuk,John M. ;Simpson, James ;
REPT. NO. S-975
CONTRACT: DA-28-043-AMC-01314(E)
PROJ: DA-1E6-22001-A-055
TASK: 1E6-22001-A-055-04
MONITOR: ECOM 01314-8

UNCLASSIFIED REPORT

DESCRIPTORS: (*ANISOTROPY, *ELECTROMAGNETIC RADIATION), (*RADIOFREQUENCY, MATERIALS), MOLYBDENUM, STEEL, BRAZING, BORON COMPOUNDS, NITRIDES, ZIRCONIUM COMPOUNDS, ETCHING, COPPER, WETTING, ATTENUATION, CONFIGURATION, FEASIBILITY STUDIES, INTERACTIONS, FRAGMENTATION, NICKEL, GOLD, CHLORIDES, DEPOSITION, DIELECTRICS (U)

A layered anisotropic material is prepared by stacking molybdenum and steel and then etching the steel away. Experiments in the layering of zirconium diboride and boron nitride are continued. A new anisotropic sheath formed by scribing or etching bars in a thin zirconium diboride sheet is proposed. A slow-wave circuit employing an anisotropic sheet to simulate an interdigital line is analyzed. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 815 000 9/1

RADIO CORP OF AMERICA SOMERVILLE N J ELECTRONIC COMPONENTS AND DEVICES

300 C SEMICONDUCTOR FOR POWER DEVICES. (U)

DESCRIPTIVE NOTE: Interim technical rept. no. 3, 1 Jan-31 Mar 67,
MAY 67 39P Krassner,L. ;Enstrom,R. E.
;
CONTRACT: AF 33(615)-5352

UNCLASSIFIED REPORT

DESCRIPTORS: (*RECTIFIERS, SEMICONDUCTOR DEVICES), VOLTAGE, DEPOSITION, GALLIUM COMPOUNDS, ARSENIDES, CRYSTAL GROWTH, SEMICONDUCTOR DIODES, MANUFACTURING, EPITAXIAL GROWTH, COATINGS, CAPACITANCE, ETCHING, SUBSTRATES (U)

During the period covering this report, vapor-phase, epitaxial p-n junctions were grown in gallium arsenide, and the effects of several parameters, including temperature and substrate condition on the junction quality, were studied. Microplasmas still limit the breakdown of large-area diodes (0.100-inch diameter) but for diodes of smaller size (0.030-inch diameter) the breakdown is now limited only by material purity. Improved procedures for etching gallium-arsenide junctions were developed so that the breakdown determined by the material parameters can be measured with surface conditions having a minimum effect. The preservation of such stable surfaces over long periods was not achieved completely, however. Techniques for package mounting diodes, were partly developed, permitting some forward-bias measurements. In addition, some analysis of junction profiles through capacitance-voltage plate was made. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 809 337 7/4 9/5

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER.

PHOTOMETALLIC PROCESS INVESTIGATION. (U)

DESCRIPTIVE NOTE: Final development rept. 1 Dec 65-30 Nov 66.
JAN 67 52P Schaefer,Donald L. ;
REPT. NO. S-67-1007
CONTRACT: NObsr-95045

UNCLASSIFIED REPORT

DESCRIPTORS: (*MICROELECTRONICS, *CIRCUITS), (*PHOTOCHEMICAL REACTIONS, *DECOMPOSITION), METAL FILMS, PHOTOENGRAVING, ETCHING, SILICON DIOXIDE, FILMS, GOLD, ALUMINUM, NICKEL, CHROMIUM, HALOGENS, POLYMERS, REACTION KINETICS, CARBINOLS, SOLVENTS, STYRENE PLASTICS, SENSITIVITY (U)
IDENTIFIERS: THIN FILMS, THIN FILM ELECTRONICS (U)

IAC ACCESSION NUMBER: PL-010349
IAC DOCUMENT TYPE: PLASTC -HARD COPY--

This is the Final Technical Report of a twelve month program to investigate and develop the Photometallic Process. The broad objective of the program was the fabrication of microelectronic circuits in thin films of gold, nichrome, aluminum and silicon dioxide by a process in which these materials are directly etched by a photosensitive material according to an incident light pattern. A balanced program of basic investigation and application orientation experimentation has resulted in photosensitive polymer films that etch the thin film in a pattern corresponding to the areas exposed to activating radiation. This investigational program has been advanced to the point where 30 to 50 lines per millimeter resolution has been obtained even at this early stage of process development. A preferred etching system for gold in N,N-dibromodimethyldantoin dissolved in an alcohol soluble butyrate polymer with methanol as a system solvent. Nichrome can be etched with the same system but if ferric chloride is used as the photosensitive material, the system etches nichrome selectively and not gold.

(U)

AD- 804 296 13/8

JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB

ADVANCEMENTS IN SPACE FLIGHT HARDWARE THROUGH CHEMICAL MILLING. (U)

DESCRIPTIVE NOTE: Technical memo.,
SEP 66 31P Hicks,Robert E. ;
REPT. NO. TG-858
CONTRACT: NOw62-0604

UNCLASSIFIED REPORT

DESCRIPTORS: (*CHEMICAL MILLING, ETCHING), REDUCTION, WEIGHT, HARDNESS, THICKNESS, METALS, STRESSES, BRITTLENESS, PHYSICAL PROPERTIES, SILICON, PLATING, MACHINING (U)

IAC ACCESSION NUMBER: MCIC-071287
IAC DOCUMENT TYPE: MCIC -HARD COPY--

The art of chemical metal removal is by no means new. It has been used by photoengravers for decades in the preparation of printing and engraving plates. This technique has also been used in the fabrication of decorative metalwork and nameplates. The latest innovation is the processing of the etched printed circuit; however, only within recent years has the potential of chemical metal removal been recognized. In spite of the tremendous advantages the process has to offer, its use has been limited to only a few applications; but as the equipment and know-how are becoming more readily available, the use of chemical milling as a production metal removal process is now taking its place as a specialized metalworking process. With the demands for special hardware in satellite and other space applications steadily increasing, designers find they can satisfy many of these demands with the aid of chemical milling. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 803 613 11/6

AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO

INVESTIGATION OF SINGLE-CRYSTAL DIMOLYBDENUM CARBIDE. (U)

DESCRIPTIVE NOTE: Technical documentary rept. Oct 63-Feb 66,
AUG 66 168P Vahldiek,Fred W. ;Mersol, Stanley A. ;Lynch,Charles T. ;
REPT. NO. AFML-TR-66-268
PROJ: AF-7350
TASK: 735001

UNCLASSIFIED REPORT

DESCRIPTORS: (*SINGLE CRYSTALS, *CARBIDES), (*MOLYBDENUM COMPOUNDS, CARBIDES), CRYSTAL SUBSTRUCTURE, CRYSTAL GROWTH, ELECTRON MICROSCOPY, ETCHING, ELECTRON DIFFRACTION, MICROSTRUCTURE, ANNEALING, SPECTRUM ANALYZERS, EMISSIVITY, HARDNESS, CRYSTAL DEFECTS, TEMPERATURE, DEFECTS(MATERIALS), OPTICAL EQUIPMENT, CHEMICAL ANALYSIS, ELASTIC PROPERTIES, ELECTRICAL RESISTANCE, TWINNING(CRYSTALLOGRAPHY), BONDING (U)

A veining substructure was observed on all planes of the as-grown Mo2C crystals, using optical and electron microscopy. Effects of annealing on the Mo2C matrix and the veining substructure at temperatures ranging from 1600 to 2200 C were studied. Certain phase relationships in these crystals were determined, using a combination of chemical, x-ray, emission spectrographic, electron diffraction, and electron microprobe analyses. Dislocation etch pits brought out on Mo2C crystals by etching were studied relative to the Mo2C structure and phase relationships found at various temperatures. Anisotropy in room temperature microhardness, elastic modulus, electrical resistivity, and Debye temperature was determined. Effects of annealing on microhardness were also studied. It was established that slip and twinning are produced by microhardness identations at room temperature. The primary slip and twin systems for Mo2C were determined. Bonding mechanism in Mo2C is discussed and certain comparisons are made with polycrystalline Mo2C and MoC. (Author) (U)

AD- 802 516 9/2

STANFORD RESEARCH INST MENLO PARK CALIF

HIGH-INFORMATION-DENSITY STORAGE SURFACES. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 5, 1 Apr-30 Jun 66,
OCT 66 39P Rogers,K. T. ;Cogswell,D. L. ;
CONTRACT: DA-28-043-AMC-01261(E)
PROJ: DA-1P6-22001-A-055, SRI-5444
TASK: 1P6-22001-A-055-03
MONITOR: ECOM 01261-5

UNCLASSIFIED REPORT

DESCRIPTORS: (*MEMORY DEVICES, *ELECTRON BEAMS), (*ELECTRON MICROSCOPY, FIELD EMISSION), (*MICROELECTRONICS, FEASIBILITY STUDIES), HYDROGEN COMPOUNDS, MOSAICS(LIGHT SENSITIVE), METALS, DIELECTRIC FILMS, PROBES(ELECTROMAGNETIC), DATA PROCESSING, RESOLUTION, ELECTRON BEAMS, ELECTRON OPTICS, SCANNING, INTERFERENCE, MAGNETIC FIELDS, CHLORIDES, SAPPHIRE, SUBSTRATES, MOLYBDENUM, FILMS, CAPACITORS, ELECTRON MULTIPLIERS, MASKING, STYRENE PLASTICS, ETCHING, OXYGEN (U)
IDENTIFIERS: HYDROGEN CHLORIDE, THIN FILMS, THIN FILM ELECTRONICS (U)

This report discusses contrast measurements taken with an unbakeable field-emitter scanning electron microscope on targets consisting of metal-dielectric-metal film sandwiches on substrates, with small holes through the first two layers. Synchronous lock-in amplification is shown to override stray electron noise, permitting the detection of target holes. Variations of secondary electron contrast with sandwich potential and electron multiplier bias are presented. Effects of electron polymerization contamination, ambient ac magnetic fields, and stray electron noise on the performance of this instrument are described. The conversion of a small, relatively inexpensive commercial electron microscope into an electron probe, for use in producing regular arrays of storage elements, is described, and the first results on resist exposure and development are presented. Related work on molybdenum etching with mixtures of O2 and HCl, and on bombardment-induced-conductivity measurements are discussed (U)

AD- 801 736 9/5 17/9

TEXAS INSTRUMENTS INC DALLAS SEMICONDUCTOR-COMPONENTS DIV

INTEGRATED CIRCUITS FOR PORTABLE RADAR EQUIPMENT. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 1, 1 Mar-31 Mar 66,
OCT 66 52P Teague,E. Clayton ;Watelski, Stacy B. ;
REPT. NO. TI-03-66-81
CONTRACT: DA-28-043-AMC-02029(E)
PROJ: DA-1E6-22001-A-440
TASK: 03
MONITOR: ECOM 02029-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*INTEGRATED CIRCUITS, *GERMANIUM), (*TRANSISTORS, *MANUFACTURING), DEPOSITION, GALLIUM ALLOYS, ARSENIC ALLOYS, SUBSTRATES, EPITAXIAL GROWTH, ELECTRIC INSULATION, DOPING, CHROMIUM, ELECTRICAL PROPERTIES, DIFFUSION, CHLORIDES, GERMANIUM COMPOUNDS, HYDRIDES, DECOMPOSITION, ETCHING, IMPURITIES (U)

The program objective is to deposit germanium islands suitable for fabricating high frequency germanium transistors, while maintaining the isolation characteristics of the semi-insulating gallium arsenide. A theoretical description of the mechanism by which chromium doping achieves semi-insulating GaAs, a summary of crystal growth and slice processing techniques, and studies related to the thermal stability of the resulting GaAs is presented. Pertinent physical and electrical properties of the Ge-GaAs system have been compiled. A worst-case calculation shows that the effect of Ge diffusing into GaAs should place little or no restriction upon possible integrated circuit structures. Various process parameters of epitaxial growth by germanium tetrachloride reduction and germanium hydride pyrolysis which affect epitaxial layer quality have been investigated. Those studied during this quarter's work include: Substrate orientation. Substrate crystalline perfection and surface cleanliness. Methods of in situ vapor etching GaAs. Deposition rate and temperature. Halide and hydride concentration. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 801 472 11/6 20/2

NEW YORK UNIV N Y RESEARCH DIV

A STUDY OF THE CRYSTAL STRUCTURE OF TI-AL ALLOYS AND HYDROGEN INDUCED EXPANSIONS. (U)

DESCRIPTIVE NOTE: Final rept. 1 Jan 64-30 Sep 65,
SEP 66 91P Portisch,H. ;Margolin,H. ;
CONTRACT: DA-ARO(D)-31-124-G519
PROJ: DA-20010501B700, AROD-2513
MONITOR: AROD 2513:1

UNCLASSIFIED REPORT

DESCRIPTORS: (*TITANIUM ALLOYS, ALUMINUM ALLOYS), CRYSTAL STRUCTURE, SINGLE CRYSTALS, HYDROGEN, MICROSTRUCTURE, X RAY DIFFRACTION, TEMPERATURE, ETCHED CRYSTALS, ETCHING, DENSITY, HEAT TREATMENT (U)

The structure of a Ti-Al phase reported on gamma Ti3Al has been found by single crystal x-ray studies to be alpha Ti with superlattice spots of Ti3Al. A surface expansion, found to occur after etching alloys containing 9.5-12.5 wt% Al, occurs as a result of hydrogen picked up by etching. It is proposed that hydrogen initially enters octahedral sites of Ti3Al coherent with alpha Ti and later shifts to the tetrahedral sites. It is postulated that expansion occurs when the hydrogen enters the tetrahedral sites. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 783 086 11/2

RENSSELAER POLYTECHNIC INST TROY N Y MATERIALS DIV

Fracture Strength of Soda-Lime Glass after Etching. (U)

DESCRIPTIVE NOTE: Technical rept.,
JUN 74 26P Doremus,Robert H. ;
Pavelchek,Edward K. ;
CONTRACT: N00014-67-A-0117-0014
PROJ: NR-023-531

UNCLASSIFIED REPORT

DESCRIPTORS: *Alkali glass, *Fracture(Mechanics), Etching, Cryogenics, Crack propagation (U)

IAC ACCESSION NUMBER: MCIC-090025
IAC DOCUMENT TYPE: MCIC -HARD COPY--
The strength of soda-lime glass at liquid nitrogen temperature after various amounts of etching was measured. A median crack length of 6 micrometers was calculated from the results and a model of the etching process. It was found that the rate of etching at the crack tip was much lower than on the external surface. Measured distributions of strength for samples etched different depths were also in reasonable agreement with calculated distributions. The etching process itself was found to cause some weakening of the glass. (Author) (U)

IAC SUBJECT TERMS: M--(U)SODA-LIME GLASS, ETCHING, LIQUID NITROGEN TEMPERATURE FRACTURE STRENGTH.;

AD- 782 980 9/1

TORONTO UNIV (ONTARIO) DEPT OF ELECTRICAL ENGINEERING

Moat-Etched Two-Phase Charge-Coupled Devices, (U)

AUG 73 9P Gelberger,P. P. ;Salama,C. A. T. ;

UNCLASSIFIED REPORT

Availability: Pub. in Solid-State Electronics, v17 p301-305 1974.
SUPPLEMENTARY NOTE: Revision of report dated 18 Jun 73.
DESCRIPTORS: *Charge coupled devices, Fabrication, Etching, Silicon, Silicon dioxide, Metal oxide semiconductors, Canada (U)

A novel technique for fabricating two-phase charge-coupled devices is described. The structure requires only thermally grown SiO2 and makes use of moats etched into the silicon which in conjunction with a single layer metallization achieve small interelectrode spacings and directionality of charge transport. The feasibility of the technique is demonstrated experimentally. The devices fabricated were successfully operated as both digital and analog shift registers. The method described offers certain advantages in ease of fabrication and reliability along with the capability for high speed operation. (Author) (U)

AD- 781 831 9/5 13/8

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

A Study of the Etching Characteristics of Semiconductor Materials in RF Plasmas. (U)

DESCRIPTIVE NOTE: Master's thesis,
JUN 74 77P Shy,James Dale ;
REPT. NO. GE/EE/74-35

UNCLASSIFIED REPORT

DESCRIPTORS: *Etching, *Semiconductors, *Microcircuits, Plasmas(Physics), Gases, Glass, Silicon nitrides, Silicon dioxide, Silicon, Microelectronics, Wafers, Fabrication, Theses (U)

An experimental study was made on the use of plasma etching machines to etch semiconductor materials used in microcircuit fabrication processes. Plasmas were used to etch a number of materials to include phosphosilicate glass, silicon nitride, chemically vapor deposited silicon dioxide, epitaxially deposited silicon dioxide, and silicon. Etching characteristics of these materials were obtained in a variety of operating conditions ranging from variations of power from 0 to 400 watts, pressure from 0 to 0.50 torr, and gas flow from 0 to 500 cc per minute. The etching technique was then used to etch circuit wafers which were developed into microcircuits. Results demonstrated that the plasma etching process could be used in place of chemical etchants. Yield of usable devices from the circuit wafers varied from 10% to 70% per wafer; however, no damage was attributed to the plasma etching process. A limited investigation into the etching of multiple passivation layers was conducted but was not completed. (Modified author abstract) (U)

AD- 777 000 19/1

NATIONAL MATERIALS ADVISORY BOARD (NAS-NAE) WASHINGTON D C

Alternate Production Processes for Fuze Pinions. (U)

DESCRIPTIVE NOTE: Final rept.
JAN 74 65P
REPT. NO. NMAB-311
CONTRACT: DAAA25-73-C-0316

UNCLASSIFIED REPORT

DESCRIPTORS: *Projectile fuzes, *Gears, Production, Processing, Casting, Moldings, Powder metallurgy, Etching, Chemicals, Diffusion bonding, Fuzes(Ordnance) (U)
IDENTIFIERS: *Pinions (U)

A study was conducted of possible methods for producing small pinions that would not involve use of imported machinery or scarce skills. Four methods were identified: zinc die casting, plastic molding, powder compaction, and chemical etching/ diffusion bonding. All processes are probably economically competitive, but each has some limitations, which are outlined. Additional recommendations of a more general nature are included. (Author) (U)

AD- 775 466 11/6 14/2

GENERAL DYNAMICS FORT WORTH TEX CONVAIR AEROSPACE DIV

Nondestructive Testing Techniques for Diffusion Bonded Titanium Structures. (U)

DESCRIPTIVE NOTE: Final rept. 1 Dec 72-1 Oct 73, DEC 73 130P Regalbuto,John A. ;
CONTRACT: DAAG46-73-C-0067
PROJ: DA-1728041
MONITOR: GIDEP,GIDEP E043-2093,556.45.30.00-EO-01

UNCLASSIFIED REPORT

DESCRIPTORS: *Titanium alloys, *Nondestructive testing, *Diffusion bonding, Aluminum alloys, Vanadium alloys, Ultrasonic tests, X rays, Etching, Fractography, Defects(Materials), Fatigue(Mechanics) (U)
IDENTIFIERS: Titanium alloy 6Al 4V (U)

IAC ACCESSION NUMBER: NT-013800
IAC DOCUMENT TYPE: NTIAC -HARD COPY--
This report describes the establishment of nondestructive testing techniques for diffusion bonded structures fabricated from Ti-6Al-4V sheet and forgings. Ultrasonic shear waves, radio frequency and signal-averaged pulse-echo techniques, x-ray, fluorescent penetrant, and blue-etch-anodize were used to inspect a series of diffusion bonded defect specimens. Analysis of NDT, mechanical property, and fractographic data indicated that shear wave inspection of the sheet material could be correlated with the observed decrease in fatigue life with deflect concentration. Shear strength of the sheet specimens was not affected by the presence of the internal defects to any measurable degree. Grain structure noise limited inspectability of the small (0.006-in. dia.) defects in the diffusion bonded forging. (Author) (U)

IAC SUBJECT TERMS: N--(U)TITANIUM, ALLOYS, DIFFUSION, BONDING, ULTRASONIC TESTING, STRUCTURES, SHEAR WAVES, RADIOFREQUENCY, PULSE ECHO TECHNIQUE, X RAYS, PENETRANTS, FLUORESCENCE, ETCHING;

AD- 773 296 9/1

TORONTO UNIV (ONTARIO) DEPT OF ELECTRICAL ENGINEERING

V Groove M.O.S. Transistor Technology, (U)

AUG 73 3P Holmes,F. E. ;Salama,C. A. T. ;

UNCLASSIFIED REPORT

Availability: Pub. in the Electronics Letters, v9 n19 p1-2, 20 Sep 73.

DESCRIPTORS: *Field effect transistors, *Transistors, *Integrated circuits, Metal oxide semiconductors, Fabrication, Silicon, Etching, Masking, Semiconductors, Canada (U)

IDENTIFIERS: *Metal oxide transistors (U)

An metal oxide semiconductor transistor structure in which the channel is defined by preferential etching of the silicon is described. The fabrication technology involves either a 3- or 4-mask process, and results in very-short-channel devices, using noncritical alignment tolerances. Experimental results obtained on the fabricated devices are presented, and possible uses of the technology are described. (Author) (U)

AD- 772 617 11/6 20/2

ILLINOIS UNIV URBANA DEPT OF METALLURGY AND MINING ENGINEERING

Dislocation Etch Pitting in High-Purity Niobium. (U)

DESCRIPTIVE NOTE: Technical rept., DEC 73 11P Walson,R. P. ;Birnbaum,H. K. ;

CONTRACT: N00014-67-A-0305-0020

UNCLASSIFIED REPORT

DESCRIPTORS: *Niobium, *Etching, *Dislocations, Microstructure (U)

A technique for etch-pitting screw and mixed dislocations in high purity niobium is described. (U)

AD- 772 045 11/6

GEORGIA INST OF TECH ATLANTA SCHOOL OF CHEMICAL ENGINEERING

Thermal Etching of Beta Ti-V Alloys, (U)

72 11P Ling,Fu-Wen ;Starke,E. A. , Jr;
REPT. NO. TR-74-1
CONTRACT: N00014-67-A-0159-0015
PROJ: NR-031-750

UNCLASSIFIED REPORT

Availability: Pub. in Metallography, v5 p399-407 1972.
DESCRIPTORS: *Titanium alloys, *Vanadium alloys, *Etching, Heat, Microstructure, Dislocations, Surfaces, Orientation(Direction) (U)

The paper describes the thermal etching of beta-Ti-V alloys by annealing in vacuum at 900C. The thermal-etch pits and facets are correlated with dislocations. Using crystals of known orientation it has been determined that the facets consist of either (100), (110), or (112) planes and that the morphology of the pits depends on the surface orientation. (Author) (U)

AD- 769 857 20/2

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Fabrication Procedure for Silicon Membrane X-Ray Lithography Masks. (U)

DESCRIPTIVE NOTE: Technical note,
SEP 73 14P Cohen,Ronald A. ;Mountain, Robert W. ;Smith,Henry I. ;Lemma,Muriel A. ;Spears,David L. ;
REPT. NO. TN-1973-38
CONTRACT: F19628-73-C-0002
PROJ: DA-7-X-263304-D-215
MONITOR: ESD TR-73-248

UNCLASSIFIED REPORT

DESCRIPTORS: (*X ray diffraction, *Masking), (*Wafers, X ray diffraction), Silicon, Membranes, Etching, Boron, Fabrication (U)

A step-by-step procedure for the fabrication of silicon membrane x-ray lithography masks is described. The procedure involves the diffusion of boron into the polished face of an n-type <100> silicon wafer, the formation of gold absorber patterns on the boron diffused face, and the selective etching of the n-type silicon so as to produce thin membranes (2 to 5 microns thick) of silicon supporting the absorber patterns. (Author) (U)

AD- 769 129 11/6 20/12

ILLINOIS UNIV URBANA DEPT OF METALLURGY AND MINING ENGINEERING

Dislocation Velocity Measurements in High Purity Niobium. (U)

DESCRIPTIVE NOTE: Technical rept., OCT 73 140P Walson,Robert P. ;Birnbaum, Howard K. ;
CONTRACT: N00014-67-A-0305-0020

UNCLASSIFIED REPORT

DESCRIPTORS: (*Niobium, *Dislocations), Plastic deformation, Etching, Stresses, Low temperature, Single crystals, Velocity, Theses (U)

IAC ACCESSION NUMBER: MCIC-088360
IAC DOCUMENT TYPE: MCIC -HARD COPY--

The velocity of screw dislocations on (211) planes, mixed dislocations on (101) planes, and mixed dislocations on (211) planes has been investigated microscopically in ultra-high purity niobium single crystals using Berg-Barrett X-ray topographs and chemical etching techniques. The Berg-Barrett X-ray topographic technique was found to be unsatisfactory for resolving individual dislocations or slip lines in the niobium used in this investigation. Chemical etching on the other hand produced satisfactory results and allowed the study of individual dislocations. An asymmetry of the velocity of screw dislocations on (211) planes was observed between a state of compression and a state of tension at room temperature. The screw and mixed dislocation velocities could be described by a power law dependence on stress. (Modified author abstract) (U)

IAC SUBJECT TERMS: M--(U)UNALLOYED COLUMBIUM, TWINNING, COMPRESSIVE STRESSES, DISLOCATIONS, VELOCITY, SLIP, SHEAR STRESS, X-RAY ANALYSIS, TENSILE YIELD STRENGTH, LOW TEMPERATURES, LITERATURE SURVEY.;

AD- 768 855 9/5 13/8

MARTIN MARIETTA AEROSPACE ORLANDO FLA

Manufacturing Methods and Technology Study Covering Methods for Manufacturing Electronic Modules. Manufacturing Methods for Electronic Modules. (U)

DESCRIPTIVE NOTE: Final rept. Mar 72-Jan 73, JAN 73 561P Pfeil,William H. ;Tantaglia, Frederick E. ;
REPT. NO. OR-12332
CONTRACT: DAAH03-71-C-0006
MONITOR: ILS 4-72

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-768 854 and AD-768 856.
DESCRIPTORS: (*MODULES(ELECTRONICS), MANUFACTURING), PRINTED CIRCUITS, DESIGN, PLATING, CLEANING, MACHINING, DRILLING, ETCHING, COATINGS, SOLDERING, ASSEMBLY, INSTRUCTION MANUALS, AUTOMATION, PRODUCTION CONTROL, GUIDED MISSILE COMPONENTS (U)

A process and workmanship manual for use in the manufacture of missile electronic modules was prepared, using an industry producer-user survey for state-of-the-art processes, materials, and equipment. The areas of manufacturing technology covered by this manual include cleaning, drilling, resist coating, etching, plating, assembling, soldering, and conformal coating. The information depicted in each area of technology covered includes materials, equipment, procedures, rework, in-production testing, and production checkpoints. Also, workmanship bulletins presented as Do's and Don'ts covering procedures, equipment, and processing materials are presented for each area of technology. (Author) (U)

AD- 768 058 11/6

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

Effect of Alloying Components on the Hydrogen Absorption of Titanium Alloys during Etching, (U)

SEP 73 10P Usova,V. V. ;Modestova,V. N. ;Tomashov,N. D. ;
REPT. NO. FTD-HT-23-152-74
PROJ: FTD-60107, FTD-T74-01-10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited trans. of mono. Novyi Konstruktsionny Material-Titan, n.p., 1972 p170-174, by Paul J. Reiff.
DESCRIPTORS: (*TITANIUM ALLOYS, *ETCHING), (*HYDROGEN, TITANIUM ALLOYS), ABSORPTION, HYDROCHLORIC ACID, SULFURIC ACID, FLUORINE COMPOUNDS, ACIDS, DIFFUSION, USSR (U)
IDENTIFIERS: TRANSLATIONS, HYDROFLUORIC ACID (U)

IAC ACCESSION NUMBER: MCIC-088663
IAC DOCUMENT TYPE: MCIC -HARD COPY--
The paper discusses etching titanium and alloys of the Ti-Al system in solutions containing hydrochloric and sulphuric acid and in solutions containing hydrofluoric acid. Hydrogen absorption is established with respect to time. The presence of aluminum in titanium reduced its hydrogen absorption. Alloys with additional elements were found to have less hydrogen absorption than have binary alloys. (U)

IAC SUBJECT TERMS: M--(U)VT15, TITANIUM ALLOYS, ALUMINUM ADDITION, MOLYBDENUM ADDITION, CHROMIUM ADDITION, VT1, SULFURIC ACID, ETCHING, HYDROFLUORIC ACID, HCL, WATER, ABSORPTION, CORROSION, HYDROGEN ENVIRONMENT.;

AD- 762 767 7/4 11/2

RENSSELAER POLYTECHNIC INST TROY N Y MATERIALS DIV

The Rate of Dissolution of Amorphous Silica in Water. Inaccessibility of Crack Tips in Glass. (U)

DESCRIPTIVE NOTE: Technical rept.,
JUN 73 43P Doremus,Robert H. ;Alim-Marvasti,F. ;Pavelchek,Edward K. ;Doremus, Robert H. ;
CONTRACT: N00014-67-A-0117-0014
PROJ: NR-032-531

UNCLASSIFIED REPORT

DESCRIPTORS: (*SILICON DIOXIDE, SOLUBILITY), (*GLASS, CRACKS), WATER, PH FACTOR, TEMPERATURE, ETCHING (U)
IDENTIFIERS: *ALKALI GLASS, SODA LIME GLASS, *DISSOLVING (U)

The report discusses two research projects. In the first, the rate of dissolution of finely divided amorphous silica in water was determined by molybdate analysis of the dissolved monomeric silicic acid. Effects of pH, temperature, addition of salt, and stirring were studied. It was concluded from the results and those of earlier investigators that the dissolution rate was not controlled by a simple reaction of silica with water at the silica surface. The second report discusses the strengthening of soda-lime glass which results when it is etched with hydrofluoric acid. It was found much smaller than expected for etching of the crack tip. Thus little or no etchant reaches the tip, and perhaps it is protected from the surroundings by a layer of hydrated glass. Etching experiments indicate that the etching acid does penetrate part way down the crack, giving rounded pits and lines on the glass surface. (Modified author abstract) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 759 259 20/12 20/2

AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS

Coordination Chemistry and Kinetics of Preferential Etching on Surfaces of TiO2 (Rutile). (U)

DESCRIPTIVE NOTE: Technical rept., APR 73 33P Fleischauer,Paul D. ;Chase, Armond B. ;
REPT. NO. TR-0073(9250-05)-1
CONTRACT: F04701-72-C-0073
MONITOR: SAMSO TR-73-148

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, ETCHING), (*RUTILE, ETCHING), SINGLE CRYSTALS, TITANIUM COMPOUNDS, DIOXIDES, PHOTOCHEMICAL REACTIONS, POLISHES, CHEMICAL REACTIONS(U)
IDENTIFIERS: TITANIUM(IV) OXIDE (U)

Three different types of etch pits were observed on the (001) surfaces of rutile after etching in a KHSO4 flux at temperatures between 400 and 550C. A chemical reaction scheme is presented, which along with a consideration of the surface chemistry of the various crystallographic faces, is used to explain the kinetics of dissolution of the substrate and hence the observed shapes of the etch pits. Etching of a defect is enhanced in surface regions where silver is photochemically deposited and removed prior to the etching. This phenomenon is explained in terms of a hole (or electron) trapping mechanism at a crystal defect. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 758 934 20/1 9/1 13/8

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

Ion Beam Etching of Reflective Array Filters. (U)

DESCRIPTIVE NOTE: Meeting speech, 72 5P Smith,Henry I. ;Williamson, Richard C. ;Brogan,William T. ;
REPT. NO. MS-3413
CONTRACT: F19628-73-C-0002
MONITOR: ESD TR-72-370

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of the Ultrasonics Symposium (1972), Boston, p4-7 Oct 72.
DESCRIPTORS: (*ACOUSTIC FILTERS, *ETCHING), (*ULTRASONIC RADIATION, ACOUSTIC FILTERS), SURFACES, ION BEAMS, SUBSTRATES, ARGON, LITHIUM COMPOUNDS, NIOBATES, MASKI (U)
IDENTIFIERS: LITHIUM NIOBATES, *ACOUSTIC WAVES, *SURFACE WAVES, PHOTORESIST TECHNIQUES, PHOTORESISTORS, SIGNAL PROCESSING, GRATINGS(SPECTRA), SURFACE WAVES (U)

The use of a neutralized argon ion beam to sputter etch surface wave reflection gratings is described. Linewidths as small as 0.3 micrometer, edge definitions of about 0.1 micrometer, and depths as great as 5 micrometers have been achieved. Scanning electron micrographs are used to show the dependence of groove structure on etching parameters. In some cases, the amplitude of the time domain response of filters was varied by varying the groove depth as a function of position in the grating. This was done by placing a fixed aperture in the beam and programming the rate at which a substrate was pulled past it. This weighting technique and the resulting performance of several types of filters is described. (Author) (U)

AD- 758 762 9/1 13/8

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS

Fabrication of Elastic Surface Devices by Chemical Etching. (U)

DESCRIPTIVE NOTE: Physical sciences research papers, DEC 72 24P Kearns,William J. ;Silva, Jose H. ;
REPT. NO. AFCRL-72-0731, AFCRL-PSRP-518
PROJ: AF-5573
TASK: 557307

UNCLASSIFIED REPORT

DESCRIPTORS: (*TRANSDUCERS, MANUFACTURING), (*DELAY LINES, MANUFACTURING), PHOTOENGRAVING, ETCHING, LITHOGRAPHY, MICROPHOTOGRAPHY (U)
IDENTIFIERS: ACOUSTICS, MICROWAVES, ACOUSTIC WAVES, SURFACE WAVES, ACOUSTIC DELAY LINES, INTERDIGITAL TRANSDUCERS, SURFACE WAVES (U)

The fabrication of elastic surface-wave encoders and decoders for use in secure, antijam command, control, and communications systems is described. The processes consist of substrate cleaning, vacuum evaporation of thin aluminum films, photolithography, and chemical etching. Using these techniques, surface-wave interdigital transducer gratings have been fabricated with linewidths as small as 1.5 micrometer. A discussion of the factors affecting the yield of these devices is included. (Author) (U)

AD- 757 878 9/1 13/8

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

RF Sputter Etching of Al, SiO2, and Photoresist. (U)

DESCRIPTIVE NOTE: Master's thesis, DEC 72 129P Wilkinson,Kenneth D. ;
REPT. NO. GE/EE/73-23

UNCLASSIFIED REPORT

DESCRIPTORS: (*SILICON DIOXIDE, ETCHING), (*ALUMINUM, ETCHING), (*SEMICONDUCTOR DIODES, MANUFACTURING), PHOTOENGRAVING, SPUTTERING, ION BOMBARDMENT, FEASIBILITY STUDIES, THESES (U)
IDENTIFIERS: ARGON, PLASMAS(PHYSICS), PHOTORESIST TECHNIQUES, SCHOTTKY BARRIER DEVICES, SEMICONDUCTOR DIODES (U)

The procedures followed to determine the feasibility of using an rf-generated argon plasma to sputter etch windows through 8000 A of SiO2 are described in this thesis. The sputtered windows will be used to fabricate Schottky diodes and interconnections for multilayer devices. The rf sputter etch rate for Al, SiO2 and Waycoat photoresist was investigated at various self-bias voltages and longitudinal magnetic fields. All experiments were carried out at 27.12 MHz and 10 mTorr argon pressure. (Author Modified Abstract) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 756 250 20/12 9/1

INTERNATIONAL BUSINESS MACHINES CORP HOPEWELL JUNCTION N Y EAST FISHKILL LAB

Damage Profiles in Silicon and their Impact on Device Reliability. (U)

DESCRIPTIVE NOTE: Technical rept. 6 Jun-30 Dec 72,
JAN 73 31P Schwuttke,Guenter H. ;
REPT. NO. TR-1
CONTRACT: DAHC15-72-C-0274, ARPA Order-2196

UNCLASSIFIED REPORT

DESCRIPTORS: (*SILICON, DEFECTS(MATERIALS)), (*CAPACITORS, RELIABILITY(ELECTRONICS)), SEMICONDUCTOR DEVICES, ELECTRICAL PROPERTIES, TRANSIENTS, ETCHING, ELECTRON MICROSCOPY, THIN FILM STORAGE DEVICES (U)
IDENTIFIERS: METAL OXIDE SEMICONDUCTORS, TRANSMISSION ELECTRON MICROSCOPY (U)

Standard silicon wafers are shown to frequently contain residual mechanical saw damage in the surface. The damage is identified through transmission electron microscopy (TEM) as microsplits of the silicon lattice. Microsplits are not detectable by standard inspection, screening or etching techniques. Microsplit dimensions range from 0.1 to 10 micrometer. The density of the splits can vary from zero to 10 to the 6th power/sq cm or even higher. Microsplits are shown to cause loss of storage time in MOS capacitors. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 754 762 14/2

MONSANTO RESEARCH CORP ST LOUIS MO

An Experimental Technique for Monitoring Dynamic Cracks, (U)

OCT 72 21P Lavengood,R. E. ;Peretz,D. ;Brissey,F. L. ;Wu,E. M. ;
REPT. NO. HPC-70-126
CONTRACT: N00014-67-C-0218, ARPA Order-876
PROJ: NR-356-484

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Report on Monsanto/Washington Univ., ONR/ARPA Association project development of High Performance Composites.
DESCRIPTORS: (*MONITORS, *CRACK PROPAGATION), CRACKS, MEASURING INSTRUMENTS, METAL FILMS, COPPER, ETCHING (U)

A technique is presented which, by means of plating and etching processes, permits the creation of a wide variety of crack propagation gages. High precision gages of arbitrary size and shape are easily prepared. Specific gage configuration are shown for center notch, edge notch and cleavage type specimens. Optimum gage design is discussed and typical readout circuits are shown. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 753 918 20/12 20/5

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

Interaction of Semiconductor Materials with Laser Radiation at 10.6 Micrometers. (U)

DESCRIPTIVE NOTE: Research and development technical rept.,
DEC 72 41P Bates,R. D. , Jr.;Cook, C. F. , Jr.;Shapiro,J. R. ;Rohde,R. S. ;Mahoney,J. P. ;
REPT. NO. ECOM-4059
PROJ: DA-1-T-061102-B-11-A
TASK: 1-T-061102-B-11-A-01

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, DAMAGE), (*SILICON, DAMAGE), INFRARED LASERS, GAS LASERS, COHERENT RADIATION, ETCHING, ELECTRON MICROSCOPY, THERMAL STABILITY, (U)THERMAL STABILITY (U)
IDENTIFIERS: *LASER BEAMS, CARBON DIOXIDE LASERS, THERMAL DEGRADATION (U)

IAC ACCESSION NUMBER: MCIC-084992 GC-730337
IAC DOCUMENT TYPE: MCIC -HARD COPY-- GACIAC -HARD COPY--

Initial experiments characterizing the nature and mechanisms of electronic materials failure when irradiated by CW 10.6 micrometer CO2 laser light have been performed. The selective application of such techniques as optical microscopy, scanning electron microscopy, electron microprobe analysis, x-ray crystallography, spin resonance spectroscopy, and infrared spectroscopy provides a specialized facility for the detailed characterization of the nature of the damage state and the paths which lead to this state. Preliminary results on the changes induced in silicon samples show five distinct phases: (1) thermal etching; (2) stress relief through formation of slip traces and cracks; (3) peak formation; (4) melting; and (5) abrupt surface modification. These detailed results are unique in the study of 10.6 micrometer laser irradiation of semiconductor materials. The nature of these mechanisms and the possible means of component immunization are discussed.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 750 517 11/3 13/9

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

Plasma Babbitt Surfacing of the Steel Base of Bearings, (U)

AUG 72 8P Bruk,M. V. ;Khmelevskaya, V. B. ;
REPT. NO. FTD-HC-23-0882-72
PROJ: AF-7343

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Unedited rough draft trans. of Institut Vodnogo Transporta, Leningrad. Trudy (USSR) n126 p49-52 1971.
DESCRIPTORS: (*METAL COATINGS, *ELECTRODEPOSITION), (*BEARINGS, METAL COATINGS), CLEANING, ETCHING, ION BOMBARDMENT, ALLOYS, FINISHES, USSR (U)
IDENTIFIERS: *ARC SPRAYING, BEARING ALLOYS, *PLASMA SPRAYING, TRANSLATIONS (U)

The authors suggest the use of an alternating current plasma arc for preparing a surface just before pouring (in this case, the surface is cleaned by the so called ion etching process) and for facing the bearing's framework with babbitt. This process eliminates the laborious operation of cleaning the surface. The quality of the babbitt deposited by the plasma arc and its adhesion strength are not inferior to those characteristics obtained by the usual method. (Author) (U)

AD- 748 525 13/8

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

Pretreatment of Titanium for Subsequent Electrodeposition of Metal, (U)

MAY 72 21P Hansel,V. G. ;
REPT. NO. FTD-HC-23-266-72
PROJ: AF-7343

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Unedited rough draft trans. of Eigenschaften und Anwendung Hochschmelzender und Reaktiver Metalle, Dresden, 15-18 Feb 67. Paper (Properties and Use of High Melting and Reactive Metals, Dresden, 15-18 Feb 67. Paper), Freiberg, n.d.
DESCRIPTORS: (*ELECTROPLATING, *TITANIUM ALLOYS), HYDRIDES, FILMS, METAL COATINGS, ETCHING, ZIRCONIUM ALLOYS, TANTALUM ALLOYS, COPPER, NICKEL, GOLD, PLATINUM, EAST GERMANY (U)
IDENTIFIERS: TRANSLATIONS (U)

IAC ACCESSION NUMBER: MCIC-085085
IAC DOCUMENT TYPE: MCIC -HARD COPY--
Surface oxidation can be prevented and the adherence of Cu. Ni, Au, and Pt to Ti can be improved by forming a thin hydride film on a Ti. Hydrides can be formed by chemical etching in 0.5M HF or cathodic polarization in 0.5M HF containing 1 to 4 NH4F followed by polarization in 0.1M H2SO4. The hydride film has no effect on the mechanical properties and the sheets can be rolled less than or equal to 25 percent. The method can be used for improving the adherence of metals to Zr, Ta, and Nb. (Author) (U)

IAC SUBJECT TERMS: M--(U)Unalloyed Titanium, Titanium Alloys, Platinum, Copper, Unalloyed Nickel, Gold, Zirconium, Tantalum, Columbium, Coatings, Electroplating, Electrodeposition, Etching, Cleaning, Oxidation, Titanium Hydride.;

AD- 748 422 6/2 11/3

MISSOURI UNIV COLUMBIA SPACE SCIENCES RESEARCH CENTER

Chronic Oxygen Electrodes - A Feasibility Study. (U)

DESCRIPTIVE NOTE: Final rept.,
JUL 72 49P Hahn,Allen W. ;Barr,Ronald E. ;Mayhan,Kenneth G. ;
CONTRACT: DADA17-71-C-1104

UNCLASSIFIED REPORT

DESCRIPTORS: (*ELECTRODES, *PLASTIC COATINGS), OXYGEN, MEDICAL EQUIPMENT, NITROCELLULOSE, LABORATORY EQUIPMENT, CLEANING, TEST METHODS, POLAROGRAPHIC ANALYSIS, ETCHING, IN VIVO ANALYSIS, IN VITRO ANALYSIS, WIRE, FEASIBILITY STUDIES (U)
IDENTIFIERS: OXYGEN ELECTRODES, *BIOINSTRUMENTATION, *PLASMA SPRAYING, POLYPROPYLENE (U)

The feasibility of obtaining stable oxygen electrodes by coating with a plasma catalyzed polymer film was studied. These electrodes are to be used for chronic in vivo measurement of tissue oxygen tension. The application of the film was tested on both disc-shaped and needle-type platinum oxygen reducing polarographic electrodes in simulated biological media. It was shown that a uniform polymer film of 1-2 micrometers could be applied to the sensing surface. This could be done, however, only if the surface was cleaned by hydrofluoric acid etching. Results of testing coated electrodes showed a significant reduction in noise output and increased electrode stability. From the preliminary feasibility study, it was concluded that plasma deposited polymer films as an electrode coating is a practical technique. (Author) (U)

AD- 747 019 11/3 11/2

CALIFORNIA INST OF TECH PASADENA CALIF DEPT OF ELECTRICAL ENGINEERING

Analysis of Aluminum Oxide Films on Silicon, (U)

MAY 72 56P Kamoshida,Mototaka ;Mayer, James W. ;Mitchell,Ian V. ;
REPT. NO. Scientific-2
CONTRACT: F19628-71-C-0056
PROJ: AF-5638
TASK: 563802
MONITOR: AFCRL 72-0319

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Nippon Electric Co., Kawasaki (Japan).
DESCRIPTORS: (*SILICON, COATINGS), (*ALUMINA, DEPOSITION), (*CERAMIC COATINGS, ALUMINA), HYDROLYSIS, ALUMINUM COMPOUNDS, CHLORIDES, ETCHING, HEAT TREATMENT, CHEMICAL PROPERTIES, OXIDATION, SILICON COMPOUNDS, NITRIDES, DIELECTRIC FILMS (U)
IDENTIFIERS: ALUMINUM COMPOUNDS, CHLORIDES, ALUMINUM CHLORIDES, *ALUMINUM OXIDE FILMS, ANODIC COATINGS, *CHEMICALS, *VAPOR DEPOSITION, SILICON NITRIDES, VAPOR DEPOSITION (U)

Aluminum oxide exhibits novel and useful properties as a passivating layer on silicon surfaces. The study was concerned with the properties of hydrolytically grown aluminum oxide films on silicon. The study covered the influence of deposition temperature, of subsequent heat treatment and of anodization. The principal tool of measurement was MeV He(+) ion backscattering technique; in addition etch rates were measured and electron diffraction patterns were taken. Aluminum oxide films deposited onto silicon substrates by hydrolysis of AlCl3 show marked differences in etch rates, electron diffraction patterns and chlorine content between films grown below 700C and above 800C. However, both film types are stoichiometric. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 742 436 13/8

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

A Study of RF Sputter Etching in an Argon Plasma Using Silicon as a Target. (U)

DESCRIPTIVE NOTE: Master's thesis,
MAR 72 127P Duke,William G. ;
REPT. NO. GE/EE/72-10

UNCLASSIFIED REPORT

DESCRIPTORS: (*SPUTTERING, FEASIBILITY STUDIES), (*SILICON, *ETCHING), (*ALUMINUM, ETCHING), THIN FILM STORAGE DEVICES, SEMICONDUCTOR DEVICES, INTEGRATED CIRCUITS, MANUFACTURING, PLASMA MEDIUM, ARGON, THESES (U)
IDENTIFIERS: ARGON, PLASMAS(PHYSICS), PROCESS CONTROL, *RADIOFREQUENCY SPUTTERING (U)

Highly reproducible etch rates were achieved by sputter etching on silicon and aluminum targets in an RF generated argon plasma. The target materials were subjected to a number of different etching conditions to evaluate the dependence of etch rate upon electrode separation, argon pressure, self-biasing voltage, and a static magnetic field. Formulas for etch rate dependence upon the self-bias boltage and magnetic field were derived from theoretical considerations and experimental observations. Plasma contamination and masking technique were critical factors. With the proper selection of etching conditions, etch rates were reproduced with an error less than 5%. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 742 198 11/6

DEFENCE STANDARDS LABS ALEXANDRIA (AUSTRALIA)

Measurement of Deformation in Alpha Brass by Means of an Electrolytic Thiosulfate Etch. (U)

APR 71 9P Manion,S. A. ;Mulhearn,T. O. ;

UNCLASSIFIED REPORT

Availability: Pub. in Metallography, v4 p551-559 1971. Summaries in French and German.
DESCRIPTORS: (*BRASS, *DEFORMATION), (*ETCHING, BRASS), THIOSULFATES, ELECTROLYTES, METALLOGRAPHY, AUSTRALIA (U)

An examination has been made of the factors controlling the sensitivity for detection of deformation in 70:30 brass by the electrolytic sodium thiosulfate etch. It has been shown that the most important factors are cleanliness of the metal surface and the composition of the electrolyte. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 740 315 11/5

NAVAL ORDNANCE LAB WHITE OAK MD

Carbon Fiber Microstructure, (U)

MAR 72 57P Barnet,F. Robert ;Norr, Marriner K. ;
REPT. NO. NOLTR-72-32
PROJ: A32-520/292/70WF51544201

UNCLASSIFIED REPORT

DESCRIPTORS: (*CARBON FIBERS, MICROSTRUCTURE), (*ELECTRON MICROSCOPY, CARBON FIBERS), ETCHING, PLASMA JETS, GRAPHITE, MODULUS OF ELASTICITY, SURFACES (U)
IDENTIFIERS: ELECTRON MICROSCOPY, ELECTRONIC SCANNERS (U)

IAC ACCESSION NUMBER: MCIC-083859 PL-017831
IAC DOCUMENT TYPE: MCIC -HARD COPY-- PLASTC -HARD COPY--
Electron and optical microscopy, X-ray, and other characterization methods have been utilized extensively in the development of models describing the morphology of carbon fibers. In a new approach which complements these techniques, carbon fibers have been plasma etched, making their salient structural characteristics highly visible when viewed in a scanning electron microscope. Major differences are seen in the etch patterns, and these can be correlated with the precursor fiber and with the carbon fiber moduli. These patterns give evidence of the crystalline order in the fiber cross section and of gross structural variations, such as flaws. (Author-PL) (U)

IAC SUBJECT TERMS: P--(U)Morphology-Carbon fiber, Electron microscopy-Carbon fiber, Optical microscopy-Carbon fiber, X ray diffraction-Carbon fiber, Plasma etching-Carbon fiber, Microstructure-Carbon fiber, ZZ Unlimited; M--(U)CARBON, FILAMENTS, MICROSTRUCTURE, MORPHOLOGY, SEM, GRAPHITE, ETCHING;

AD- 738 682 7/4 13/8

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

Certain Chemical Properties of Indium Phosphide, (U)

OCT 71 11P Ugai,Ya. A. ;Gordin,V. L. ;Gukov,O. Ya. ;Markina,G. I. ;
REPT. NO. FTD-HT-23-1248-71
PROJ: AF-7343

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited trans. of mono. Khimiya Fosfidov s Poluprovodnikovymi Svoistvami (The Chemistry of Phosphides with Semiconductor Properties), n.p., 1970 p46-51, by D. Koolbeck.
DESCRIPTORS: (*INDIUM COMPOUNDS, *ETCHING), (*PHOSPHIDES, ETCHING), ACIDS, SEMICONDUCTORS, SINGLE CRYSTALS, PHOSPHINE, HYDROLYSIS, HYDROXIDES, USSR (U)
IDENTIFIERS: *INDIUM PHOSPHIDES, TRANSLATIONS (U)

The rates of dissolution of indium phosphide in certain acids at various temperatures were determined. Etching agents are proposed for chemical polishing, finding dislocation pits, and also for detecting single-crystal nature of ingots of indium phosphide without using microstructural investigations. During abrasive treatment of indium phosphide using water, it is found that the source of liberation of phosphine is not only the hydrolysis reaction, but also includes processes leading to the reaction of InP with the products of its oxidation at points of local heating. (Author) (U)

AD- 737 946 20/2

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

Morphology of Thermally Etched Basal Surfaces of Cadmium Selenide. (U)

DESCRIPTIVE NOTE: Technical rept., SEP 71 22P Munir,Z. A. ;Seacrist,L. S. ;Hirth,J. P. ;
REPT. NO. OSURF-2966-TR-4
CONTRACT: N00014-67-A-0232-0005
PROJ: NR-036-047, OSURF-2966

UNCLASSIFIED REPORT

Availability: Pub. in Surface Science, v28 n2 p357-372 Dec 71.
SUPPLEMENTARY NOTE: Prepared in cooperation with San Jose State Coll., Calif. Dept. of Materials Science.
DESCRIPTORS: (*CADMIUM SELENIDES, *ETCHED CRYSTALS), SINGLE CRYSTALS, ETCHING, SURFACE PROPERTIES, ELECTRON MICROSCOPY (U)

Sublimated (0001) and (000(-1)) surfaces of CdSe single crystals were studies by scanning electron microscopy. The observations, together with kinetic rate measurements, are shown to be consistent with the terrace-ledge-kink model of sublimation. Other proposed mechanisms of sublimation of II-VI compounds are discussed. (Author) (U)

AD- 736 758 9/5

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

Mode Control and Related Studies of VHF Quartz Filter Crystals. (U)

MAR 71 9P Lukaszek,Theodore J. ;

UNCLASSIFIED REPORT

Availability: Pub. in IEEE Transactions on Sonics and Ultrasonics, vSU18 n4 p238-246 Oct 71.
SUPPLEMENTARY NOTE: Revision of report dated 26 May 70. Supersedes report dated Nov 70, AD-719 175.
DESCRIPTORS: (*CRYSTAL FILTERS, VERY HIGH FREQUENCY), (*QUARTZ RESONATORS, MANUFACTURING), ETCHING (U)

The purpose of this paper, is to present new information which alleviates previously encountered restrictions and permits fabrication of filter crystals to frequencies as high as 200 MHz. This has been made possible on the basis of first, a recently assembled crystal plating and monitoring system and secondly, the introduction of a new processing method employing ion-etch techniques. (Author) (U)

AD- 727 620 13/8

GRUMMAN AEROSPACE CORP BETHPAGE N Y

Advanced Chemical Milling Processes. (U)

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 69-31 Dec 70,
MAR 71 213P Staebler,Christian J. , Jr;
CONTRACT: F33615-69-C-1840
PROJ: AF-705-9
MONITOR: AFML TR-71-44

UNCLASSIFIED REPORT

DESCRIPTORS: (*CHEMICAL MILLING, *TITANIUM ALLOYS), AUTOMATION, INORGANIC ACIDS, MASKING, ETCHING, HEAT TREATMENT, MECHANICAL WORKING, AIR POLLUTION (U)
IDENTIFIERS: HYDROFLUORIC ACID (U)

IAC ACCESSION NUMBER: MCIC-081104
IAC DOCUMENT TYPE: MCIC -HARD COPY--
The program objective was to improve the capability, reliability, and cost effectiveness of chemical milling when applied to selected aerospace structural materials. A completely automated, centrifugal regeneration system for titanium hydrofluoric acid etchant was designed, fabricated, and tested. This system automatically analyzes the etchant, adds fresh acid, determines the titanium concentration, and actives a centrifuge which removes precipitated titanium and reclaims the etchant. A new, styrene-butadiene maskant was developed that gives excellent line definition on titanium substrates and that can be manufactured for about one-half the cost of commercially available maskants The feasibility of using a laser-drilled, high-energy water jet to scribe chem-milling maskants was established. Optimum chem-milling/forming methodizing sequences were established that minimize distortion of titanium alloy detail parts. Sampling and analytical techniques were established for the major pollutants emitted by chem-milling operations. Air pollution control agencies and equipment manufacturers were surveyed. (Author) (U)

IAC SUBJECT TERMS: M--(U)DIMENSIONAL STABILITY, HEAT TREATING, ULTIMATE TENSILE STRENGTH, YIELD STRENGTH, CONTOUR, ROLL FORMING, BRAKE FORMING, AIR POLLUTION, PHOTORESIST COATINGS, TI-8AL-1MO-1V, CHEMICAL MILLING, ETCHANTS, MASKANT, TI-6AL-4V, HYDROGEN CONTENT, TI-6AL-6V-

AD- 720 013 11/6

ONTARIO) DEPT OF MECHANICAL

on Grain Boundary Etching
or and Its Relation to Nonequilibrium
Boundary Solute Enrichment, (U)

JUL 69 2P Bercovici,S. J. ;Niessen,
P. ;

UNCLASSIFIED REPORT

Availability: Pub. in Transactions of the Metallurgical Society of AIME, v245 p2591-2592 Dec 69. No copies furnished.
DESCRIPTORS: (*ZINC ALLOYS, GRAIN BOUNDARIES), (*GRAIN BOUNDARIES, ETCHING), HARDENING, CANADA (U)

The note reports on observations of different grain boundary etching phenomena in high purity zinc alloys. These phenomena appear to depend on whether a K < 1 or K > 1 solute is present. (Author) (U)

AD- 715 857 11/2

ARMY MATERIALS AND MECHANICS RESEARCH CENTER WATERTOWN MASS

Transmission Microscopy of Ion-Bombardment Thinned Boron Carbide. (U)

DESCRIPTIVE NOTE: Technical rept.,
NOV 70 10P Katz,R. Nathan ;King,Abram O. ;
REPT. NO. AMMRC-TR-70-31
PROJ: DA-1-T-062105-A-330

UNCLASSIFIED REPORT

DESCRIPTORS: (*CARBIDES, *ELECTRON MICROSCOPY), (*ETCHING, CARBIDES), BORON COMPOUNDS, DISLOCATIONS, ION BOMBARDMENT, MICROSTRUCTURE (U)
IDENTIFIERS: *BORON CARBIDES (U)

The use of the ion-bombardment etching technique to thin boron carbide ceramics for transmitted light optical and transmission electron microscopy is demonstnated. The results of the transmission electron microscopy provide the first direct evidence of the existence of dislocations in boron carbide. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 713 554 20/2

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J INST FOR EXPLORATORY RESEARCH

DIRECT SOLUTION OF COMPLEX CRYSTAL STRUCTURES BY ELECTRON MICROSCOPY, (U)

70 14P Kohn,Jack A. ;Cook,Charles F. , Jr.;Eckart,Donald W. ;

UNCLASSIFIED REPORT

DESCRIPTORS: (*ETCHED CRYSTALS, *ELECTRON MICROSCOPY), (*FERRITES, *CRYSTAL STRUCTURE), ETCHING, TEST METHODS, MICROWAVE EQUIPMENT (U)

Hexagonal ferrites, complex ferrimagnetic oxides having exploitable microwave/millimeter-wave properties, form structures too large and complex for solution by classical diffraction techniques. Determination of crystal structures, however, is essential for a structural understanding of properties and for attaining the ultimate objective of tailor-made materials in thi frequency range. The procedure described herein uses high-resolution replica electron microscopy to 'read out' structural stacking sequences 'encoded' onto hexagonal ferrite crystal surfaces by hydrochloric and, particularly, nitric acid etching. The method readily permits the direct solution of such crystal structures, including materials with larger unit cells than in any known inorganic substances. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 708 756 11/6 13/8

ILLINOIS UNIV URBANA DEPT OF METALLURGY AND MINING ENGINEERING

SPARK EROSION CUTTING OF GERMANIUM. (U)

DESCRIPTIVE NOTE: Technical rept., JUL 70 10P Walson,R. P. ;Haworth,W. L. ;Birnbaum,H. K. ;
CONTRACT: N00014-67-A-0305-0016

UNCLASSIFIED REPORT

DESCRIPTORS: (*GERMANIUM, *SPARK MACHINING), DISLOCATIONS, DEFECTS(MATERIALS), ETCHING, SURFACE ROUGHNESS, MANUFACTURING, CRYSTAL DEFECTS (U)
IDENTIFIERS: *SPARK EROSION MACHINING (U)

The conditions for machining germanium by the spark erosion technique are established. The effects of this machining on the structure of the crystal are studied by etch pitting. Under proper conditions minimal damage to the crystal results. This technique appears to have the advantages of speed, minimal surface damage and flexibility in the shape of the cut. (Author) (U)

AD- 707 400 11/6

WATERVLIET ARSENAL N Y

METALLOGRAPHIC TECHNIQUE FOR THE DEVELOPMENT OF MICROSTRUCTURAL CONSTITUENTS IN GUN STEEL. (U)

DESCRIPTIVE NOTE: Technical rept., MAY 70 19P Brassard,Theresa V. ;Nolan, Charles J. ;
REPT. NO. WVT-7029
PROJ: DA-1-C-024401-A-110, DA-1-T-062105-A-328

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, MICROSTRUCTURE), ETCHING, GRAIN BOUNDARIES, GUN BARRELS, METALLOGRAPHY (U)

IAC ACCESSION NUMBER: MCIC-078137
IAC DOCUMENT TYPE: MCIC -HARD COPY--

An investigation was undertaken to develop etching procedures to clearly distinguish certain metallographic features of large forgings. The investigation demonstrates that (1) good microstructure resolution was obtained in untempered martensite using a 2% nital etchant, (2) either 25% sodium bisulfite in water or 4% picral plus hydrochloric acid yielded the best results for both tempered martensite and a duplex structure of tempered martensite and tempered lower bainite, and (3) an aqueous solution of 1% picric acid and 7% sodium tridecylbenzene sulfonate proved highly satisfactory in revealing both the prior austenitic grain boundaries and the macrostructure.
(Author) (U)

IAC SUBJECT TERMS: M--(U)ETCHING, FORGINGS, MICROSTRUCTURE, MARTENSITE, BAINITE, AUSTENITE, GRAIN BOUNDARIES, METALLOGRAPHY, ENGINEERING STEEL, GUNS.;

AD- 699 991 11/2 13/8

SASKATCHEWAN UNIV SASKATOON COLL OF ENGINEERING

AN ELECTRON-MICROSCOPICAL EXAMINATION OF GRAYSON'S MICRO-RULINGS. (U)

69 7P Booth,A. D. ;

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of the Royal Microscopical Society, v4 pt3 p109-114 Jul 69. No copies furnished.
DESCRIPTORS: (*GLASS, ETCHING), (*ETCHING, ELECTRON MICROSCOPY), FILMS, CUTTING TOOLS, VISUAL INSPECTION, TEST METHODS, CANADA (U)

Turner and Bradbury (1966) have performed a valuable service, both to practising microscopists and to students of microscope history, by producing their detailed paper on Nobert's twenty band test plate, and also for their earlier work (Bradbury and Turner, 1963) on his ten band plate. The paper by Turner and Bradbury (1966) aroused a determination to dismantle the major portion of the Grayson ruling and to subject it to examination with the EM6G electron microscope which was installed in the College of Engineering in Saskatchewan in 1967. This examination has now been carried out, and it is the purpose of the present paper to report the results.
(Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 699 723 11/6 14/2

SASKATCHEWAN UNIV SASKATOON COLL OF ENGINEERING

ON THE USE OF COLOUR ETCHING TECHNIQUES FOR STAINLESS STEELS (Ueber die Anwendung von Farbaetzungen bei Rostfreien Staehlen), (U)

69 12P Le May,Iain ;White,William E. ;

MONITOR: DRB Reprint-3032

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Praktische Metallographie, v4 n1 p53-63 1969. No copies furnished.

DESCRIPTORS: (*STAINLESS STEEL, PHASE STUDIES), (*ETCHING, STAINLESS STEEL), AUSTENITE, VISUAL INSPECTION, CANADA (U)

It was shown that with careful control of etching procedures, colour etchants can be successfully employed to distinghish between ferrite, sigma phase and carbides in austenitic steels. Detailed procedures to achieve this are outlined. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 697 569 20/12 7/4

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

METHODS OF SiC SURFACE AND p-n JUNCTION TREATMENT, (U)

MAY 69 10P Afanaseva,G. M. ;Ryzhikov, I. V. ;Kmita,T. G. ;Pavlichenko,V. I. ;

REPT. NO. FTD-MT-24-21-69

PROJ: FTD-7230278

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited machine trans. of mono. Vsesoyuznaya Konferentsiya Pokarbidu Kremniya, Kiev, 1964. Karbid Kremniya; Trudy (All-Union Conference on Silicon, Kiev, 1964. Silicon Carbide) papers, n.p., 1964 p265-267.

DESCRIPTORS: (*SEMICONDUCTORS, SURFACE PROPERTIES), (*SILICON CARBIDES, ETCHING), ELECTRON DIFFRACTION, ETCHED CRYSTALS, INTERFACES, USSR (U)

IDENTIFIERS: SEMICONDUCTOR JUNCTIONS, TRANSLATIONS (U)

Etchants for alpha SiC crystals and rectifying junctions were examined. The optimum dissolution rate and the best surface quality were obtained with 4KNO3 plus 1KOH; 2KNO3 plus 1K2 SO4 plus 1KOH; 1KNO3 plus 1NA2 CO3 plus 1KOH. Etching was conducted in a nickel crucibel in air at a temperature of 700-750 degrees C. The quality of the etched surface was checked on an electron diffraction camera by reflective photography. Etching gave optimum results in the melted mixture 5NA2 O2 plus 7NaCl plus 5KOH. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 696 910 20/12

NATIONAL BUREAU OF STANDARDS WASHINGTON D C INST FOR MATERIALS RESEARCH

FRACTURE OF SAPPHIRE, (U)

MAR 69 10P Wiederhorn,S. M. ;
PROJ: DA-2-0-061102-B-32-D
MONITOR: AROD 5724:6-MC

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the American Ceramic Society, v52 n9 p485-491, 21 Sep 69.
SUPPLEMENTARY NOTE: Revision of report dated 13 Jan 69. Presented at the Annual Meeting of the American Ceramic Society (70th), Chicago, Ill., 22 Apr 68.
DESCRIPTORS: (*SAPPHIRE, FRACTURE(MECHANICS)), CRACK PROPAGATION, DISLOCATIONS, ETCHING, SURFACE PROPERTIE(U)
IDENTIFIERS: PLASTIC DEFORMATION (U)

The fracture of sapphire was studied using the double-cantilever-cleavage technique. Fracture surface energies were 7.3 and 6.0 J/m squared for the (10-10) and (-1012) type planes, respectively. The failure of sapphire to fracture along the basal plane was attributed to the fact that these planes lack electrostatic charge neutrality. The possibility of fracture-induced dislocation motion in sapphire at room temperature was investigated using etch-pit techniques. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 696 861 20/2 20/12

AIR FORCE AVIONICS LAB WRIGHT-PATTERSON AFB OHIO

EFFECT OF KILOVOLT ELECTRONS ON THE ETCH RATE OF Al2O3 AND Ta2O5, (U)

JAN 69 4P Hill,B. H. ;
REPT. NO. AFAL-TR-69-140

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the Electrochemical Society, v116 n5 p668-669 May 69.
SUPPLEMENTARY NOTE: Revision of report dated 8 Oct 68.
DESCRIPTORS: (*ALUMINA, *ETCHING), (*TANTALUM COMPOUNDS, ETCHING), (*ELECTRON IRRADIATION, *CRYSTALS), FILMS, ETCHED CRYSTALS (U)
IDENTIFIERS: *ALUMINA, BEER(BOMBARDED ENHANCED ETCH RATE), BEER(BOMBARDMENT ENHANCED ETCH RATE), BOMBARDMENT ENHANCED ETCH RATE, BOMBARDED ENHANCED ETCH RATE, *TANTALUM(V) OXIDE (U)

It has been established recently that the chemical etch rate of thermally grown SiO2 is enhanced (3 times) when the sample is bombarded with energetic electrons. This process is called the bombarded enhanced etch rate (BEER) effect and is a function of electron dose. In order to determine whether the BEER effect would open discretionary windows in other dielectric materials, electron irradiation studies were conducted on films of Al2O3 and Ta2O5. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 694 836 11/2 20/11

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

METHOD FOR INCREASING THE MECHANICAL STRENGTH OF GLASS. (U)

APR 69 5P Kuznetsov,A. Ya. ;Orlova, L. A. ;

REPT. NO. FTD-HT-23-1492-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited trans. of Patent (USSR) 201 614 1p, 12 Aug 66, by D. Koolbeck.

DESCRIPTORS: (*OPTICAL GLASS, MECHANICAL PROPERTIES), HARDNESS, ETCHING, CLEANING, SURFACE PROPERTIES, ETHERS, ETHANOLS, CLEANING COMPOUNDS, AMMONIUM COMPOUNDS, HYDROXIDES, CONCENTRATION(CHEMISTRY), USSR (U)

IDENTIFIERS: AMMONIUM HYDROXIDE, TRANSLATIONS (U)

The invention involves a method for increasing the mechanical strength of glass by treating the clean surface with an etching solution. The procedure is designed for optical glass and involves cleaning the surface with a mixture of petroleum ether and hydrolytic ethyl alcohol, followed by etching at room temperature in a solution of ammonium hydroxide, preferably 6.7-13.4 N, for 50-180 minutes. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 694 802 18/8 20/2

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

EFFECT OF DISLOCATION DENSITY ON THE RADIATION EXPANSION OF THE VOLUME OF CRYSTALS, (U)

APR 69 6P Kalnin,D. O. ;Shvarts,K. K. ;Feldmane,E. E. ;

REPT. NO. FTD-HT-23-1283-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited trans. of Akademiya Nauk Latviiskoi SSR, Riga. Izvestiya. Seriya Fizicheskikh i Tekhnicheskikh Nauk, n6 p101-102 1966, by D. Koolbeck.

DESCRIPTORS: (*LITHIUM FLUORIDES, *DAMAGE), (*DISLOCATIONS, DENSITY), THERMAL NEUTRONS, ETCHING, USSR, (U)USSR (U)

IDENTIFIERS: TRANSLATIONS (U)

The effect of the dislocation density on the expansion of the volume of LiF during irradiation in a reactor was investigated. The LiF crystals were grown in a vacuum and etched in an aqueous solution. The dislocations have no significant effect on the radiation expansion. (U)

AD- 693 812 9/5 13/8

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

METHOD FOR FABRICATING HIGH FREQUENCY SURFACE WAVE TRANSDUCERS. (U)

DESCRIPTIVE NOTE: Journal article,
JAN 69 3P Smith,Henry I. ;
REPT. NO. JA-3406
CONTRACT: AF 19(6[illegible])-5167
MONITOR: ESD TR-69-23[illegible]

UNCLASSIFIED REPORT

Availability: Pub. in Review of Scientific Instruments, v40 n5 p729-730 May 1969.
SUPPLEMENTARY NOTE: Revision of report dated 23 Dec 68.
DESCRIPTORS: (*TRANSDUCERS, MANUFACTURING), MECHANICAL WAVES, PIEZOELECTRIC CRYSTALS, SUBSTRATES, ELECTRODES, METAL COATINGS, ETCHING, HIGH FREQUENCY (U)
IDENTIFIERS: SURFACE WAVES (U)

The most efficient way of generating surface elastic waves on piezoelectric substrates is by means of interdigital electrode transducers. Such transducers are generally fabricated by evaporating a metallic coating on the substrate and employing standard photoresist-chemical etching techniques common to integrated circuit technology. The paper describes a method developed for producing interdigital electrode transducers with finger widths of 1 1/4 microns in a delay line configuration. (Author) (U)

AD- 691 130 9/2 13/8

STANFORD RESEARCH INST MENLO PARK CALIF

HIGH-INFORMATION-DENSITY STORAGE SURFACES. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 16 1 Jan-31 Mar 69,
JUL 69 54P Heynick,Louis N. ;
CONTRACT: DA-28-043-AMC-01261(E)
PROJ: DA-1-H-662705-A-055, SRI-5444
TASK: 1-H-662705-A-05503
MONITOR: ECOM 01261-16

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Quarterly rept. no. 15, AD-688 178.
DESCRIPTORS: (*DATA STORAGE SYSTEMS, THIN FILM STORAGE DEVICES), (*THIN FILM STORAGE DEVICES, MANUFACTURING), ELECTRON BEAMS, CAPACITORS, ETCHING, DIELECTRIC FILMS, MOLYBDENUM, ALUMINA, SPUTTERING, MICROELECTRONICS, ELECTRON LENSES, DEFLECTION, STORAGE TUBES (U)

This program is devoted to the preparation and investigation of novel electron-beam-addressable storage mosaics and to the construction of an experimental large-capacity high-speed data-storage system utilizing such mosaics. At present, emphasis is on so-called micro-cap mosaics, the elements of which are discrete, submicron-size capacitors at the bases of regular arrays of closely spaced holes in molybdenum/alumina/molybdenum film sandwiches on sapphire substrates. A fine-mesh screen is used as an array of electrostatic lenses for mosaic-pattern exposure on electron-sensitive resist. Further experimental work toward the development of a vacuum etching process for the selective removal of molybdenum is covered. The results thus far indicate that ion-beam sputtering is still the most useful process for this purpose. Prior theoretical calculations of lens aberrations indicated that with a field-emitter source, adequate on-axis spot sizes should be obtained at long throw distances (17 cm). Experimental confirmation for throw distances up to about 10 cm was achieved this quarter in the brass lens system. (Author) (U)

AD- 689 936 20/2

DEFENCE STANDARDS LABS MARIBYRNONG (AUSTRALIA)

DISLOCATION ETCHING OF CYCLOTRIMETHYLENE TRINITRAMINE CRYSTALS. (U)

OCT 68 5P Connick,W. ;May,F. G. J.

;

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Crystal Growth, v5 p65-69 1969. No copies furnished.
SUPPLEMENTARY NOTE: Revision of report dated 24 Jul 68.
DESCRIPTORS: (*RDX, *DISLOCATIONS), ETCHING, CRYSTAL GROWTH, ETCHED CRYSTALS, ORGANIC SOLVENTS, ACETONES, CYCLOHEXANONES, ELECTRON MICROSCOPY, AUSTRALIA (U)

Habit faces of crystals of solution grown cyclotrimethylene trinitramine (RDX, cyclonite) are identified and dislocations characterised using the etch pit technique. The effects of nature of etchant and crystal history on etching are investigated and the dependence of etch pit shape on crystal face demonstrated. Observations by optical and scanning electron microscopy are used to study etch pit structure. The effects of thermal treatment and plastic deformation on dislocation glide and multiplication are examined and possible glide planes postulated. (Author) (U)

AD- 689 274 13/7 13/1 7/4

NATIONAL RESEARCH COUNCIL OF CANADA OTTAWA (ONTARIO) DIV OF MECHANICAL ENGINEERING

QUARTERLY BULLETIN OF THE DIVISION OF MECHANICAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT. (U)

DESCRIPTIVE NOTE: Rept. for 1 Jan-31 Mar 69.
69 80P
REPT. NO. DME/NAE-1969(1)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also *Quarterly Rept. no. 4* dated 31 Dec 68, AD-683 912.
DESCRIPTORS: (*FLUID AMPLIFIERS, ETCHING), (*FURNACES, CONTAMINATION), (*SPRAYS, EVAPORATION), MECHANICAL ENGINEERING, AERONAUTICS, PLATINUM ALLOYS, RHODIUM ALLOYS, CANADA (U)

Contents: Fluidic device manufacture by chemical etching; Contamination by platinum in a resistance furnace wound with platinum - 20% rhodium wire; Evaporation of sprays; Currents projects of the division of mechanical engineering and the national aeronautical establishment. (U)

AD- 688 863 11/4

WATERVLIET ARSENAL N Y BENET R AND E LABS

BOND STRENGTH CHARACTERISTICS OF ELECTRODEPOSITED NICKEL ON BORON AND SILICON CARBIDE FILAMENTS (REINFORCED COMPOSITES), (U)

MAY 69 41P Greco,V. Peter ;Wallace, William A. ;
PROJ: DA-0780-201
MONITOR: WVT 6916

UNCLASSIFIED REPORT

DESCRIPTORS: (*REINFORCING MATERIALS, ADHESION), (*BORON, FILAMENTS), (*SILICON CARBIDES, FILAMENTS), COMPOSITE MATERIALS, TUNGSTEN ALLOYS, NICKEL, ELECTRODEPOSITION, TENSILE PROPERTIES, ETCHING, FAILURE(MECHANICS), ENCAPSULATION, HEAT TREATMENT, BONDING, ETCHING (U)
IDENTIFIERS: BORON, FIBERS, *FIBER COMPOSITES, *COMPOSITE MATERIALS, *MATRIX MATERIALS, *METALS, FIBERS, SILICON CARBIDES (U)

IAC ACCESSION NUMBER: MCIC-075593
IAC DOCUMENT TYPE: MCIC -HARD COPY--

The mechanical properties of filament reinforced composites consisting of boron and silicon carbide filaments in an electrodeposited nickel matrix from the sulfamate bath, were investigated. Specific attention was given to filament strength and bond strength characteristics of the filament-matrix interface and the effects from current density, filament surface etching and heat treatment. (Author) (U)

AD- 688 783 11/6 11/3

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

GRINDING AND POLISHING LARGE PLATES FOR AIRCRAFT SKINS, (U)

MAR 69 14P Verezub,V. N. ;Khokhlov,B. A. ;
REPT. NO. FTD-MT-24-437-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited machine trans. of Samoletostroenie i Tekhnika Vozdushnogo Flota (USSR) n8 p168-173 1966.
DESCRIPTORS: (*AIRPLANE PANELS, ALUMINUM ALLOYS), (*ALUMINUM ALLOYS, FINISHES), ABRASIVE BLASTING, CONFIGURATION, ETCHING, SURFACE ROUGHNESS, ABRASIVES, USSR (U)
IDENTIFIERS: *METAL POLISHING, TRANSLATIONS (U)

Wedge-shaped plates of aluminum alloys, used for aircraft skins, have to be either etched or milled to give them varying cross sections; after etching, the plates have to be polished. The report presents the results of an investigation of the hydroabrasive polishing method. (Author) (U)

AD- 688 178 9/2

STANFORD RESEARCH INST MENLO PARK CALIF

HIGH-INFORMATION-DENSITY STORAGE SURFACES. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 15, 1 Oct-31 Dec 68,
APR 69 56P Heynick,Louis N. ;
CONTRACT: DA-28-043-AMC-01261(E)
PROJ: DA-1-H-662705-A-055, SRI-5444
TASK: 1-H-662705-A-05503
MONITOR: ECOM 01261-15

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Quarterly rept. no. 14, AD-681 892.
DESCRIPTORS: (*DATA STORAGE SYSTEMS, *THIN FILM STORAGE DEVICES), ELECTRON BEAMS, ETCHING, MICROELECTRONICS, METAL FILMS, DIELECTRIC FILMS, CAPACITORS, MOLYBDENUM, ALUMINA, SPUTTERING, ELECTRON MULTIPLIERS, ELECTRON LENSES (U)

The program is devoted to the preparation and investigation of novel electron-beam-addressable storage mosaics and to the construction of an experimental, large-capacity, high-speed data-storage system utilizing such mosaics. At present, emphasis is on so-called micro-cap mosaics, the elements of which are discrete, submicron-size capacitors at the bases of regular arrays of closely spaced holes in molybdenum/alumina/molybdenum film sandwiches on sapphire substrates. Further work is described on the use of a fine-mesh screen as an array of lenses for electron-sensitive resist exposure. First result of using (1) the screen-lens resist-exposure technique, (2) ion-beam sputtering of molybdenum, and (3) tantalum-fluoride etching of alumina in succession to form arrays of holes having the ultimate packing density are described. (Author) (U)

AD- 687 644 7/4 20/12

LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF LOCKHEED RESEARCH LAB

ILLUMINATION AND THE PHOTOENGRAVING OF SILICON, (U)

DEC 68 6P Wales,R. D. ;

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the Electrochemical Society, v116 n4 p483-488 Apr 69. No copies furnished.
SUPPLEMENTARY NOTE: Revision of report dated 22 Aug 68.
DESCRIPTORS: (*SEMICONDUCTORS, ETCHING), (*SILICON, PHOTOENGRAVING), ILLUMINATION, ELECTROLYTES, CRYSTAL DEFECTS, ELECTROCHEMISTRY, RESOLUTION (U)

Equations have been derived for the rate and depth of engraving of near-intrinsic and low-resistivity n-type semiconductor materials. Semiempirical relationships for n-type silicon have been developed from the derived equations. The low-resistivity material, probably due to the defect structure, etched in triangular pits. The high-resistivity material gave very good engravings with a resolution of better than 12 micrometers. The good quality of the pattern and lens is critical in obtaining fine engravings, and the quality and degree of monochromaticity of the illumination affect the resolution and quality of the engraving. (U)
(Author)

AD- 686 301 11/2

IIT RESEARCH INST CHICAGO ILL

FRACTURE MECHANISMS IN POLYCRYSTALLINE NONMETALLIC MATERIALS. (U)

DESCRIPTIVE NOTE: Final rept. 31 Mar 67-30 Mar 68,
APR 68 65P Johari,O. ;Parikh,N. M. ;
REPT. NO. IITRI-B6080-4
CONTRACT: DAAG46-67-C-0122, DA-19-066-AMC-288(X)
PROJ: IITRI-B6057
MONITOR: AMMRC CR-69-02(F)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Rept. no. AMRA-CR-66-09(F) dated Oct 66, AD-645 142.
DESCRIPTORS: (*ALUMINA, FRACTURE(MECHANICS)), DISLOCATIONS, CRYSTAL DEFECTS, ETCHING, SURFACE PROPERTIES, ELECTRON MICROSCOPY, FRACTOGRAPHY, CRYSTAL SUBSTRUCTURE, GRAIN SIZE, SINGLE CRYSTALS, IMPURITIES, HEAT TREATMENT, SAPPHIRE, SPINEL (U)
IDENTIFIERS: ELECTRON MICROSCOPY, ELECTRONIC SCANNERS (U)

IAC ACCESSION NUMBER: MCIC-004048
IAC DOCUMENT TYPE: MCIC -HARD COPY--

Fracture phenomena and their relation to dislocations and dislocation motion were studied during the course of the investigation. High-purity single crystals were stressed up to 60,000 psi. Although cracks formed in the crystals, no etch pits or associated dislocation motion was observed. X-ray techniques and transmission electron microscopy of thin films prepared by ion bombardment are proposed for determining dislocation velocity stress relationships. Present results indicate that the impurities play a major role in dislocation behavior in alumina and their presence is essential for formation of etch pits. Polycrystalline Lucalox of 5 micron, 20 micron, and 30 micron grain size was fractured at room temperature, 400, 700, and 1000C. Extensive cleavage and intercrystalline fracture were observed using the Scanning Electron Microscope. The extent of cleavage decreased with increase in temperature and grain size.

(U)

AD- 684 965 20/12 9/1

UNIVERSITY COLL OF NORTH WALES BANGOR DEPT OF PHYSICS

INVESTIGATION OF MATERIALS SUITABLE FOR THE FABRICATION OF SPACE CHARGE AMPLIFIERS. (U)

DESCRIPTIVE NOTE: Final technical rept. Oct 67-Sep 68,
SEP 68 15P Tredgold,R. H. ;
CONTRACT: DAJA37-68-C-0137
PROJ: DA-2-0-061102-B-31-E

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTING FILMS, EPITAXIAL GROWTH), (*BORON COMPOUNDS, SEMICONDUCTING FILMS), (*PHOSPHIDES, SEMICONDUCTING FILMS), VAPOR PLATING, ETCHING, PHOSPHINE, X RAY DIFFRACTION, GREAT BRITAIN (U)
IDENTIFIERS: BORON PHOSPHIDE, CHEMICALS, VAPOR DEPOSITION, THIN FILMS (U)

The report describes attempts to produce epitaxial films of boron phosphide (BP) and the difficulties encountered involving decomposing films and substrate etching. A successful method of producing large quantities of amorphous BP powder is presented and methods for single crystal growth using this powder as a starting material are described. Various modifications and refinements on current apparatus are described and new methods to be attempted are discussed. (Author)

(U)

- 684 497 11/6 13/8

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF METALLURGY AND MATERIALS SCIENCE

GRAIN BOUNDARY SEGREGATION OF IMPURITIES IN METALS AND INTERGRANULAR BRITTLE FRACTURE. (U)

DESCRIPTIVE NOTE: Technical rept.,
MAR 69 37P Low,John R. , Jr.;Goodman, Stephen R. ;Smith,Craig L. ;
REPT. NO. CMU-031-727-1
CONTRACT: N00014-67-A-0314
PROJ: NR-031-727

UNCLASSIFIED REPORT

DESCRIPTORS: (*STEEL, HEAT TREATMENT), GRAIN BOUNDARIES, DUCTILE BRITTLE TRANSITION, IMPACT TESTS, PHOSPHORUS ALLOYS, ANTIMONY ALLOYS, ETCHING, NEUTRON ACTIVATION, CHEMICAL ANALYSIS (U)

The report discusses two investigations of temper embrittlement in low alloy quenched and tempered steel. Part I deals with additive effects of phosphorus and antimony as embrittling impurities in this type of grain-boundary embrittlement. Part II describes efforts to develop a method of determining the degree of segregation of alloys and impurities to grain-boundaries during temper embrittlement. The method under study involves neutron activation analysis of the etchant from etched intergranular fracture surfaces. (Author) (U)

AD- 684 014 7/4 20/12

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

INFLUENCE OF ACTIVE GASES ON THE ELECTROPHYSICAL PROPERTIES OF THE SURFACE OF SILICON, (U)

NOV 68 11P Arslambekov,V. A. ;Smirnov, G. V. ;
REPT. NO. FTD-HT-23-622-68

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited trans. of Simpozium po Elektronnym Protsessam na Poverkhnosti i v Tonkikh Monodristal-licheskikh Sloyakh Poluprovodnikov (Symposium on Electronic Process on Surfaces and in their Monocrystal Layers of Semiconductors) Novosibirsk, 1967 p7-12.
DESCRIPTORS: (*SILICON, *SURFACE PROPERTIES), (*ETCHING, SILICON), (*PHOTOCONDUCTIVITY, SILICON), CRYSTAL DEFECTS, IMPURITIES, RELAXATION TIME, FLUORIDES, HYDROGEN COMPOUNDS, USSR, GASES, FLUORINE, AIR (U)
IDENTIFIERS: FLUORIDES, HYDROGEN, SURFACE CHEMISTRY, TRANSLATIONS (U)

The purpose of the investigation was to compare the electrophysical properties of a pure silicon surface with a surface coated by the film produced during chemical etching. The tests were made on n-type single-crystal silicon cut along the (111) plane and polished with corundum. The tests were made in atmospheres of air, hydrogen fluoride, gaseous fluorine, and other gases, and also in vacuum. Most experiments were performed at room temperature. The rate of surface recombination of the minority carriers was determined from the relaxation time of the photoconductivity after elimination by short light puises from a flash lamp especially constructed for the purpose. The results showed that the etching reduces the surface recombination as result of the increased number of defects produced by the film. The causes for differences between the effects of different gases are explained. (U)

AD- 682 922 18/4

NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF

CHARGED PARTICLE TRACKS IN POLYMERS NO. 7: SENSITIVITY ENHANCEMENT OF LEXAN, (U)

NOV 68 12P Benton,Eugene V. ;Henke, Richard P. ;

REPT. NO. USNRDL-TR-68-136

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-660 365.

DESCRIPTORS: (*RADIATION MEASURING INSTRUMENTS, POLYESTER PLASTICS), (*POLYESTER PLASTICS, *IONIZATION TRAILS), CONTROLLED ATMOSPHERES, ETCHING, PARTICLE TRAJECTORIES, OPTICAL PROPERTIES, DIELECTRIC PROPERTIES, ULTRAVIOLET RADIATION, OXYGEN (U)

IDENTIFIERS: LEXAN, POLYCARBONATE RESINS (U)

Ultraviolet radiation in the presence of oxygen has been used to greatly enhance track-etching rates in Lexan polycarbonate nuclear particle track detector. When irradiated detectors are stored in darkness, the slow variation of chemical track reactivity with the age of latent tracks can be explained as being caused by the presence of oxygen. (Author) (U)

AD- 681 892 9/2

STANFORD RESEARCH INST MENLO PARK CALIF

HIGH-INFORMATION-DENSITY STORAGE SURFACES. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 14, 1 Jul-30 Sep 68,

DEC 68 45P Heynick,L. N. ;

CONTRACT: DA-28-043-AMC-01261(E)

PROJ: DA-1H662705A055, SRI-5444

TASK: 1H662705A05503

MONITOR: ECOM 01261-14

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Quarterly report no. 13, AD-677 410.

DESCRIPTORS: (*THIN FILM STORAGE DEVICES, *DATA STORAGE SYSTEMS), CAPACITORS, STORAGE TUBES, ELECTRON GUNS, ELECTRON MICROSCOPY, MICROELECTRONICS, MACHINING, FILMS, DIELECTRICS, ETCHING, DESIGN (U)

This program is devoted to the preparation and investigation of novel electron-beam-addressable storage mosaics and the construction of an experimental, large-capacity, high-speed data-storage system based on the use of such mosaics. Current emphasis is on so-called micro-cap mosaics, the elements of which are discrete, submicron-size capacitors at the bases of regular arrays of closely spaced holes in molybdenum/alumina/molybdenum film sandwiches. The technique of using a fine-mesh screen as an array of electrostatic lenses for resist exposure has been extended to the formation of images having about 0.5-micrometer spots spaced on about 1-micrometer centers. However, a larger illumination cathode is needed for obtaining more uniform exposure. Selective etching of alumina films with molybdenum as the resist is performed with a directed beam of tantalum fluoride, formed by reacting lead fluoride with tantalum. Modifications to the molybdenum lens system are described, which have resulted in very stable performance of the system, and useful storage and readout results are now being obtained therefrom. Development of the high-speed readout circuitry required has been initiated.

(U)

AD- 681 798 20/2 13/8 20/12

GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF

THE CHLORINE ETCHING OF SINGLE CRYSTAL SILICON, (U)

NOV 61 39P Baker,C. E. ;Goble,G. J. ;

REPT. NO. GDA-ERR-AN-094

UNCLASSIFIED REPORT

DESCRIPTORS: (*SILICON, *ETCHING), SURFACE PROPERTIES, CRYSTAL DEFECTS, PHOTOMICROGRAPHY, TEMPERATURE, SEMICONDUCTORS, ULTRAVIOLET RADIATION, SINGLE CRYSTALS, ETCHED CRYSTALS, CHLORINE (U)

The feasibility of using chlorine gas to etch silicon surfaces was demonstrated. The effect of illumination and temperature on the reaction was studied. Optimum results were obtained when the silicon was heated to 450C and illuminated with a high pressure mercury lamp. Current theories of etching both by acid solution and halogen vapor are discussed. (Author) (U)

AD- 680 561 13/8

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

CHEMICAL MILLING (DEEP CONTOUR ETCHING), (U)

MAY 68 14P Tarasova,V. A. ;

REPT. NO. FTD-HT-23-1225-67

UNCLASSIFIED REPORT

PORTIONS OF THIS DOCUMENT ARE ILLEGIBLE. SEE INTRODUCTION SECTION OF THIS ANNOUNCEMENT JOURNAL FOR CFSTI ORDERING INSTRUCTIONS.

SUPPLEMENTARY NOTE: Unedited rough draft trans. of mono. Spravochnik Mashinostroitelya (Reference Book for the Mechanical Engineer) n.p., 1963 v5 bk. 1 p387-393, by E. Harter.

DESCRIPTORS: (*CHEMICAL MILLING, REVIEWS), INORGANIC ACIDS, CLEANING, MASKING, ETCHING, LIQUID IMMERSION TESTS, ALUMINUM ALLOYS, TITANIUM ALLOYS, STAINLESS STEEL, TABLES(DATA), POLYVINYL CHLORIDE, USSR (U)

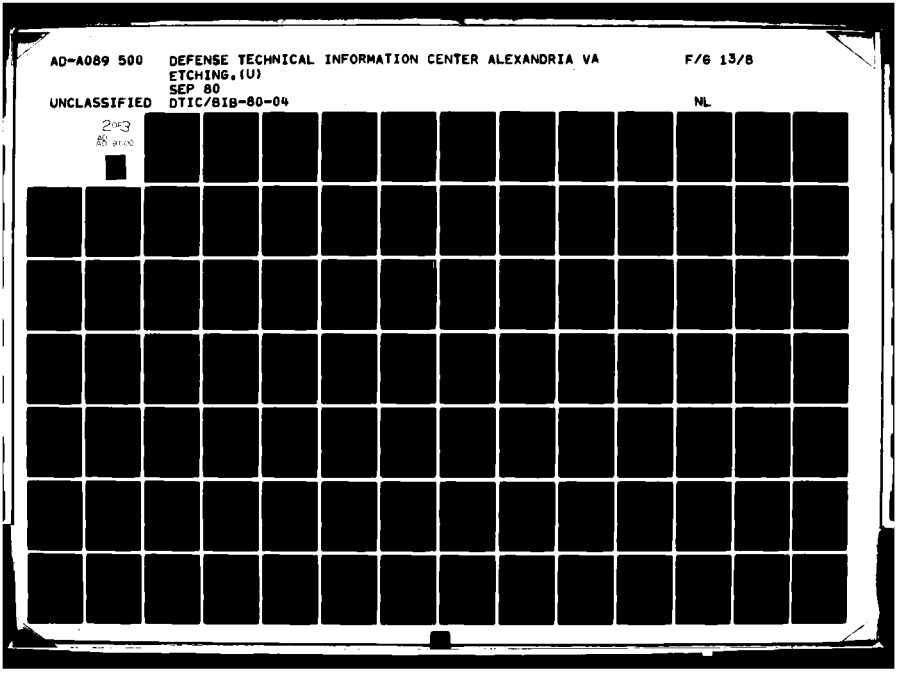
IDENTIFIERS: STEEL 1050, TRANSLATIONS (U)

IAC ACCESSION NUMBER: MCIC-076468

IAC DOCUMENT TYPE: MCIC -HARD COPY--

For the shaping of parts, instead of mechanical removing of material to obtain a given form there is described a method of etching the material away with chemicals. There are four operations involved in this process. The material not to be removed is protected by paints and varnishes, preferably chlorinated-polyvinyl-chloride lacquers and enamels. Adhesive tapes and rubber are also used. The surface has to be prepared beforehand. Not more than 24 hours should elapse between the applying of these protections and the etching work. Weakening and warping is avoided by using chemicals instead of machining. Extensive tables are attached giving directions for the preparing and applying the coatings to protect material not to be removed and for removing the coating afterwards. (Author) (U)

IAC SUBJECT TERMS: M--(U)Chemical Milling, Etching, Aluminum Alloys, Titanium Alloys, Stainless Steel.;


AD-A089 500 DEFENSE TECHNICAL INFORMATION CENTER ALEXANDRIA VA F/G 13/8
ETCHING.(U)
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2 OF 3
AD A089500

AD- 680 411 9/5

RCA LABS PRINCETON N J

INTEGRATED LOGIC NETWORKS. (U)

DESCRIPTIVE NOTE: Final rept. 1 Mar 67-30 Sep 68,
OCT 68 35P Allison,James F. ;
CONTRACT: F19628-67-C-0290
PROJ: AF-4641
TASK: 464104
MONITOR: AFCRL 68-0516

UNCLASSIFIED REPORT

DESCRIPTORS: (*INTEGRATED CIRCUITS, *LOGIC CIRCUITS), SEMICONDUCTING FILMS, SILICON, SAPPHIRE, SPINEL, NUCLEATION, CRYSTAL GROWTH, ETCHING, ELECTRON MICROSCOPY (U)
IDENTIFIERS: METAL OXIDE SEMICONDUCTORS (U)

This report describes research into the properties and uses of thin films of silicon-on-sapphire with emphasis on the development of high-speed complementary-symmetry MOS integrated circuits. The nucleation rate during the growth of the films was found to greatly affect the film properties. A comparison of diodes fabricated in silicon-on-sapphire and diodes fabricated in silicon-on-spinel (magnesium-aluminate) is made, indicating that some advantages may be realized by the use of spinel substrates. The results of the investigation into the shape of the edge of silicon etched in various etchants are presented. The use of the scanning electron microscope (SEM) has yielded invaluable information into the details of the shape of the edge which cannot be discerned with optical microscopy. Techniques are described which allowed the successful fabrication of a pattern containing 62,500 crossovers. The fabrication of high-speed nondestructive readout memory cells, exhibiting a read/write cycle time of 5 nsec, and the fabrication of a 5-stage ring oscillator are described. The latter operates at a frequency of 32 MHz at 4.5 V, which indicates a pair-delay of approximately 1 nsec. (Author) (U)

AD- 680 123 11/6 20/11

BATTELLE MEMORIAL INST COLUMBUS OHIO

PLASTIC FLOW IN THE LOCALE ON NOTCHES AND CRACKS IN Fe-3Si STEEL UNDER CONDITIONS APPROACHING PLANE STRAIN. (U)

DESCRIPTIVE NOTE: Final rept.,
NOV 68 63P Hahn,G. T. ;Rosenfield,A. R. ;
CONTRACT: NObs-92383
PROJ: SR-164
MONITOR: SSC 191

UNCLASSIFIED REPORT

DESCRIPTORS: (*IRON ALLOYS, MECHANICAL PROPERTIES), CREEP, CRACK PROPAGATION, LOADS(FORCES), NOTCH SENSITIVITY, COLD WORKING, AGING(MATERIALS), PLASTIC PROPERTIES, ETCHING, DEFECTS(MATERIALS), LIFE EXPECTANCY, PHOTOMICROGRAPHY, MICROSTRUCTURE, MODELS(SIMULATIONS) (U)
IDENTIFIERS: *CAST IRON, IRON ALLOY 3SI (U)

The development of the plastic zones generated by sharp through-cracks and blunter notches was studied systematically in plates of Fe-3Si steel. A sensitive etching technique revealed the plastic zone both on the plate surface and on parallel and normal interior sections. In addition, the progress of through-the-thickness deformation was followed by monitoring normal displacements at the plate surface. (Author) (U)

AD- 678 722 11/6

NEW YORK UNIV N Y

HYDROGEN-INDUCED EXPANSIONS IN TITANIUM-ALUMINUM ALLOYS, (U)

JAN 68 16P Margolin,Harold ;Portisch, Hansheinz ;

CONTRACT: DA-ARO(D)-31-124-G519
MONITOR: AROD 25.3:1

UNCLASSIFIED REPORT

Availability: Pub. in Transactions of the Metallurgical Society of AIME, v242 p1901-1913 Sep 68.

DESCRIPTORS: (*ALUMINUM ALLOYS, SURFACE PROPERTIES), (*TITANIUM ALLOYS, SURFACE PROPERTIES), INTERMETALLIC COMPOUNDS, X RAY DIFFRACTION, PHOTOMICROGRAPHY, ETCHING, METALLOGRAPHY, HEAT TREATMENT, RECRYSTALLIZATION, HYDROGEN EMBRITTLEMENT, DIFFUSION, AGING(MATERIALS) (U)
IDENTIFIERS: TITANIUM ALUMINIDES (U)

IAC ACCESSION NUMBER: MCIC-074324
IAC DOCUMENT TYPE: MCIC -HARD COPY--

A surface expansion was found to occur sometime after etching in titanium-aluminum alloys containing 9.5 to 12.5 wt pct aluminum. The structure formed, grew, and disappeared with time. The surface expansion was followed by microscope observations and interferometric and lattice parameter measurements. Activation energy measurements for the growth of the 'expansion structure' and chemical analysis indicated that the phenomenon occurred as a result of hydrogen pickup during etching. It is proposed that hydrogen initially enters octahedral sites of Ti3Al coherent with alpha Ti and later shifts to the tetrahedral sites. It is postulated that expansion occurs when hydrogen enters the tetrahedral sites. The expansion structure disappeared, it is proposed, because of diffusion of hydrogen from the surface into the body of the alloy and because of loss of coherency of Ti3Al. (Author) (U)

AD- 677 066 11/6 13/8

GENERAL DYNAMICS/CONVAIR SAN DIEGO CALIF

REDUCING HAND STRAIGHTENING BY CHEM-MILLING 7075 AND 7178 ALUMINUM ALLOY IN THE 'W' (OR NATURALLY AGED) CONDITION. (U)

DESCRIPTIVE NOTE: Final rept.,
OCT 60 23P Whiting,H. A. ;Plummer,C. E. ;
REPT. NO. GDC-PR919

UNCLASSIFIED REPORT

DESCRIPTORS: (*ALUMINUM ALLOYS, *CHEMICAL MILLING), ETCHING, SURFACE ROUGHNESS, FINISHES, AGING(MATERIALS), PANELS, MECHANICAL WORKING, TOLERANCES(MECHANICS) (U)
IDENTIFIERS: ALUMINUM ALLOY 7075 (U)

The objective and purpose of the project was to etch 7075 and 7178 aluminum alloys, 0.125 in. thick, in the 'W' (or naturally aged condition). A maximum surface roughness (RMS) of 125 microinches was not to be exceeded. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 675 563 20/2 11/6

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

A STUDY OF DISLOCATION STRUCTURE OF SUBBOUNDARIES IN MOLYBDENUM SINGLE CRYSTALS, (U)

JAN 68 27P Feng Tuan,;Li Ch'i,;Min Nai-pen,;

REPT. NO. FTD-HT-23-593-67

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Edited trans. of Wu Li Hsueh Pao (Chinese People's Republic) v21 n2 p431-449 1965.

DESCRIPTORS: (*MOLYBDENUM, *DISLOCATIONS), GRAIN STRUCTURES(METALLURGY), SINGLE CRYSTALS, ZONE MELTING, ELECTRON BEAM MELTING, GRAIN BOUNDARIES, MATHEMATICAL ANALYSIS, ETCHED CRYSTALS, ETCHING, ELECTROEROSIVE MACHINING, CHINA (U)

IDENTIFIERS: TRANSLATIONS (U)

Using the etch-figure technique, the authors have directly observed the dislocation structure of subboundaries in electron-beam zone-melted molybdenum single crystals. A thorough analysis of experimental results are given. The authors have observed various patterns indicating interactions of singular dislocations with subboundaries, in particular, 'steps' on the subboundaries induced by singular dislocations and also interactions of inclusions with subboundaries. The etch-figure method of observing dislocations is an effective means for the quantitative study of dislocation substructure in crystals. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO9

AD- 675 421 20/12

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

ELECTRONIC AND IONIC PROCESSES IN SOLIDS, NO. 1, 1964 (SELECTED ARTICLES), (U)

JAN 68 18P Andronikashvili,E. L. ; Kvavadze,K. A. ;Getiya,M. Sh. ;Politov,N. G. ;

REPT. NO. FTD-HT-23-1240-67

UNCLASSIFIED REPORT

PORTIONS OF THIS DOCUMENT ARE ILLEGIBLE. SEE INTRODUCTION SECTION OF THIS ANNOUNCEMENT JOURNAL FOR CFSTI ORDERING INSTRUCTIONS.

SUPPLEMENTARY NOTE: Edited trans. of Elektronnye i Ionnye Protsessy v Tverdykh Telakh (USSR) n1 p31-41, 94-97 1964.

DESCRIPTORS: (*CRYSTAL DEFECTS, *DAMAGE), (*SODIUM CHLORIDE, *ETCHING), POTASSIUM COMPOUNDS, CHLORIDES, LITHIUM FLUORIDES, NEUTRON SCATTERING, ANNEALING, DISLOCATIONS, ETCHED CRYSTALS, ION BOMBARDMENT, USSR, (U)USSR (U)

IDENTIFIERS: TRANSLATIONS (U)

Contents: Radiation changes of dislocation densities in ionic crystals; Ionic etching of sodium chloride crystals. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 674 757 20/2

AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS

ETCHING AND REGROWTH OF CUPROUS CHLORIDE, (U)

JUN 68 13P Chase,Armond B. ;Wilcox, William R. ;Teviotdale,James R. ;
REPT. NO. TR-0158(9230-03)-3
CONTRACT: F04695-67-C-0158
MONITOR: SAMSO TR-68-281

UNCLASSIFIED REPORT

DESCRIPTORS: (*COPPER COMPOUNDS, *ETCHING), (*CRYSTAL GROWTH, COPPER COMPOUNDS), CHLORIDES, CRYSTAL STRUCTURE, TWINNING(CRYSTALLOGRAPHY), ETCHED CRYSTALS, HYDROCHLORIC ACID, NITRIC ACID, DISLOCATIONS, ACETONES (U)
IDENTIFIERS: COPPER(I) CHLORIDE (U)

Partial dissolution in hydrochloric acid followed by gentle rinsing in water allowed individual grains and twins in cuprous chloride to be distinguished easily with the naked eye. It was found that regrowth occurred during rinsing because of dissociation of the soluble CuCl2(-) complex. This regrowth resulted in the formation of a shingled surface which served to reflect light quite differently from different grain orientations. Polished surfaces were found to result from etching with 50:50 nitric acid-water for times up to 30 sec at room temperature. Dislocation etch pits were revealed by placing cuprous chloride in hydrochloric acid for times up to 5 sec followed by spraying with acetone. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 674 591 11/6 11/4 20/11

AIR FORCE MATERIALS LAB WRIGHT-PATTERSON AFB OHIO

MECHANICAL BEHAVIOR OF BERYLLIUM WIRE REINFORCED PLASTIC COMPOSITES. PART II. TIME DEPENDENT MECHANICAL PROPERTIES. (U)

DESCRIPTIVE NOTE: Technical rept. Sep 66-Oct 67,
JUN 68 40P Schwartz,H. S. ;Mahieu,W. ;
REPT. NO. AFML-TR-66-404-Pt-2
PROJ: AF-7340
TASK: 734003

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part I, AD-657 309.
DESCRIPTORS: (*COMPOSITE MATERIALS, LAMINATED PLASTICS), (*LAMINATED PLASTICS, MECHANICAL PROPERTIES), BERYLLIUM, WIRE, DUCTILITY, MODULUS OF ELASTICITY, TENSILE PROPERTIES, EPOXY RESINS, ELONGATION, SURFACE ROUGHNESS, ETCHING, RUPTURE, FATIGUE(MECHANICS) (U)

IAC ACCESSION NUMBER: PL-011532
IAC DOCUMENT TYPE: PLASTC -HARD COPY--

The dependence of the mechanical behavior of beryllium wire reinforced plastic composites on duration of load (creep and stress-rupture), number of loading cycles (fatigue), and vibrational frequency (dynamic modulus and damping) was investigated. Where possible, this behavior is compared with that of the constituent beryllium wire and other structural materials. The stress at which plastic deformation commences (elastic limit) in beryllium wire was determined. The static mechanical properties of beryllium wire which had been acid etched to achieve a smooth surface were determined and were compared with similar properties of as received beryllium wire. (Author) (U)

IAC SUBJECT TERMS: P--(U)Bonding, Beryllium wire, Epoxy, Mechanical properties, Time dependent properties, Composites, ZZ Unlimited.;

AD- 674 066 11/6 13/8

BATTELLE MEMORIAL INST COLUMBUS OHIO DEFENSE METALS INFORMATION CENTER

A REVIEW OF METALLOGRAPHIC PREPARATION PROCEDURES FOR BERYLLIUM AND BERYLLIUM ALLOYS, (U)

JUN 68 20P Price,C. W. ;McCall,J. L. ;
REPT. NO. DMIC-Memo-237
CONTRACT: F33615-68-C-1325

UNCLASSIFIED REPORT

DESCRIPTORS: (*BERYLLIUM, METALLOGRAPHY), (*BERYLLIUM ALLOYS, METALLOGRAPHY), REVIEWS, ELECTRON MICROSCOPY, FINISHES, GRINDING, ETCHING, CUTTING, MACHINING, CHEMICAL MILLING (U)

The Memorandum is divided into four topics: (1) Grinding, (2) Polishing, (3) Etching, and (4) Thining for transmission electron microscopy. Procedures reviewed are also listed in tabular form for ready reference. In addition to reviewing published references, the authors have included a considerable amount of previously unpublished data based on their own experience and private communication with associates in the field. (Author) (U)

AD- 673 601 20/5

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

LONG-WAVELENGTH INFRARED PB(1-X)SN(X)TE DIODE LASERS. (U)

DESCRIPTIVE NOTE: Journal article,
MAR 68 4P Butler,Jack F. ;Harman, Theodore C. ;
REPT. NO. JA-3240
CONTRACT: AF 19(628)-5167
MONITOR: ESD TR-68-223

UNCLASSIFIED REPORT

Availability: Pub. in Applied Physics Letters, v12 n10 p347-349, 15 May 68.
DESCRIPTORS: (*SEMICONDUCTOR DEVICES, *LASERS), SEMICONDUCTOR DIODES, LEAD COMPOUNDS, TIN COMPOUNDS, TELLURIDES, SOLID SOLUTIONS, INFRARED RADIATION, CRYSTAL GROWTH, ANNEALING, DIFFUSION, ETCHING (U)
IDENTIFIERS: LEAD STANNOTELLURIDES (U)

Diode lasers with emission wavelengths as long as 28 microns have been fabricated using Pb(1-x)Sn(x)Te with x up to 0.27. Properties of laser diodes at 77K and 12K have been measured for a number of compositions in the range 0.15 < or = x < or = 0.27. The vapor growth and annealing-diffusion steps were performed in a special quartz ampoule which remained sealed throughout the process. Threshold current densities were dependent on diode surface conditions and could be reduced by at least 50% by etching. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 673 143 9/2 9/5

STANFORD RESEARCH INST MENLO PARK CALIF

HIGH-INFORMATION-DENSITY STORAGE SURFACES. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 12, 1 Jan-31 Mar 68,
JUL 68 41P Heynick,Louis N. ;
CONTRACT: DA-28-043-AMC-01261(E)
PROJ: DA-1H622001A055, SRI-5444
TASK: 1H622001A055-03
MONITOR: ECOM 01261-12

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Quarterly rept. no. 11, AD-668 242.
DESCRIPTORS: (*DATA STORAGE SYSTEMS, *MICROELECTRONICS), (*THIN FILM STORAGE DEVICES, SANDWICH CONSTRUCTION), CAPACITORS, DIELECTRIC FILMS, ELECTRON BEAMS, STORAGE TUBES, ELECTRON GUNS, METAL FILMS, MOLYBDENUM, ETCHING, NETWORKS, SPUTTERING, FOCUSING, ELECTRON MICROSCOPY, ACRYLIC RESINS (U)
IDENTIFIERS: COMPUTER AIDED DESIGN (U)

Progress is described on a program devoted to the preparation and investigation of two novel kinds of electron-beam-addressable storage elements of submicron size and densely packed arrays of these elements, and to the construction of a large-capacity, high-speed, electron-beam-addressable, data-storage system utilizing regular arrays of these elements. Further work on poly(methyl methacrylate), and electron-sensitive material that exhibits both positive- and negative-resist behavior, is discussed leading to a basic procedure for utilizing this material to advantage in storage mosaic formation. A new technique for exposing positive resists in regular patterns of high packing density over large areas is described. This technique is based on the use of a fine-mesh screen as a corresponding array of local electron lenses. Recent developments of aluminum-oxide etching with vaporized lead fluoride (PbF2) are covered, including the use of RF for ameliorating the unwanted etching of molybdenum resist perimeters surrounding the alumina film areas. First results of storage and readout on regular arrays of micro-cap elements are presented. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 672 095 9/1 11/7 13/8

RAYTHEON CO WALTHAM MASS RESEARCH DIV

CHEMICAL VAPOR DEPOSITED MATERIALS FOR ELECTRON TUBES. (U)

DESCRIPTIVE NOTE: Triannual rept. no. 1, 15 Dec 67-14 Apr 68,
JUN 68 54P Steele,S. R. ;Schilling,H. ;Pappis,J. ;Simpson,J. ;
REPT. NO. S-1075
CONTRACT: DAAB07-68-C-0153
PROJ: DA-1HG22001A055
TASK: 1HG22001A055-01
MONITOR: ECOM 0156-1

UNCLASSIFIED REPORT

DESCRIPTORS: (*ELECTRON TUBE PARTS, *VAPOR PLATING), MICROWAVE EQUIPMENT, BORON COMPOUNDS, NITRIDES, WAVEGUIDES, ELECTRODES, ELECTRIC INSULATION, ETCHING, WAVEGUIDE WINDOWS, FILMS, DENSITY, DEPOSITS, STABILITY, BONDING, NICKEL ALLOYS, ZIRCONIUM COMPOUNDS, HYDRIDES (U)
IDENTIFIERS: *BORON NITRIDES, *CHEMICALS, *VAPOR DEPOSITION (U)

Microwave tests of etched patterns of a conductor on a dielectric substrate have shown that fine-lined, ruled structures can provide slow-wave circuits of the Karpline type when the assembly is uniform over its length. Tests have shown that grid spacers can easily be made of high-density isotropic CVD BN by using an air abrasive unit. Several isotropic CVD BN depositions to fabricate cylindrical microwave windows were made with uniformly good results. Isotropic CVD BN materials with densities both higher and lower than standard isotropic CVD BN were prepared in small quantities. Preliminary measurements have shown that certain of these materials may be more desirable for some applications than standard isotropic CVD BN. High-density isotropic CVD BN can be prepared by reducing reactant concentrations but the deposition rate is low. Increased density, together with increased deposition rate, appears possible with proper control of critical deposition parameters. Good results were obtained with a special metallizing tape (88% ZrH2-12% Ni) on boron nitride, (U)

AD- 671 925 11/3 11/6 14/2

AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS

CHEMICAL TINTING OF HAFNIUM AND ZIRCONIUM CARBIDES FOR METALLOGRAPHIC EXAMINATION, (U)

NOV 67 13P Joyce,Robert L. ;Janowski, Kenneth R. ;Richardson,James H. ;
REPT. NO. TR-0158(3250-10)-11
CONTRACT: F04695-67-C-0158
MONITOR: SAMSO TR-68-220

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color, reproducible in black/white only after original supply is exhausted.
DESCRIPTORS: (*HAFNIUM COMPOUNDS, ETCHING), (*ZIRCONIUM COMPOUNDS, ETCHING), (*CARBIDES, *ETCHING), METALLOGRAPHY, EUTECTICS, SOLID SOLUTIONS, CARBON ALLOYS, GRAPHITE, COLORS, GRAIN STRUCTURES(METALLURGY), NITRIC ACID, HYDROGEN COMPOUNDS, FLUORIDES (U)
IDENTIFIERS: ETCHANTS, HAFNIUM CARBIDE, FLUORIDES, HYDROGEN, ZIRCONIUM CARBIDE (U)

An etchant is described that imparts color to the surface of hafnium and to zirconium carbide metallographic specimens. These colors not only provide a sharp delineation of individual grains, but also define the boundaries of eutectic colonies that contain both graphite and carbide. For a given specimen, similar orientations of grains may be inferred from similar coloration. (Author) (U)

AD- 669 099 20/12 20/2

STANFORD RESEARCH INST MENLO PARK CALIF

GROWTH, PROCESSING AND CHARACTERIZATION OF BETA-SILICON CARBIDE SINGLE CRYSTALS, (U)

FEB 68 44P Bartlett,Robert W. ;Mueller, Robert A. ;
REPT. NO. Scientific-2
CONTRACT: F19628-67-C-0243
PROJ: AF-5620, SRI-PMU-6488
TASK: 562006
MONITOR: AFCRL 68-0166

UNCLASSIFIED REPORT

DESCRIPTORS: (*SEMICONDUCTORS, SILICON CARBIDES), (*SILICON CARBIDES, *CRYSTAL GROWTH), VAPOR PLATING, SUBSTRATES, EPITAXIAL GROWTH, SILANES, PROPANE, SURFACE PROPERTIES, DOPING, IMPURITIES, ALUMINUM, BORANES, SEMICONDUCTOR DIODES, TRANSISTORS, ETCHING, MASKING, ELECTROLUMINESCENCE (U)
IDENTIFIERS: CHEMICALS, VAPOR DEPOSITION, METAL-OXIDE SEMICONDUCTORS (U)

IAC ACCESSION NUMBER: MCIC-005751
IAC DOCUMENT TYPE: MCIC -HARD COPY--

Vapor deposition of beta-silicon carbide on (111) beta-silicon carbide platelets is being studied using methyltrichlorosilane or mixtures of silane and propane. Although epitaxial deposits were achieved with either source gas, low octahedral steps (triangles) and numerous intergrown star-shaped hillocks on the alternate side usually occur. Process conditions were systematicialy varied to improve the surface perfection, and n-type epitaxial layers with smooth surfaces free of hillocks were grown on n-type beta-silicon carbide crystal substrates using CH_3SiCl_3. Epitaxial deposits of n-type beta-silicon carbide were grown on aluminum-doped p-type silicon carbide substrates, and p-type epitaxial deposits were grown on n-type crystals using diborane for p-doping during vapor deposition. Processing of diodes requires a suitable etching procedure. Hydrogen etching through thermally grown oxide masks was not successful because of reduction of the oxide.

(U)

AD- 668 449 20/2

AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS

ETCHING BEHAVIOR OF IN203 GROWN FROM PBO-B203, (U)

MAR 68 18P Chase,Armond B. ;Teviotdale, James R. ;
REPT. NO. TR-0158(9230-03)-4
CONTRACT: F04695-67-C-0158
MONITOR: SAMSO TR 68-165

UNCLASSIFIED REPORT

DESCRIPTORS: (*ETCHED CRYSTALS, *INDIUM COMPOUNDS), OXIDES, SINGLE CRYSTALS, ETCHING, NITRIC ACID, HYDROCHLORIC ACID, CRYSTAL GROWTH, DISLOCATIONS (U)
IDENTIFIERS: INDIUM(III) OXIDE (U)

Single crystals of In203 grown from a PbO-B203 solution are etched by HNO3 or HNO3-HCl solutions. Characteristic etch pits and etch tubes are described. The number of etch pits is found to be related to the growth history of the crystals. The relationship of the etch tubes to crystal growth is discussed. (Author) (U)

AD- 668 242 9/2 9/5

STANFORD RESEARCH INST MENLO PARK CALIF

HIGH-INFORMATION-DENSITY STORAGE SURFACES. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 11, 1 Oct-31 Dec 67,
MAR 68 32P Rogers,Kendal T. ;Cone, Donald R. ;Heynick,Louis N. ;
CONTRACT: DA-28-043-AMC-01261(E)
PROJ: DA-1H6-22001-A-055
TASK: 1H6-22001-A-055-03
MONITOR: ECOM 01261-11

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-665 634.
DESCRIPTORS: (*DATA STORAGE SYSTEMS, *MICROELECTRONICS), (*THIN FILM STORAGE DEVICES, SANDWICH CONSTRUCTION), CAPACITORS, DIELECTRIC FILMS, ELECTRON BEAMS, VACUUM APPARATUS, STORAGE TUBES, ELECTRON GUNS, METAL FILMS, MOLYBDENUM, ETCHING, SPUTTERING, ARGON, ELECTRON MULTIPLIERS, SILOXANES, METALORGANIC COMPOUNDS, ACRYLIC RESINS, COMPUTER PROGRAMS (U)
IDENTIFIERS: COMPUTER AIDED DESIGN, PROTECTIVE COATINGS (U)

This program is devoted to the preparation and investigation of two novel kinds of electron-beam-addressable storage elements of submicron size and densely packed arrays or these elements; also to the construction of a large-capacity, high-speed, electron-beam-addressable, data-storage system utilizing regular arrays of these elements. Work on storage mosaics was devoted to further development of techniques for the preparation of regular arrays of densely packed micro-cap elements including: investigations of other resists besides tetrakistriphenyl siloxytitanium, such as KPR, Shipley's AZ 111, and poly(methyl methacrylate); argon-ion sputtering of molybdenum films; and lead-fluoride etching of aluminum-oxide films. Appropriate combinations of these techniques appear promising. The development of a computer program for the design of electron-optical systems capable of scanning 100,000,000 elements per field for mosaic fabrication and for element address is continuing. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 667 368 9/5

BUNKER-RAMO CORP CANOGA PARK CALIF DEFENSE SYSTEMS DIV

PLANAR COAXIAL INTERCONNECTION TECHNIQUES. (U)

DESCRIPTIVE NOTE: Semi-annual rept. no. 1, 1 Apr-30 Sep 67,
MAR 68 116P Parks,Howard L. ;Griff, William ;Kitaguchi,Tom ;
CONTRACT: DA-28-043-AMC-02024(E)
PROJ: DA-IE6-22001-A-440
TASK: IE6-22001-A-440 01
MONITOR: ECOM 02024-5

UNCLASSIFIED REPORT

DESCRIPTORS: (*CIRCUIT INTERCONNECTIONS, SANDWICH CONSTRUCTION), DIELECTRICS, ETCHING, COMPUTERS, LAMINATES, BONDING, SHIFT REGISTERS, INTEGRATED CIRCUITS, MANUFACTURING, HIGH FREQUENCY, VERY HIGH FREQUENCY (U)

The semi-annual technical report documents the research and developmental effort for Phase I of the follow-on program concerning a Multilayer Planar Coaxial Interconnection System. The primary objectives of the program are to optimize developments of materials and fabrication techniques for a multilayer planar coaxial structure which is applicable for interconnecting subassemblies and assemblies utilized in computers operating in the 20- to 50-MHz range. The developmental areas essential to providing such a multilayer system are documented in this report. These include investigations of improved etching techniques, dielectric systems, conductor applications, lamination methods, through-hole plating technology, and microbonding. The experimental developmental model designed for the Phase I effort is a pseudorandom code generator, which is comprised of a 5-stage shift register with two exclusive OR circuits and a propagation delay oscillator for clock. Operation of this pseudorandom clock generator was at 70 MHz, which showed a capability higher than the program goals of 20 to 50 MHz. Manufacturing specifications for the multilayer structure have been established and documented in this report with regard to material requirements, (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 666 543 18/4

NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF

A STUDY OF CHARGED PARTICLE TRACKS IN CELLULOSE NITRATE, (U)

JAN 68 251P Benton,Eugene V. ;
REPT. NO. USNRDL-TR-68-14
PROJ: ZF-011-01-01

UNCLASSIFIED REPORT

DESCRIPTORS: (*RADIATION MEASURING INSTRUMENTS, NITROCELLULOSE), (*PARTICLE TRAJECTORIES, *NITROCELLULOSE), CHARGED PARTICLES, DIELECTRICS, ALPHA PARTICLES, FISSION PRODUCTS, ION BOMBARDMENT, ETCHING, MICROSCOPY, COSMIC RAYS, DOSIMETERS, FALLOUT, AUTORADIOGRAPHY (U)

Both experimental and theoretical contributions are presented on the topic of dielectric charged particle track detectors. Cellulose nitrate was the principal track recording material. The study covers four areas: The chemical etch development of tracks; Track registration criteria; Range-energy calculations and comparisons with the etched tracks lengths; Charged particle detection. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 665 280 20/2 7/4

MCMASTER UNIV HAMILTON (ONTARIO)

ON THE SLOPE OF ETCH PITS. (U)

DESCRIPTIVE NOTE: Technical rept.,
JAN 68 37P Ives,M. B. ;McAusland,D.
D. ;
REPT. NO. TR-11
CONTRACT: Nonr-3925(00)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Technical rept. no. 11, AD-660 381.
DESCRIPTORS: (*ZINC, ETCHED CRYSTALS), (*CRYSTAL DEFECTS, *ETCHED CRYSTALS), CRYSTAL SUBSTRUCTURE, SOLVENTS, GEOMETRIC FORMS, SYMMETRY(CRYSTALLOGRAPHY), METAL CRYSTALS, ETCHING, SOLVENT ACTION, DISLOCATIONS, THESES (U)
IDENTIFIERS: ETCH PITS (U)

It is pointed out, by means of a literature review, that etch pits formed at the sites of singular defects in an otherwise slowly dissolving surface are usually shallow, composed of faces misoriented from that surface by only a few degrees. An etch pit study of the (0001) zinc surface dissolved in alcoholic hydrochloric acid solutions supports the theory that the slopes of etch pits are controlled by the dissolution kinetics of the crystals. Pits widen at a rate independent of the type of defect attacked, but the slopes are dictated by the relative rates of dissolution at the defect sites. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 664 554 20/6

AEROSPACE CORP EL SEGUNDO CALIF LAB OPERATIONS

ELIMINATION OF DAMAGE TO METALLOGRAPH OBJECTIVE LENSES BY ETCHANTS CONTAINING HYDROFLUORIC ACID. (U)

NOV 67 12P Richardson,James H. ;
REPT. NO. TR-0158(3250-10)-10
CONTRACT: F04695-67-C-0158
MONITOR: SAMSO TR-68-29

UNCLASSIFIED REPORT

DESCRIPTORS: (*MICROSCOPES, LENSES), (*LENSES, DAMAGE), ETCHING, VAPORS, INORGANIC ACIDS, PROTECTION, NEUTRALIZATION, SOLUTIONS(MIXTURES), IONS, FLUORINE COMPOUNDS, EFFECTIVENESS (U)
IDENTIFIERS: HYDROFLUORIC ACID (U)

A technique is described for eliminating the potential hazard to metallographic objectives from traces of hydrofluoric acid from etchants on specimens. Specimens are immersed for 1 hr in a solution containing ammonium pentaborate and are then rinsed and dried. This solution reacts with the acid to form a soluble and noncorrosive compound. No visible damage to metallorgraph lenses (i.e., etching) has been observed from the use of treated specimens. (Author) (U)

AD- 664 490 10/2 7/4

NAVAL RESEARCH LAB WASHINGTON D C

ON THE ACTIVITY OF PLATINUM CATALYSTS IN SOLUTION. PART I. EFFECTS OF THERMAL TREATMENT AND CHEMICAL ETCHING ON THE PT-O/HYDROGEN SPECIFIC REACTION RATE.(U)

DESCRIPTIVE NOTE: Interim rept.,
DEC 67 16P Warner,Theodore B. ;
Schuldiner,Sigmund ;Piersma,Bernard J. ;
REPT. NO. NRL-6622-Pt-1
PROJ: SF-020-05-01-0809

UNCLASSIFIED REPORT

DESCRIPTORS: (*FUEL CELLS, CATALYSTS), (*CATALYSTS, *PLATINUM), OXYGEN, HYDROGEN, REACTION KINETICS, CATALYSIS, HEAT TREATMENT, ETCHING, CHEMISORPTION, ELECTRODES, OXIDATION REDUCTION REACTIONS, ELECTROCHEMISTRY (U)

The effects of thermal treatment and chemical etching of platinum on the specific rate of the chemical reaction of chemisorbed oxygen with hydrogen were determined. The hydrogen was present in electrochemically clean 1M H2SO4 and in the derma of the metal. On successive thermal treatments of bright Pt beads, which were heated to the melting point and then slowly recrystallized under high temperatures, the specific rate varied randomly from trial to trial. Where heating was more uniform and the cooling rate slower, reaction of hydrogen with Pt-O was usually faster. Repeated aqua regia etching of a given Pt bead caused monotonic improvement until a rate between 0.014 and 0.021 amp/sq cm was attained. Rates on Pt wire electrodes, which probably differed from the flame-formed Pt beads both in average crystallite size and number of defects (created by the drawing process and only partially removed by subsequent annealing), were highly variable but considerably lower than on beads. Surfaces whose activity for the Pt-O/hydrogen reaction differed manyfold showed no differences in anodic charging curves. Electrochemical rates of water oxidation at +0.617 v and +0.587 v (NHE) and reduction of hydrogen ions at +0.300 v also did not differ. It appears that many electrochemical reactions are insensitive to these differences in surface condition. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 664 126 9/5

RADIO CORP OF AMERICA NEW YORK ADVANCED COMMUNICATIONS LAB

MICROMINIATURE MONOLITHIC CROSSPOINT INTERCONNECTIONS. (U)

DESCRIPTIVE NOTE: Final rept. no. 4, 1 Jul 66-30 Sep 67,
DEC 67 172P Yuan,S. ;Buchsbaum,W. H. ;
Kalet,M. ;Spann,L. ;
REPT. NO. CR-67-565-35
CONTRACT: DA-28-043-AMC-02260(E)
PROJ: DA-1H6-22001-A-440
TASK: 1H6-22001-A-440-01
MONITOR: ECOM 02260-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-653 597.
DESCRIPTORS: (*CIRCUIT INTERCONNECTIONS, *MICROELECTRONICS), MANUFACTURING, INTEGRATED CIRCUITS, PACKAGING, SWITCHING CIRCUITS, DIODES(SEMICONDUCTORS), SILICON, ULTRASONIC WELDING, DEPOSITION, ETCHING, RESISTORS, CHROMIUM, ELECTRICAL PROPERTIES (U)

The report describes the techniques used for fabricating a 1 x 4 microminiature crosspoint. It also presents results from electrical tests made on 1 x 1 and 1 x 4 crosspoints. A general discussion of process steps for manufacturing beam-lead diodes is given, followed by descriptions of the deposition and etching of chromium resistors and the gold interconnection patterns, mounting of monolithic logic chips, ultrasonic wire bonding, mounting of beam-lead diodes and the final packaging of a 1 x 4 crosspoint. (Author) (U)

AD- 663 885 11/2 20/11

NAVAL RESEARCH LAB WASHINGTON D C

ENVIRONMENTALLY ASSISTED CRACK GROWTH IN GLASS. (U)

DESCRIPTIVE NOTE: Interim rept.,
NOV 67 21P Sinclair,G. M. ;Withrow,S.
P. ;
REPT. NO. NRL-6635

UNCLASSIFIED REPORT

DESCRIPTORS: (*GLASS, *CRACKS), MECHANICAL PROPERTIES, FRACTURE(MECHANICS), RELIABILITY, FATIGUE(MECHANICS), STRESSES, SURFACE PROPERTIES, COATINGS, ENVIRONMENT, ATMOSPHERES, HUMIDITY, DEFECTS(MATERIALS), ETCHING (U)

IAC ACCESSION NUMBER: MCIC-005597
IAC DOCUMENT TYPE: MCIC -HARD COPY--

Glass exhibits the properties of high compressive strength and low density. However, the surface of unprotected glass contains flaws which grow under low stress in moist conditions to critical size for failure. Various methods were used to investigate and increase the reliability of glass under stress. Data were obtained on failure of unprotected glass plates subjected to biaxial tension at about 50-percent relative humidity. Analysis by extreme-value statistics indicated that the failure condition could be represented by a plane surface in a three-dimensional coordinate system composed of extreme-value probability, log stress, and log time. Removal of surface flaws by etching in 5-percent aqueous hydrofluoric acid increased the mean failure strength from approximately 30,000 psi to 145,000 psi, with a value of 300,000 psi biaxial tension being attained in one case. Increases in lifetimes of one, two, and three orders of magnitude were obtained by protecting the glass from atmospheric moisture by preheating and coating with petrolatum, preheating glass and coating with preheated petrolatum, and experimenting at -30F, respectively. Slight improvement in minimum time to failure was obtained by eliminating the weaker specimens by proof testing. (Author) (U)

AD- 662 748 9/1 9/5

RADIO CORP OF AMERICA SOMERVILLE N J DEFENSE MICROELECTRONICS

HIGH PERFORMANCE THIN FILMS FOR MICROCIRCUITS. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 10, 1 Jun-31 Aug 67,
NOV 67 50P Topfer,Morton L. ;Schelhorn, Robert L. ;Mitchell,Joseph H. ;
CONTRACT: DA-28-043-AMC-01230(E)
PROJ: DA-1C0-24401-A-348
MONITOR: ECOM 01230-10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-660 319.
DESCRIPTORS: (*FILMS, *RESISTORS), (*MICROELECTRONICS, *CIRCUITS), HAFNIUM, ELECTRICAL RESISTANCE, SUBSTRATES, HAFNIUM COMPOUNDS, OXIDES, SPUTTERING, ANODIC COATINGS, ETCHING, SILICON, SEMICONDUCTOR DEVICES, CAPACITORS, MANUFACTURING (U)

Fabrication of 1-megohm thin-film hafnium resistors (10,000 ohms/sq.) exhibiting temperature coefficients of resistance (TCR) of approximately -900 ppm was accomplished. A complete TCR curve was plotted from experimental data obtained from samples between 6 and 10,000 ohms/sq. deposited on glazed ceramic substrates. Investigation of etching procedures for fine-line resistor patterns to be deposited on passivated silicon wafers was begun. New resistor test patterns were chosen which will yield 1000 individual elements of five different geometries per wafer. Procedures for fabrication of resistors and capacitors using hafnium technology on silicon are outlined. Detailed capacitance-voltage plots of the hafnium-dioxide films indicated the presence of contaminants. Modifications in the fabrication processes eliminated most of the contamination. Characteristics are reported for P-channel MOS devices which were fabricated. (Author) (U)

AD- 661 042 9/5

TEXAS INSTRUMENTS INC DALLAS SEMICONDUCTOR-COMPONENTS DIV

HETEROCRYSTAL INTEGRATED CIRCUIT TECHNIQUES. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 5, 1 Mar-31 May 67,
OCT 67 22P Teague,E. Clayton ;Watelski, Stacy B. ;Dennis,C. ;Sharif,L. ;
REPT. NO. 03-67-66
CONTRACT: DA-28-043-AMC-02029(E)
PROJ: DA-1H6-22001-A-440
TASK: 03
MONITOR: ECOM 02029-5

UNCLASSIFIED REPORT

DESCRIPTORS: (*INTEGRATED CIRCUITS, MANUFACTURING), GERMANIUM, CRYSTAL GROWTH, GALLIUM ARSENIDES, SUBSTRATES, DEPOSITION, ETCHING, MASKING, ALUMINUM COMPOUNDS, OXIDES, SILICON COMPOUNDS, NITRIDES (U)

The report contains a summary of experimental work related to the following topics: (1) Use of aluminum oxide, silicon oxide, and silicon nitride as possible masking materials for selectively etching GaAs and Ge deposition in GaAs; (2) Isolation properties of GaAs sub SI as received from crystal processing and after oxide and germanium growth; (3) Device characteristics of junctions formed in germanium regions selectively grown in germanium and in gallium arsenide substrates. (Author) (U)

AD- 660 381 20/2

MCMASTER UNIV HAMILTON (ONTARIO)

A STUDY OF LITHIUM FLUORIDE ETCH MORPHOLOGIES USING SILICA GEL. (U)

DESCRIPTIVE NOTE: Technical rept.,
SEP 67 57P Ives,M. B. ;McElroy,R. O. ;
REPT. NO. TR-10
CONTRACT: Nonr-3925(00)

UNCLASSIFIED REPORT

DESCRIPTORS: (*LITHIUM FLUORIDES, *ETCHED CRYSTALS), (*SILICA GEL, ETCHING), MICROSTRUCTURE, ELECTRON MICROSCOPY, IRON, INHIBITION, CRYSTAL STRUCTURE, DISLOCATIONS, CANADA (U)
IDENTIFIERS: ETCHANTS (U)

Cleavage surfaces of lithium fluoride were etched on a silica hydrogel containing ferric ions as inhibitor. The dissolution etch pits and features were examined by interference and electron microscopy. The ledge structure of pits thus formed is very regular. It is proposed that the gel eliminates turbulence in the system and retards the diffusion of ferric ions towards the dissolving interface. An explanation for the observed rounding of pits at very high inhibitor concentration is proposed. (Author) (U)

AD- 658 947 9/1 14/4

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J ELECTRONIC COMPONENTS LAB

INCREASED RESISTANCE OF CRYSTAL UNITS AT OSCILLATOR NOISE LEVELS, (U)

APR 67 3P Bernstein,M. ;

UNCLASSIFIED REPORT

Availability: Published in Proceedings of the IEEE v55 n7 p1239-41 Jul 1967.
DESCRIPTORS: (*QUARTZ RESONATORS, DEFECTS(MATERIALS)), SURFACE PROPERTIES, ETCHING, RELIABILITY(ELECTRONICS), NOISE(RADIO), CRYSTAL OSCILLATORS, ELECTRICAL RESISTANCE (U)

Problems have been experienced with inoperative military equipment which have been traced to a defect in some quartz crystal units. This defect has been determined to be an increase in resistance (loss of Q) of crystal resonators when excited at very low power levels. The typical crystal oscillator, when first turned on, excites the resonator with thermal noise and consequently the power dissipated is very small. Simple instrumentation has been assembled to show clearly the low power increased crystal resistance effect. Tests have shown that surface defects, due to the final lapping process, contribute to the problem. The necessity of surface etch to remove the damaged surface layer is shown to be required to avoid defective crystal units. (Author) (U)

AD- 658 248 20/2 7/4 9/5

CALIFORNIA UNIV BERKELEY DEPT OF ELECTRICAL ENGINEERING

THE GROWTH AND ETCHING OF SI THROUGH WINDOWS IN SIO, (U)

67 10P Oldham,W. G. ;Holmstrom,R. ;

CONTRACT: AF-AFOSR-139-65
PROJ: AF-4751
MONITOR: AFOSR 67-2086

UNCLASSIFIED REPORT

Availability: Published in Journal of the Electrochemical Society v114 n4 p381-8 Apr 1967.
DESCRIPTORS: (*SILICON, *CRYSTAL GROWTH), (*ETCHING, SILICON), VAPOR PLATING, SILICON DIOXIDE, FILMS, MASKING, DIFFUSION, CONCENTRATION(CHEMISTRY), ETCHED CRYSTALS, INTEGRATED CIRCUITS, PREPARATION (U)

A theory of the kinetics of vapor deposition and etching through small openings in an oxide layer on Si is developed and compared with experiments. A model that assumes equilibrium at the Si surface and purely diffusive transport through the gas phase is used to derive the concentrations and fluxes of the interesting gaseous species in the neighborhood of the window. The previously reported concave growth surfaces and convex etching surfaces are explained by the constriction of the flow near the edges of the windows. The measured etch rate is in quantitative agreement with theoretical estimates based on this model. Furthermore, the derived concentration profiles explain the appearance and relative size of the band of oxide free from Si overgrowth which surrounds each window in the growth experiments. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMOB

AD- 655 098 20/6 14/2

JOHNS HOPKINS UNIV BALTIMORE MD LAB OF ASTROPHYSICS AND PHYSICAL METEOROLOGY

DEVELOPMENT OF DIFFRACTION GRATINGS FOR THE FAR ULTRAVIOLET. (U)

DESCRIPTIVE NOTE: Final rept. 1 Apr 64-31 Mar 67, APR 67 16P McClellan,J. F. ;Strong, John ;
CONTRACT: AF 19(628)-4077
PROJ: AF-6688
TASK: 668801, 66880102
MONITOR: AFCRL 67-0294

UNCLASSIFIED REPORT

DESCRIPTORS: (*DIFFRACTION GRATINGS, MANUFACTURING), (*SPECTRUM ANALYZERS, ULTRAVIOLET SPECTROSCOPY), GLASS, ETCHING, ION BOMBARDMENT, ULTRASONIC RADIATION, DESIG(U)

Work on procedures of ruling gratings for the far ultraviolet is reported in the following areas: (1) Ruling tools other than diamond. (2) Improvements in tool shape and lubrication. (3) Ruling properties of glass surfaces--fire polish versus pitch and felt polish; and composition. (4) Resists and management of etching by ultrasonic agitation. (5) Etching by ion bombardment. (6) Interpretation of electron microphotographs of grating grooves. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMOB

AD- 654 427 9/5 13/8

JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB

THIN FILM CIRCUIT TECHNIQUES. (U)

SEP 60 25P Byron,Ernest ;
REPT. NO. CF-2884
CONTRACT: NOrd-7386

UNCLASSIFIED REPORT

DESCRIPTORS: (*CIRCUITS, FILMS), MASKING, MANUFACTURING, ETCHING, SUBSTRATES (U)

A primary practical problem in the fabrication of thin film circuits is the development of a mask changer. If entire circuits are to be fabricated with dispatch, registration of numerous masks without 'breaking' the vacuum is necessary. This report deals with the fabrication of a 5 x 5 resistance matrix requiring four masks. The matrix although merely a vehicle for the design of a mask changer, required alignment of successive masks to within 5 mils without evacuating the chamber between each deposition. In addition to the matrix, capacitors of the order of 0.047 microfarads per sq. inch and associated topics such as masking, etching, substrates, and materials are also considered. (Author) (U)

AD- 654 305 20/2

TYCO LABS INC WALTHAM MASS

THE INVESTIGATION OF SILICON CARBIDE BY A TRAVELLING SOLVENT METHOD. (U)

DESCRIPTIVE NOTE: Final rept. 1 Mar 65-31 Jan 67,
APR 67 77P Wolff,G. A. ;Das,B. N. ;
CONTRACT: AF 19(628)-4384
PROJ: AF-4608
TASK: 460805
MONITOR: AFCRL 67-0271

UNCLASSIFIED REPORT

DESCRIPTORS: (*SILICON CARBIDES, CRYSTAL STRUCTURE), CRYSTAL GROWTH, CRYSTALLIZATION, ETCHING, ETCHED CRYSTALS, SOLVENTS, EPITAXIAL GROWTH, ALLOYS, X RAY DIFFRACTION, CRYSTAL DEFECTS (U)

IAC ACCESSION NUMBER: MCIC-004757
IAC DOCUMENT TYPE: MCIC -HARD COPY--

The crystallization of SiC from molten alloy mixtures of Cr-SiC, Cr5-Si3-SiC, and CrSi2-SiC of varying compositions was investigated. The resulting crystals were analyzed for their polytype structure and crystal morphology. Cubic (beta) SiC was obtained preferably from dilute solutions in molten Cr5Si3 when rapidly cooled. The amount of alpha-SiC increased for slower cooling rates; it was also greater for the other alloy mixtures. Structure identification was achieved by X-ray precession methods and by crystal morphology analysis. Etching in ClF3 gas at 400 C was used for the determination of polarity of SiC deposited from either molten alloy or from CH3SiCl3-H2 gaseous mixtures. This etch proved superior to previously used conventional etches in surface and dislocation studies. Epitaxial deposition was studied in detail with respect to substrate influence and structure propagation. Considerations on the crystal growth mechanism and on necessary requirements as dictated by morphology conditions are presented. It is stated that crystal growth and desired polytype formation can be well monitored by proper control of growth conditions as derived from morphology considerations, if it can be done at all. (Author) (U)

AD- 653 628 9/5 17/9

TEXAS INSTRUMENTS INC DALLAS SEMICONDUCTOR-COMPONENTS DIV

INTEGRATED CIRCUITS FOR PORTABLE RADAR EQUIPMENT. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 4, 1 Dec 66-28 Feb 67,
JUN 67 38P Teague,E. Clayton ;Watelski, Stacy B. ;Dennis,Charles F. ;Sharif,Louay ;

REPT. NO. 03-67-31
CONTRACT: DA-28-043-AMC-02029(E)
PROJ: DA-1E6-22001-A-440
TASK: 1E6-22001-A-44003
MONITOR: ECOM 02029-4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-650 040.
DESCRIPTORS: (*INTEGRATED CIRCUITS, *RADAR EQUIPMENT), PORTABLE EQUIPMENT, GALLIUM ARSENIDES, GERMANIUM, EPITAXIAL GROWTH, ETCHING, DEPOSITION, ELECTRICAL RESISTANCE (U)

The results of experiments on factors determining the surface structure and topography of the germanium growth front during selective etch and deposition in GaAs are summarized. Experimental data have been obtained which show that preferential growth near the pocket edges can be eliminated by partially refilling the etched regions. The surface topography of the selectively deposited germanium is determined primarily by the substrate temperature and the GeCl4 concentration. The device to be fabricated in the Ge pockets is described. (Author) (U)

AD- 653 335 7/2 8/7

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J INST FOR EXPLORATORY RESEARCH

MORPHOLOGICAL FEATURES OF HEXAGONAL FERRITES, (U)

DEC 66 13P Cook,Charles F. , Jr.;Nye, William F. ;

UNCLASSIFIED REPORT

Availability: Published in Materials Research Bulletin v2 p1-12 1967.
SUPPLEMENTARY NOTE: Presented at the International Conference on the Characterization of Materials, State Coll., Pa., November 16-18, 1966.
DESCRIPTORS: (*FERRITES, *MORPHOLOGY(BIOLOGY)), ELECTRON MICROSCOPY, MAGNETIC PROPERTIES, SINGLE CRYSTALS, CRYSTAL STRUCTURE, PHASE STUDIES, CRYSTAL DEFECTS, SAMPLING, CRYSTAL GROWTH, PHOTOMICROGRAPHY, ETCHING, THICKNESS, ERRORS, DATA, MEASUREMENT (U)

Depression growth spirals and vicinal-hill type spirals have been discovered on basal faces of single crystal hexagonal ferrite samples. Electron microscopy studies have resolved sub-unit-cell etch steps on 'process etched' and on HCl etched surfaces. A variety of crystalline imperfections have been noted and etch pit studies have indicated the number and kinds of dislocations present. (Author) (U)

AD- 652 300 20/12 7/4 20/2

MISSOURI UNIV ROLLA

ANODIC BEHAVIOR OF GAAS SINGLE CRYSTALS AT INCREASED CURRENT DENSITIES IN ALKALINE AND ACIDIC SOLUTIONS. (U)

DESCRIPTIVE NOTE: Technical rept., MAY 67 9P Krumme,J. -P. ;Straumanis, M. E. ;
REPT. NO. TR-16
CONTRACT: Nonr-2296(03)

UNCLASSIFIED REPORT

Availability: Published in Transactions of the Metallurgical Society of AIME v239 p395-402 Mar 1967.
DESCRIPTORS: (*GALLIUM ARSENIDES, ELECTROLYSIS), (*ETCHING, GALLIUM ARSENIDES), SINGLE CRYSTALS, ELECTROCHEMISTRY, CRYSTAL STRUCTURE, SOLUTIONS(MIXTURES), BASES(CHEMISTRY), ACIDS, CRYSTAL LATTICES, SURFACES, POROSITY, SYMMETRY(CRYSTALLOGRAPHY), CHEMICAL BONDS, ETCHED CRYSTALS, SEMICONDUCTORS (U)

Electrolytic treatment of smooth surfaces of poly- and single-crystalline GaAs at high anodic current densities causes the formation of porous surface layers. The purpose of the paper is to explore and to explain the reasons for the formation of such surface layers on GaAs and, in particular, to investigate the influence of the lattice polarity of this III-V compound semiconductor in the (111) direction on the anodic dissolution behavior. (U)

AD- 650 977 9/1

JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB

A MINIATURE MONOSTRIP NANOSECOND PULSE DELAY LINE, (U)

JUN 63 25P Gordon,Stanley H. ;
REPT. NO. CF-3034
CONTRACT: NOw-62-0604

UNCLASSIFIED REPORT

DESCRIPTORS: (*DELAY LINES, MICROELECTRONICS), DIELECTRICS, SILICONE PLASTICS, TITANIUM COMPOUNDS, DIOXIDES, COPPER, ALUMINA, ELECTROMAGNETIC PULSES, MANUFACTURING, PHOTOENGRAVING, ETCHING (U)

The miniature monostrip pulse delay lines described are smaller, lighter and more rugged than the equivalent coaxial line. They can be fabricated in many form factors and can be made to operate in extreme environments of near absolute zero temperature to over 1000C. Standard photographic plating and etching techniques are employed in the fabrication of these lines and the techniques are easily adapted to economical production procedures. The electrical design of the monostrip line is quite simple and flexible and almost any reasonable desired characteristic can be designed into the delay line. (Author) (U)

AD- 647 160 14/5 9/5

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J INTEGRATED ELECTRONICS DIV

DURABLE CHROMIUM MASKS FOR PHOTORESIST APPLICATIONS. (U)

DESCRIPTIVE NOTE: Revised ed.,
MAY 66 1P Rogel,Alex ;

UNCLASSIFIED REPORT

Availability: Published in The Review of Scientific Instruments v37 n10 p1416 Oct 1966.
SUPPLEMENTARY NOTE: Revision of manuscript submitted 22 Mar 66.
DESCRIPTORS: (*METAL FILMS, *PHOTOENGRAVING), CHROMIUM, FILMS, CIRCUITS, SUBSTRATES, VAPOR PLATING, ETCHING (U)
IDENTIFIERS: THICK FILMS (U)

Chemically pure chromium powder was melted under vacuum in a carbon crucible in a standard MRC EVD 96 BJ electron beam vapor deposition unit. Thorough cleaning of the microscope slides first in detergent, then ultrasonically in acetone, alcohol, and distilled water, proved to be of utmost importance for achieving Cr films free of pinholes. Outgassing of the source was then performed at a beam setting of 0.5 kV and 50 mA before opening the shutter for the deposition cycle. Most satisfactory 3000 A films with good adherence were obtained during 45 min evaporation time at a beam setting of 100 mA and 1 kV. The substrate was not directly heated before or during evaporation. Before etching, these films were coated with Photoresist Kodak KPR. The desired patterns were then exposed to ultraviolet light and developed. Chromium films of 3000 A thickness were etched within a 2 min period. After etching, the photoresist was removed, and the slide was heated for 10 min at 400C. (U)

AD- 646 957 20/12 20/3

OXFORD UNIV (ENGLAND) ENGINEERING LAB

FIELD EMISSION FROM CADMIUM SULPHIDE, (U)

NOV 66 3P Husain,S. A. ;Walsh,D. ;
CONTRACT: AF-EOAR-37-65
PROJ: AF-9767
TASK: 976702
MONITOR: AFOSR 67-0317

UNCLASSIFIED REPORT

Availability: Published in Electronics Letters v2 n12 n.p. Dec 1966.
DESCRIPTORS: (*CADMIUM SULFIDES, *FIELD EMISSION), SINGLE CRYSTALS, ETCHING, ETCHED CRYSTALS (U)

A technique for etching fine field emitters of CdS single crystals was developed. Relatively high field-emission currents at low voltages were obtained (typically 0.000001A at 2kV). The results, when plotted, agree with the Fowler-Nordheim equation, with deviations at currents above 10 to the minus 7th power A and below 10 to the minus 9th power A. Possible explanations of the deviations are discussed. (Author) (U)

AD- 645 201 13/8 11/6

STANFORD RESEARCH INST MENLO PARK CALIF

GASEOUS PRECISION ETCHING OF MOLYBDENUM. (U)

DESCRIPTIVE NOTE: Technical rept.,
NOV 66 38P Preist,Ruth C. ;
CONTRACT: Nonr-2887(00)
PROJ: SRI-2863

UNCLASSIFIED REPORT

DESCRIPTORS: (*METAL FILMS, MOLYBDENUM), (*MOLYBDENUM, ETCHING), GASES, PRECISION FINISHING, OXYGEN, HYDROGEN COMPOUNDS, CHLORIDES, MACHINING, OXYCHLORIDES (U)
IDENTIFIERS: THICK FILMS (U)

Reactions which lead to the solution or volatilization of molybdenum and which are suitable for high-precision etching of patterns in thin films of molybdenum are not well known. In a search for a process for etching cavities in films 1mu thick it has been found that the formation and simultaneous removal of molybdenum trioxide can be achieved by exposure of heated molybdenum films to a mixture of oxygen and hydrogen chloride gases. Etch rates of 1000 to 10,000 A/min have been obtained with specimen temperatures of 400 to 600C and with gas pressures between 0.1 and 1 torr. An etch factor of about 2 has been typical, and the final etched surface has been as smooth if not smoother than the original surface. Aluminum oxide of about 0.1mu thickness has been used as a resist. It is hoped than an electron-exposed organic resist can eventually be adapted for use with this process. Discussion and speculation on the mechanism of formation of the oxide and its removal have been included, as well as discussion of some of the factors which are important in predicting the optimum conditions for etching. A residue of a very thin, adherent layer of MoO2 on partially etched molybdenum surfaces has been a problem, and means for removing this film are discussed. The process appears to have promise for etching with dimensional control accurate to better than 0.1mu in films 1mu thick. Greater precision may be possible in films thinner than 1mu. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 645 047 9/5 20/12

TEXAS INSTRUMENTS INC DALLAS SEMICONDUCTOR-COMPONENTS DIV

INTEGRATED CIRCUITS FOR PORTABLE RADAR EQUIPMENT. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 2, 1 Jun-31 Aug 66,
DEC 66 43P Teague,E. Clayton ;
REPT. NO. TI-03-66-130
CONTRACT: DA-28-043-AMC-02023
PROJ: DA-1E6-22001-A-440
TASK: 1E6-22001-A-440-03
MONITOR: ECOM 02029-2

UNCLASSIFIED REPORT

DESCRIPTORS: (*INTEGRATED CIRCUITS, *RADAR EQUIPMENT), PORTABLE EQUIPMENT, GALLIUM ARSENIDES, ETCHING, VAPOR PLATING, EPITAXIAL GROWTH, GERMANIUM COMPOUNDS, CHLORIDES (U)

Experimental results, and a theoretical description for vapor etching GaAs with HCl in H2 and H2 + AsH3 gas mixtures, are presented. Optical microscopy and surface profile studies of various surfaces have been performed to relate the initial substrate surface to the resulting germanium growth surface. These surface studies were made for selective and non-selective etch and deposition processes. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 644 652 11/6 20/2

LEHIGH UNIV BETHLEHEM PA DEPT OF METALLURGY AND MATERIALS SCIENCE

REPLICATION OF FINE STRUCTURE IN MARTENSITE. (U)

APR 66 2P Shapiro,S. ;Krauss,G. ;
MONITOR: AROD 4806:1

UNCLASSIFIED REPORT

Availability: Published in Transactions of the Metallurgical Society of AIME v236 p1371-3 Sep 1966.
DESCRIPTORS: (*MARTENSITE, MICROSTRUCTURE), (*METALLOGRAPHY, MARTENSITE), ETCHING, TRANSFORMATIONS, ELECTRON MICROSCOPY, AUSTENITE, ETCHED CRYSTALS, DENSITY (U)

Recent investigations of the products of martensitic transformation in Fe-Ni and Fe-Ni-C alloys have made use of light microscopy to describe martensitic fine structure. The application of conventional metallographic techniques to this problem was possible because of the similarity of distributions of parallel striations developed by etching polished surfaces to distributions of transformation twins which are positively identified in thin films by transmission electron microscopy. The surface striations frequently are not well-defined, and could also be due to, for example, rows of etch pits which are not resolved by the light microscope. This note describes the etching effects revealed by examination of surface replicas of martensite in the electron microscope. The application of a replica technique both extends the observations of fine structure made with the light microscope and allows the results of conventional metallography to be used with more confidence. (U)

AD- 643 540 18/4

NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF

A STANDARDIZED METHOD FOR MAKING NEUTRON FLUENCE MEASUREMENTS BY FISSION FRAGMENT TRACKS IN PLASTICS,(U)

DEC 66 32P Tochilin,Eugene ;Pretre,S. ; Goldstein,Norman ;
REPT. NO. USNTRDL-TR-1089

UNCLASSIFIED REPORT

DESCRIPTORS: (*NEUTRON DETECTORS, DESIGN), (*NEUTRON FLUX, MEASUREMENT), NUCLEAR ENERGY, NUCLEAR CROSS SECTIONS, SENSITIVITY, DAMAGE, RADIATION EFFECTS, FISSION PRODUCTS, PLASTICS, COUNTING METHODS, ETCHING (U)

A neutron detector is described which consists of a fission foil (232Th, 235U, 238U, 237Np or 239Pu) in contact with a plastic track detector. These detectors were exposed to reactor neutrons and to monoenergetic neutrons with energies between 1.0 - 18 MeV. Fission fragment tracks registered in the plastic were selectively etched by an hydroxide and counted in an optical microscope. For thick foils of fissionable metals the sensitivity of the system was found to be (1.16 plus or minus 3%) X 10 to the minus 5th power fission fragment tracks/neutron - barn which is in good agreement with theoretical calculations. This sensitivity is independent of the fissionable element used, independent of the neutron energy, fairly independent of the material chosen for track registration (plastics, glass, mica) and of etching conditions. Since the (n,f) cross sections are accurately known for most neutron energies, the above constant can also be used for standardized measurements of neutron fluences. (U)

AD- 642 794 18/4

NAVAL RADIOLOGICAL DEFENSE LAB SAN FRANCISCO CALIF

RANGE AND DEPTH DOSE DISTRIBUTION OF LOW ENERGY CHARGED PARTICLES IN DOSIMETRY GLASSES, (U)

OCT 66 23P Becker,K. ;
REPT. NO. USNRDL-TR-1088
PROJ: SF-011-05-11
TASK: 0503

UNCLASSIFIED REPORT

DESCRIPTORS: (*DOSIMETERS, GLASS), (*DOSE RATE, MEASUREMENT), (*ETCHING, DOSIMETERS), NUCLEAR PARTICLES, NUCLEAR ENERGY LEVELS, LUMINESCENCE, ETCHING, PROTONS, DEUTERONS, ALPHA PARTICLES, ERRORS, RADIATION MEASURING INSTRUMENTS (U)

A new method for the direct determination of particle ranges and depth dose distributions in silver-activated phosphate glasses is based on the successive removal of extremely thin surface layers from the exposed glass by chemical etching ('peeling') and measurement of the residual radiophotoluminescence between successive etchings. Glass composition, etching chemicals and etching speed can be varied within wide limits. The experimental technique, using Yokota-type dosimeter glasses and 28% NaOH at 60C (etching speed 0.12 microns/min.) is briefly described. As examples for the practical application of the method, measurements using several types of radiation sources (aqueous solutions of 3H, 63Ni and 35S, solutions and thin and thick solid sources of 239Pu, 237Np and 235U, monoenergetic protons, deuterons and He(+) ions in a wide energy range) were made. Accuracy, possibilities and limitations of the method are briefly discussed. Possible sources of error are: discoloration of the glass because of very high surface doses; incertainties in the determination of the etching speed; etching speed along charged particle tracks higher than the bulk etch rate for ions of very high LET. (Author) (U)

AD- 642 425 9/1 13/8

BULOVA WATCH CO INC WOODSIDE N Y ELECTRONICS DIV

PRODUCTION ENGINEERING MEASURE FOR TYPE CR-(XM-60)/U CRYSTAL UNITS. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 8, Apr-Jun 66,
JUN 66 18P Dance,K. ;
CONTRACT: DA-36-039-AMC-03633(E)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-633 688.
DESCRIPTORS: (*QUARTZ RESONATORS, MANUFACTURING), CRYSTAL HOLDERS, WELDING, QUALITY CONTROL, LOW FREQUENCY, VAPOR PLATING, VACUUM APPARATUS, RELIABILITY(ELECTRONICS), ETCHING, ETCHED CRYSTALS, QUARTZ (U)

Resistance welding as a means of lead attaching is not recommended for center mounted crystal units since pull test values are much too low. The method does not show any merit which would warrant further investigations at this time. Ultrasonic welding of leads to the blank is the only method which has not been fully investigated. Thermo-compression bonding and resistance welding was investigated to the point where they were shown to be not suitable methods of attaching center leads to low frequency crystal units. In general their pull test values are too low. Vacuum final plating can be done successfully on low frequency crystal units provided extreme accuracy is taken in the lapping and etching of the crystal loaves to frequency. (Author) (U)

AD- 642 040 20/2

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD MASS

CRYSTAL PERFECTION OF ALPHA-AL203 AS A FUNCTION OF GROWTH METHOD. (U)

DESCRIPTIVE NOTE: Physical sciences research papers,
SEP 66 38P Sahagian,Charles S. ;
REPT. NO. AFCRL-PSRP-268 ,AFCRL-66-659
PROJ: AF-5620
TASK: 562005

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at General Assembly (7th), International Congress and Symposium, International Union of Crystallography, Moscow, Jul 66.
DESCRIPTORS: (*RUBY, CRYSTAL DEFECTS), (*SAPPHIRE, CRYSTAL DEFECTS), CRYSTAL GROWTH, ETCHING, ALUMINUM COMPOUNDS, OXIDES (U)

IAC ACCESSION NUMBER: MCIC-004157
IAC DOCUMENT TYPE: MCIC -HARD COPY--
Synthetic ruby and sapphire crystals grown by flame-fusion and flux methods are described and discussed in terms of growth method and growth techniques. Dislocation densities are given for all samples, and comparisons are made in an attempt to obtain correlation between the growth method used and the resulting lattice defect structure. Data are presented for crystals grown by various methods, namely, Verneuil, flux, hydrothermal, electron-beam zone refining, Czochralski, vapor deposition, and plasma torch methods. Dislocation density evaluation is based on chemical etchpit analysis, which produced average dislocation density values varying from about 1,000,000/sq cm for crystals grown by the plasma torch method to about 1000/sq cm for crystals grown by the electron-beam method. Crystals grown by the other methods mentioned about show dislocation densities lying between these values. A brief description is presented of the chemical etching techniques and apparatus used at AFCRL. (Author) (U)

AD- 641 500 11/2 11/4

STATE UNIV OF NEW YORK STONY BROOK DEPT OF MATERIALS SCIENCE

MECHANISMS OF ATTACK ON GLASSES IN AQUEOUS MEDIA. (U)

DESCRIPTIVE NOTE: Interim scientific rept., 1 Jun-20 Sep 66,
SEP 66 70P Levine,Sumner N. ;LaCourse, William C. ;
CONTRACT: Nonr-4803(00)

UNCLASSIFIED REPORT

DESCRIPTORS: (*GLASS TEXTILES, SURFACE PROPERTIES), ETCHING, ACIDS, MICROSTRUCTURE, PHASE STUDIES, CHEMICAL REACTIONS, SILICON COMPOUNDS, BORON COMPOUNDS, OXIDES, CORROSION, COMPOSITE MATERIALS (U)

IAC ACCESSION NUMBER: PL-009562
IAC DOCUMENT TYPE: PLASTC -HARD COPY--

As part of a program concerned with the influence of surface properties of glass on the behavior of reinforced plastics, we report here on an electron microscope study of aqueous attack on glass. Micrographs of E and 994 glasses, treated in solution of pH 2 through 11, are shown and a discussion of these micrographs is given. The effects of large scale phase separation in these glasses are discussed and plausible mechanisms for aqueous attack on these glasses are given. A detailed discussion of glass structure and a survey of earlier work on chemical attack is given in the introduction. An alternative approach to the boric oxide anomaly is also suggested. (Author) (U)

IAC SUBJECT TERMS: P--(U)SEM, Fiberglass E, Surface chemistry, Chemical resistance, ZZ Unlimited.;

AD- 639 068 9/5

BUNKER-RAMO CORP CANOGA PARK CALIF DEFENSE SYSTEMS DIV

PLANAR COAXIAL INTERCONNECTION TECHNIQUES. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 1, 1 Apr-30 Jun 66.
SEP 66 41P Parks,H. L. ;Smith,C. W. ; Older,R. B. ;
REPT. NO. F-058,
CONTRACT: DA-28-043-AMC-02024(E),
PROJ: DA-1E6-22001-A440,
TASK: 1E6-22001-A440-01,
MONITOR: ECOM 02024-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*CIRCUIT INTERCONNECTIONS, MANUFACTURING), MICROELECTRONICS, ALUMINUM ALLOYS, LAMINATES, METAL PLATES, ETCHING (U)

The object of this work is the development of planar coaxial interconnection techniques that integrate the batch fabrication advantages of printed circuits with the electrical characteristics of point-to-point coaxial wiring by forming coaxial conductors within laminated aluminum plates. Analyses and investigations have been completed on three types of aluminum, eight types of surface preparation, and two types of photo resist; in addition, several combinations of etch solutions and etch times have been studied. Work to date indicates that the aluminum surface can be prepared by mechanical sanding, followed by trichloroethylene vapor cleaning; with this approach, Kodak KMER or KPR is used as the photo resist, 22 degree Baume ferric chloride is used as the etchant, and alloy 1100 aluminum is used as the substrate. An alignment tool, for punching holes in photographic film masks and the aluminum plates to an accuracy of 0.0001 inch, has been fabricated and is being investigated. Results obtained indicate that channels can be etched into aluminum plates with depths controlled to an accuracy of 0.5 mil, that cavity widths can be etched to within plus or minus 1.0 mil, and that the etched channel linearity can be held to within plus or minus 0.3 mil. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 637 803 20/2

PERKIN-ELMER CORP NORWALK CONN

THE PREPARATION OF ORIENTED SINGLE CRYSTAL SPHERES OF INTERMETALLIC COMPOUNDS BETWEEN THE RARE EARTH AND IRON GROUP METALS. (U)

DESCRIPTIVE NOTE: Technical rept., 1 Oct 64-30 Sep 65.

NOV 65 32P Nester,James F. ;
CONTRACT: AF 33(657)-11282,
PROJ: AF-7371,
TASK: 737103,
MONITOR: AFML TR-65-390

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*SINGLE CRYSTALS, SPHERES), (*INTERMETALLIC COMPOUNDS, *CRYSTAL GROWTH), NEODYMIUM ALLOYS, COBALT ALLOYS, YTTERBIUM ALLOYS, TEMPERATURE CONTROL, IMPURITIES, BAND THEORY OF SOLIDS, REFRACTORY MATERIALS, CRYSTAL STRUCTURE, SYMMETRY(CRYSTALLOGRAPHY), ETCHING (U)
IDENTIFIERS: YTTERBIUM ALLOYS (U)

IAC ACCESSION NUMBER: MCIC-065494
IAC DOCUMENT TYPE: MCIC -HARD COPY--

Using minor modifications of a process previously developed (see AD-611 430), single crystal spheres up to 2 mm in diameter of Nd2Co17 and Y2Co17 were prepared. Details of the experimental work are presented. Attempts to find a suitable automatic temperature control scheme for the process were unsuccessful. As a result, impurity 'banding' of the zone-melted ingots remained a problem throughout the program and caused a lack of reproducibility in crystal growth experimental results. The ceramic material 'Lucalox' was found to be at least as suitable as Morganite alumina for use as a crucible material with rare earth-iron or cobalt melts. Efforts to orient the single crystal spheres by an optical Laue technique were unsuccessful, primarily because of the inability to consistently produce well-formed etch features exhibiting recognizable symmetry on the crystals. Etchant techniques tried included chemical etchants, thermal etching in air, and cathodic sputtering. (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 637 114 9/1 13/8

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

PRODUCTION ENGINEERING MEASURE FOR SILICON NPN SWITCHING TRANSISTORS. (U)

DESCRIPTIVE NOTE: Quarterly progress rept. no. 2, 25 Aug-25 Nov 65.
NOV 65 23P Steinmann,Charles ;Freese, Jack ;
CONTRACT: DA-36-039-AMC-06164(E),
PROJ: 26072,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-627 823
DESCRIPTORS: (*TRANSISTORS, MANUFACTURING), (*ELECTRONIC SWITCHES, TRANSISTORS), SILICON, PHOTOETCHING, DOPING, ETCHING, DIFFUSION, OXIDES, ALUMINUM COATING, ASSEMBLY, PACKAGING, RELIABILITY(ELECTRONICS), QUALITY CONTROL, ULTRASONIC WELDING (U)

An increase in basewidth resulted in improved beta and breakdown voltage range control. Diffusion time, temperature, and gas flow variations was studied and show no adverse variation. A change in oxide etching solution and temperature resulted in increased photoresist yields. Test of KMER versus KTFR emulsions have shown KMER to be superior in small pattern processing. The cause of discolored aluminum metallization was traced to the presence of oxygen in the evaporator. Installation of an ultrasonic wire bonder and in-process quality assurance wire bond inspection proved to be valuable in increasing assembly yields. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 637 020 9/1 13/8

RAYTHEON CO MOUNTAIN VIEW CALIF SEMICONDUCTOR OPERATIONS

SILICON, PNP, MEXA TRANSISTOR, TYPES 2N328A JAN AND 2N329A JAN. (U)

DESCRIPTIVE NOTE: Quarterly progress rept. no. 1, 29 Nov 65-28 Feb 66.
FEB 66 27P Chien,Frank ;Wiesner,Sidney
;

CONTRACT: DA-36-039-AMC-06172(E),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-636 762.
DESCRIPTORS: (*TRANSISTORS, SILICON), MANUFACTURING, RELIABILITY(ELECTRONICS), DIFFUSION, EPITOXIAL GROWTH, ETCHING, DISKS, DIBORANES (U)

A PERT Analysis and Gantt Chart Schedule of the entire program have been prepared and accepted. Required facilities have been obtained, installed, and are now operative. This being the initial progress report, brief descriptions of original processes and the proposed process improvements are presented. Experiments in isolation diffusion and spray etching have been initiated and evaluated by Reliability Assurance. The results are encouraging. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 636 762 9/1

RAYTHEON CO MOUNTAIN VIEW CALIF SEMICONDUCTOR OPERATIONS

SILICON, PNP, MEXA TRANSISTOR TYPES JAN 2N328A AND JAN 2N329A. (U)

DESCRIPTIVE NOTE: Quarterly progress prot. no. 2, 1 Mar-29 May 66.
MAY 66 22P Chien, Frank ;Wiesner,Sidney
;

CONTRACT: DA-36-039-AMC-06172(E),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*TRANSISTORS, SILICON), MANUFACTURING, RELIABILITY(ELECTRONICS), DIFFUSION, EPITAXIAL GROWTH, DISKS, ETCHING (U)

Experimental lost of MEXA Transistors incorporating the following programmed process improvements were fabricated in the engineering laboratory and submitted for reliability evaluation. The subtle epitaxial wafer material problem encountered during the first quarter of performance was corrected by the application of replacement material, i.e., wafers from a subsequent lot of purchased material which precluded channeling. Recurrence of the difficulty is expected to be avoided by qualifying each material shipment prior to production until material confidence has been restored. The evaluation results of Lots A through H incorporating the Isolation Diffusion and Spray Etch process improvements indicate substantial improvement in device reliability. Lots I through M are now being evaluated for reliability results. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 635 828 13/11

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO

A METHOD OF MAKING MESH FILTERS FROM MATERIALS AND ALLOYS. (U)

MAY 66 6P Chevashova, K. L. ;
REPT. NO. FTD-HT-66-189.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Unedited rough draft trans. of Patent (USSR) 134 092, appl. 659186/22, 18 Mar 60.
DESCRIPTORS: (*FLUID FILTERS, PATENTS), METALS, ALLOYS, USSR, ETCHING, ELECTROLYSIS, HYDROCHLORIC ACID, METAL FILMS, FOILS(MATERIALS), SOLVENT EXTRACTION (U)

The object of the invention is a method of making mesh filters from metals and alloys by selective anode etching, in solutions of hydrochloric acid or its salts, of initial billet from a foil obtained by rolling or by pressing and sintering metallic powders. To intensify the process and improve the quality of the mesh, electrolysis is conducted under conditions set forth in the disclosure. To obtain a mesh from metals and alloys that cannot be etched (for example, tungsten, molybdenum and tantalum) other metals (for example, zinc, cadmium, iron) that form structural components in the composition of the alloy that are soluble in the selected electrolite are introduced into the composition of the initial billet. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 635 814 9/1 13/8

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY TRANSISTORS. (U)

DESCRIPTIVE NOTE: Quarterly progress rept. no. 4, 1 Oct-31 Dec 65.
DEC 65 37P Cassidy, Michael ;Green,Paul ;
CONTRACT: DA-36-039-AMC-06156(E),
PROJ: DA-7401,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-635 118.
DESCRIPTORS: (*TRANSISTORS, MANUFACTURING), (*SILICON, TRANSISTORS), DISKS, PREPARATION, BONDING, DIFFUSION, STORAGE, RELIABILITY(ELECTRONICS), ULTRASONIC WELDING, CHEMICAL MILLING, ETCHING, ELECTRIC TERMINALS (U)

Progress during the past quarter has consisted of the following: (1) Wafer Preparation: Processing of 1 1/2-inch slurry-polished and chemically etched wafers using the new preohmic two-step photoresist process. (2) Mask Resolution and Alignment: Vertical and horizontal dimensional inspection of masks to eliminate mask variations. (3) Deionized Water Boil: Evaluation of ultrasonically wire-bonded devices after subjection to deionized water boil. (4) Wire Bonding: Evaluation of units fabricated using a Sono Bond ultrasonic bonder. (5) Diffusion Systems: Final evaluation of the BCl3 system. Emitter diffusion employing a controlled POCl3 source temperature. (6) Reliability Evaluation: Evaluation of completed units. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 635 143 9/5 13/8 7/5

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER

PHOTOMETALLIC PROCESS INVESTIGATION. (U)

DESCRIPTIVE NOTE: Interim development rept. no. 2, 1 Mar-31 May 66.
JUN 66 26P Schaefer, D. L. ;Burgess,J. F. ;
CONTRACT: NOOsr-95045,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-631 330.
DESCRIPTORS: (*PHOTOENGRAVING, INTEGRATED CIRCUITS), (*INTEGRATED CIRCUITS, PREPARATION), (*ETCHING, *PHOTOCHEMICAL REACTIONS), GOLD, NICKEL ALLOYS, CHROMIUM ALLOYS, CHLORINE COMPOUNDS, BROMINE COMPOUNDS, IODINE COMPOUNDS, PHOTOSENSITIVITY, SPECTROSCOPY, PHOTOLYSIS, POLYMERS, SOLVENTS, COMPATIBILITY, REACTION KINETICS, MICROELECTRONICS (U)
IDENTIFIERS: NICHROME (U)

The project has as its ultimate objective the fabrication of microminiature circuits in gold, nichrome, aluminum and silica by a process in which these materials are etched directly by a photosensitive material according to an incident light pattern. The evaluation of potential light sensitive halogens was extended. Spectrophotometric studies of chloro, bromo and iodo systems for etching gold were conducted. Etchant products are identified and etching mechanisms are proposed. Studies of the compatibility of polymers, solvents, and photo etchants were conducted. Reaction rate studies were initiated. The production of circuit patterns in gold and nichrome by several photometallic systems was demonstrated. (Author) (U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 634 762 9/1 13/8

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J

CHROMIUM MASKS FOR MICROCIRCUITRY. (U)

DESCRIPTIVE NOTE: Technical rept.,
MAY 66 20P Rogel, Alex ;
REPT. NO. ECOM-2715,
PROJ: DA-1P622001A056,
TASK: 02,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*INTEGRATED CIRCUITS, PHOTOENGRAVING), (*FILMS, CHROMIUM), ETCHING, PROCESSING, ELECTRON BEAMS, VAPOR PLATING, GLASS, SILICON (U)
IDENTIFIERS: THIN FILMS (U)

A method for preparing durable chromium films which may be used as masks in making photoresist patterns for microcircuitry has been developed. Films deposited by this method were found to have excellent adhesion to glass and silicon and produced good uniform and reproducible patterns. A technique for etching chromium films was developed using a photoresist process and an acid and metal etchant. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD- 634 392 13/8 20/2

NAVAL ORDNANCE LAB WHITE OAK MD

POLISHES AND ETCHES FOR TIN TELLURIDE, LEAD SULFIDE, LEAD SELENIDE, AND LEAD TELLURIDE: SUPPLEMENT. (U)

DESCRIPTIVE NOTE: Final rept. Jun 63-Feb 66,
MAR 66 15P Norr, Marriner K. ;
REPT. NO. NOLTR-66-32,
PROJ: FR-46,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-423 367.
DESCRIPTORS: (*CHEMICAL MILLING, CRYSTALS), (*ETCHING, CRYSTALS), (*ELECTROLYTIC POLISHING, CRYSTALS), (*CRYSTALS, PRECISION FINISHING), TIN ALLOYS, TELLURIUM ALLOYS, LEAD ALLOYS, LEAD COMPOUNDS, SULFIDES, SELENIUM ALLOYS, INTERMETALLIC COMPOUNDS, CRYSTAL DEFECTS (U)
IDENTIFIERS: LEAD(II) SULFIDE, LEAD TELLURIDE, LEAD SELENIDE, TIN TELLURIDE (U)

This report is a continuation of NOLTR 63-156 (AD-423 367). Together, the two reports present a review of chemical and electrolytic polishes and dislocation etches for SnTe, PbS, PbSe, and PbTe, covering the period from 1907 through 1965. The present report also describes a new polish and a new dislocation etch for tin telluride, as well as tests on and improvements in some of the polishes reported in earlier publication. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD- 633 601 11/6 11/2

FRANKLIN INST RESEARCH LABS PHILADELPHIA PA

ETCH-PITTING CHARACTERISTICS OF HIGH-PURITY MOLYBDENUM. (U)

DESCRIPTIVE NOTE: Interim technical rept.,
JUL 65 38P Prekel,H. L. ;Lawley,A. ;
REPT. NO. I-B2195-1,
CONTRACT: Nonr-4434(00),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*MOLYBDENUM, ETCHING), DEFECTS(MATERIALS), METAL CRYSTALS, CRYSTAL DEFECTS, SINGLE CRYSTALS, MICROSTRUCTURE, ELECTRON MICROSCOPY, FOILS(MATERIALS) (U)

The etch-pitting behavior of single and polycrystalline molybdenum was examined using various etching solutions and prior heat treatments. Murakami's solution, Wolff's solution, oxalic acid and sulphuric acid in methanol are found effective on planes in a region 30 degrees about < 001>, however it is shown that a one to one correspondence between etch-pits and dislocations does not necessarily exist. A plane about 11 degrees from <112> towards <012>, which is to be the observation plane in the dislocation velocity studies, was examined in detail. Reliable and reproducible pitting of dislocation sites occurs on this plane with a diluted Murakami's solution. A one to one correspondence between etch-pits and dislocations was positively established by transmission electron microscopy of thin foils of this orientation etched prior to examination. The etch-pit shape depends critically on the crystal orientation but is independent of the nature or Burgers vectors of the dislocations. Annealing of molybdenum single crystals at about 1900 degrees C in hydrogen for 8 hours lowers the dislocation density from about 10 to the 8th power/sq cm to 1, 000,000/sq cm as determined from both etch-pitting and transmission electron microscopy. The dislocation density is reduced by (i) complete removal of carbides in the metal matrix (the carbides being responsible for the high in-grown dislocation density) and (ii) re-arrangement of the dislocations into sub-grain boundaries. (U)

AD- 633 185 20/12 7/4

LINCOLN LAB MASS INST OF TECH LEXINGTON

CHEMICAL BEHAVIOUR OF SEMICONDUCTORS: ETCHING CHARACTERISTICS, (U)

65 71P Gatos,H. C. ;Lavine,M. C. ;
REPT. NO. JA-2092,
CONTRACT: AF 19(628)-5167,SD-90
MONITOR: ESD , TR-66-171

UNCLASSIFIED REPORT

Availability: Published in Progress in Semiconductors v9 p3-45.
SUPPLEMENTARY NOTE: Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.
DESCRIPTORS: (*SEMICONDUCTORS, CHEMICAL PROPERTIES), (*ETCHING, SEMICONDUCTORS), SOLUTIONS(MIXTURES), ELECTROCHEMISTRY, SURFACE PROPERTIES, REACTION KINETICS, CARRIERS(SEMICONDUCTORS), CRYSTAL DEFECTS, IMPURITIES, ELECTROLYTES, FILMS, KINEMATICS, SEMICONDUCTOR DEVICES, CHEMICAL BONDS, TRANSPORT PROPERTIES, MICROSTRUCTURE, ACIDS, REVIEWS (U)

The chemical properties of semiconductor surfaces are discussed to the extent that they contribute to the nature and applications of chemical etching. Topics include: The dissolution process (general remarks, the electrochemistry of dissolution, carrier-limited kinetics, diffusion-limited kinetics); Some factors affecting chemical etching (surface orientation, surface damage, defects, impurities in semiconductors, impurities in etching electrolytes, surface films); Kinematic consideration of etching; Practical considerations (general remarks, surface preparation, structural characterization, device fabrication); Table of etchants. (U)

AD- 631 330 9/1 13/8

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND DEVELOPMENT CENTER

PHOTOMETALLIC PROCESS INVESTIGATION. (U)

DESCRIPTIVE NOTE: Interim development rept. no. 1, 1 Dec 65-28 Feb 66,
MAR 66 47P Schaefer,Donald L. ;
CONTRACT: NOOsr-95045,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*MINIATURIZATION(ELECTRONICS), MANUFACTURING), PHOTOSENSITIVITY, ETCHING, GOLD, ALUMINUM, HALOGEN COMPOUNDS, SULFIDES, CYANIDES, SUCCINIMIDES, NICKEL ALLOYS, CHROMIUM ALLOYS, METHANE, IODINE COMPOUNDS, IRON COMPOUNDS, CHLORIDES, PHOTOCHEMICAL REACTIONS, SILICON COMPOUNDS, DIOXIDES (U)
IDENTIFIERS: IODOFORM, IRON(III) CHLORIDE, IRON(II) CYANIDE/POTASSIUM, NICHROME (U)

The project has as its ultimate objective the fabrication of microminiature circuits in gold, nichrome, aluminum and silica by a process in which these materials are etched directly by a photosensitive material according to an incident light pattern. Potential light sensitive halogens, sulfides and cyanides have been evaluated in liquid solvents. The capability of such materials as photoetchants has been demonstrated. Such materials as iodoform, N-bromosuccinimide, N,N' dibromodimethylhydantoin, N-chlorosuccinimide, ferric chloride and potassium ferrocyanide show the most promise. Thirtyseven compounds were investigated. Nineteen of these were positive etchants for gold. Eight were positive etchants for nichrome. (Author) (U)

AD- 629 644 11/6

WATERTOWN ARSENAL LABS MASS

METALLOGRAPHIC METHODS ETCHING FOR BAINITIC FINE CARBIDES. A METALLOGRAPHIC METHOD FOR REVEALING THE FINE CARBIDES IN BAINITE FORMED DURING CONTINUOUS COOLING IN A NICKEL-CHROMIUM-MOLYBDENUM COMPOSITION,(U)

OCT 48 25P Reed,Everett L. ;Carter, Harold G. ;
REPT. NO. WAL-132/13,
PROJ: WAL-14.8-U

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*ORDNANCE STEEL, METALLOGRAPHY), (*METALLOGRAPHY, ORDNANCE STEEL), ETCHING, CARBIDES, BAINITE, NICKEL ALLOYS, CHROMIUM ALLOYS, MOLYBDENUM ALLOYS, TEMPERING (U)

In this investigation a nickel-chromium-molybdenum steel with three carbon contents was selected. These steels are typical of medium heavy armor and certain other ordnance applications. An etching reagent containing 4% picral and 0.01% hydrochloric acid was developed which clearly revealed very fine carbides and their arrangement in bainite formed at low temperatures, whereas other commonly used etching reagents either slightly brought out the very fine carbides or masked them by strongly etching the matrix. The coarser carbides present in bainite formed at high temperatures are shown by the commonly used etching reagents. Tempered bainite was differentiated from tempered martensite after tempering at various temperatures for two (2) hours and after a prolonged tempering for thirty-four (34) hours at 1200 F.
(Author) (U)

AD- 626 985 9/1 7/2 20/12

RESEARCH TRIANGLE INST DURHAM N C

INTEGRATED SILICON DEVICE TECHNOLOGY. VOLUME X. CHEMICAL/METALLURGICAL PROPERTIES OF SILICON. (U)

DESCRIPTIVE NOTE: Rept. for Oct 64-Oct 65,
NOV 65 190P Padnos,B. N. ;
CONTRACT: AF33(615)-1998
PROJ: AF-4159
TASK: 415906
MONITOR: ASD , TDR-63-316-Vol-10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-624 520.
DESCRIPTORS: (*SILICON, PHASE STUDIES), (*SILICIDES, PHYSICAL PROPERTIES), (*SEMICONDUCTOR DEVICES, SILICON), ETCHING, MOLECULAR WEIGHT, CRYSTAL STRUCTURE, DENSITY, SOLUBILITY, ELECTRICAL PROPERTIES, MAGNETIC, THERMAL PROPERTIES, CHEMICAL REACTIONS, PREPARATION (U)

A complete set of existing silicon binary phase diagrams and a complete listing of known binary silicides, along with some of their properties, are presented in convenient reference form. Reactions of silicon with common reagents are summarized, emphasizing those reactions dominant in the chemical etching and polishing of silicon. A technique for spin-etching silicon wafers is also described.
(Author) (U)

AD- 626 616 9/1

JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS LAB

SHORT CUT TO PRINTED CIRCUIT PROTOTYPES. (U)

JAN 59 33P Muccino,F. R. ;
REPT. NO. TG-327
CONTRACT: NOrd-7386

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*PRINTED CIRCUITS, MANUFACTURING), ETCHING, COPPER, LAMINATES (U)

Methods for producting reliable printed circuits for prototype work are discussed. Two methods, based on etching of standard copper-laminate boards are found most practical for small-shop prototypes and are described in detail. The silk-screen process, using hand-cut stencil film is considered better than handdrawing where several identical circuit boards are needed. Step-by-step use of the silk-screen process is given; it is concluded that the process offers a low-cost way of reproducing accurately more than 200 prints per hour with unskilled hands and minimum equipment. (Author) (U)

AD- 625 676 9/1 20/6

HP ASSOCIATES PALO ALTO CALIF

SEMICONDUCTOR MATERIALS. (U)

DESCRIPTIVE NOTE: Interim engineering rept. no. 6, 15 Jul-15 Oct 65.
OCT 65 46P
CONTRACT: NObsr-89489
PROJ: SR-008-0301
TASK: 9475

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-620 267.
DESCRIPTORS: (*SEMICONDUCTORS, ELECTROLUMINESCENCE), (*ELECTROLUMINESCENCE, DISPLAY SYSTEMS), (*DISPLAY, SEMICONDUCTOR DIODES), GALLIUM ALLOYS, ARSENIC ALLOYS, PHOSPHOUS ALLOYS, OPTICAL PROPERTIES, PROCESSING, ZINC, DIFFUSION, LUMINESCENCE, EMISSIVITY, ETCHING (U)

GaAs1-xPx from a commercial source and from an in-house materials development project has been thoroughly evaluated for use in injection electroluminescence display. The work includes measurement of optical transmission, etch pit density and photoluminescence in the starting material. Processing techniques for etch polishing, Zn diffusion and diode fabrication were developed and photoluminescence of the resulting p-skins and the spectra, luminous emittance and quantum efficiency in diodes were measured. The overall conclusion is that at present only the -hpamaterial is suitable for the display application. It yields smooth regular Zn diffusion fronts; the diodes have edge emission quantum efficiencies greater than .0001 and luminous emittances of roughly 50 lumens/sq ft at about 10 A/ sq cm. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 622 879

TRW SEMICONDUCTORS INC LAWNDALE CALIF RESEARCH AND DEVELOPMENT DEPT

TRANSISTOR, VHF, SILICON, POWER (10W-500MC). (U)

DESCRIPTIVE NOTE: Final rept. for 1 Jul 63-15 Jan 65,
JAN 65 120P Clarke,R. N. ;Crishal,J. ;
REPT. NO. 59-RD-F
CONTRACT: DA36 03[illegible]MC0318[illegible]E
PROJ: 1P6 22001A056
TASK: 1P6 22001A056 01

UNCLASSIFIED REPORT

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. See also AD-439 230.
DESCRIPTORS: (*TRANSISTORS, SILICON), VERY HIGH FREQUENCY, RADIOFREQUENCY POWER, CRYSTALS, PROCESSING, PACKAGING, CHEMICAL MILLING, DIFFUSION, SILICONE PLASTICS, VAPOR PLATING, METAL FILMS (U)

The transistor produces 10 watts at 500 mc with 5-6 db of power gain and 30-40% collector efficiency. The crystal was originally designed according to present power gain theory, but it only had one to two db of power gain at 500 mc. The second crystal design was based upon the smallest practical pattern dimensions, or a 0.1 mil minimum spacing. The redesigned pattern also had provision for analyzing the transistor in multiples of sub cells as well as in its entirety. Such an analysis showed the necessity of symmetry of base feed in common emitter amplifiers to get all the cells working together. Paralleling of cells also indicated an apparent loss in f sub T with increased size. Processing and assembly was generally along standard industry practice except in the area of photoresist. There, improved glass masks were used, along with the new KTFR photoresist. Successful etching of fine metallized patterns was accomplished through the development of a jet etching technique. To retain as much of the innate crystal performance capability as possible, considerable work was done on packaging. It was concluded that no available package was truly adequate.

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

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 Heyerdahl,Norman E. ;Harvey, Donald J. ;
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 (U)

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. Z0MO8

AD- 619 295

MOTOROLA INC PHOENIX ARIZ SEMICONDUCTOR PRODUCTS DIV

PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY TRANSISTORS. (U)

DESCRIPTIVE NOTE: Quarterly progress rept. no. 1, 1 Jan-31 Mar 65,
MAR 65 52P Kearkuff,Thomas ;
CONTRACT: DA36 039AMC06156E
PROJ: 74001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*TRANSISTORS, MANUFACTURING), (*SILICON, TRANSISTORS), DIFFUSION, GOLD, CHEMICAL MILLING, PRECISION FINISHING, PROCESSING, ENCAPSULATION, BONDING, GLASS, WIRE, STORAGE, EPETIXIAL GROWTH, RELIBILITY(ELECTRONICS) (U)

New base predeposition and base diffusion systems were put into production and evaluated. Work was started on a new emitter and gold diffusion process. Work was started on the emitter stripe width evaluation. Chemical etching was placed into production and work on slurry polishing is almost complete. A new photoresist was evaluated and production controls are presently being applied. New assembly parts and processes were evaluated from the assembly viewpoint. (Author) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MO8

AD- 616 786

RENSSELAER POLYTECHNIC INST TROY N Y

PRINCIPLES OF METALLOGRAPHIC ETCHING. (U)

DESCRIPTIVE NOTE: Technical rept.,
JUN 65 26P Greene,Norbert D. ;Rudaw, Peter S. ;Lee,Linda ;
REPT. NO. TR-2
CONTRACT: Nonr59117

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*CHEMICAL MILLING, ALLOYS), (*METALLOGRAPHY, CHEMICAL MILLING), TIN ALLOYS, ZINC ALLOYS, SODIUM COMPOUNDS, HYDROXIDES, ELECTROLYTES, ANALYSIS (U)

The principles of metallographic etching have been determined by electrochemical and optical measurements on tin-zinc alloys in sodium hydroxide electrolytes. The minimum dissolution rate ratio and the minimum amount of selective dissolution necessary to achieve metallographic contrast of phases have been measured. Etching rate and contrast are uniquely defined by etching potential by potentiostatic, electrolytic and chemical etching methods. (Author (U)

AD- 614 823

NATIONAL SEMICONDUCTOR CORP DANBURY CONN

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AAND INCREASE THE RELIABILITY OF THE 2N328A TRANSISTOR. (U)

DESCRIPTIVE NOTE: Final rept. for 30 Jun 63-30 Dec 64.

DEC 64 246P Rau,R. R. ;Di Paola,R. ;
CONTRACT: DA36 039AMC01480E

UNCLASSIFIED REPORT

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. See also AD-608 583.
DESCRIPTORS: (*TRANSISTORS, MANUFACTURING), RELIABILITY (ELECTRONICS), PRODUCTION, FAILURE (MECHANICS), TESTS, SILICON ALLOYS, PROCESSING, SPECIFICATIONS, QUALITY CONTROL, LIFE EXPECTANCY, CHEMICAL MILLING, ALUMINUM, VAPOR PLATING, GAS ANALYSIS, WELDING, HEATING, FURNACES, INDUSTRIAL EQUIPMENT (U)

A summary is given of the work performed for improving the reliability of the PNP Silicon Alloy Transistor Type 2N328A. The following processes were modified during the course of the contract: An etch wheel was introduced to more accurately control final device etching; Additional bake-out furnaces were introduced and evaluated to increase the amount of time which the units are heated after etching; A gas recirculator was introduced into the final dry line to reduce the water vapor concentration; Welding shields were introduced at two welding operations while one other process was modified; all these changes were made in order to decrease the amount of weld splash striking the active region of the transistor. Devices produced for the first month of operation of the improved manufacturing line were used for the long term reliability testing. Measurements on devices made during this period of manufacture are included. This reliability evaluation consisted of operational tests for a 1000 hours at power levels of 400, 450, and 500 milliwatts;

(U)

AD- 614 180

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

ELECTROCHEMICAL DEMBER EFFECT IN SEMICONDUCTORS. (U)

64 9P Harvey,W. W. ;Finn,Mary C.
;
REPT. NO. JA-2390
CONTRACT: AF19 628 500

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science v2 p456-63 1964 (Copies available only to DDC users).
DESCRIPTORS: (*SEMICONDUCTORS, ELECTROCHEMISTRY), (*ELECTROCHEMISTRY, SEMICONDUCTORS), ETCHED CRYSTALS, GERMANIUM, SILICON, INDIUM ALLOYS, ANTIMONY ALLOYS, SURFACE PROPERTIES, THERMOELECTRICITY (U)
IDENTIFIERS: DEMBER EFFECT, INDIUM ANTIMONIDE (U)

It was demonstrated that during steady-state etching of a semiconductor with zero net current across the interface, there is a potential difference, superposed upon that of the space charge, between surface and interior whenever the reaction results in a net consumption or generation of carriers. It was possible to make rough measurements of this potential difference, which like the optically induced Dember effect is associated with gradients of excess carrier densities. Measured signals were of the correct order of magnitude and, for reactions known to be injecting, of the proper sign. In addition to etching reactions involving a net generation of carriers, examples were found of reactions which extracted carriers from the semiconductor as well as reactions in which the carriers apparently do not participate. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 613 643

ARMY MATERIALS RESEARCH AGENCY WATERTOWN MASS

THE METALLOGRAPHY OF PYROLITIC GRAPHITE, (U)

DEC 64 19P Tarpinian,Aram ;
REPT. NO. AMRA-TR-64-41
PROJ: 1A0105018010
TASK: 35183

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*PYROLITIC GRAPHITE, MICROSTRUCTURE), ION BOMBARDMENT, ARGON, MERCURY, CHEMICAL MILLING, ELECTROLYTIC POLISHING (U)

Etching of pyrolytic graphite by both argon ion bombardment and mercury ion bombardment is described. The difference between the microstructures revealed by the two methods is discussed, and an interpretation is suggested. Argon ion bombardment creates a leaf-like pattern reminiscent of stacked shingles. Mercury ion bombardment reveals a laminar structure unlike that produced by argon ion bombardment. Electrochemical polishing and etching reveals microstructures similar to those created by ion bombardment. Using an electrolyte based on phosphoric acid, microstructures similar to those resulting from mercury ion bombardment are revealed. Replacing the phosphoric acid with nitric acid results in microstructures similar to those obtained by argon ion bombardment. Based on the correlation between microstructures developed by ion bombardment and electrochemical etching, it is concluded that the microstructures revealed represent the true structure. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0M08

AD- 610 434

FRANKLIN INST PHILADELPHIA PA LABS FOR RESEARCH AND DEVELOPMENT

RESEARCH IN THE GENERAL FIELD OF SUBSTRUCTURE AND DISLOCATION NETWORKS IN METALLIC CRYSTALS. (U)

DESCRIPTIVE NOTE: Final rept. for 1 Apr 60-30 Apr 62,
APR 62 48P Damiano,V. V. ;Tint,G. S. ;
Herman,M. ;
REPT. NO. F-A2400
CONTRACT: AF49 638 821
MONITOR: AFOSR , 2574

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*METAL CRYSTALS, CRYSTAL STRUCTURE), (*CRYSTAL STRUCTURE, METAL CRYSTALS), CRYSTAL SUBSTRUCTURE, CRYSTAL DEFECTS, CRYSTALS, ZINC, IMPURITIES, CADMIUM, CHEMICAL MILLING, PHOTOMICROGRAPHY, CRYSTALLOGRAPHY (U)

The three dimensional aspects of dislocation substructures were studied in cadmium doped zinc crystals grown from the melt. Precipitates delineating the dis locations were revealed by etching a surface closely parallel to the slip plane. Using a technique of continuous etching and cinephotomicrography, the course of the dislocations was followed through the crystal. Tangles of dislocations were observed in deformed crystals. After annealing a rearrangement of dislocations into low-angle and hexagonal networks was evidenced. Closed loops and spiral dislocations were found to be associated with large inclusions. A mechanism for the multiplication of dislocations at inclusions was proposed. Dislocation reactions accounting for the observed substructures have been proposed. (Author) (U)

AD- 606 477

CRYSTALONICS INC CAMBRIDGE MASS

PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND TO INSURE THE RELIABILITY OF THE C600 SERIES FIELD EFFECT TRANSISTORS. (U)

DESCRIPTIVE NOTE: Quarterly rept. no. 4, 1 Apr-30 Jun 64,
JUN 64 40P Williams,John R. ;
CONTRACT: DA36 039AMC01483E

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-601 433.
DESCRIPTORS: (*TRANSISTORS, MANUFACTURING), (*RELIABILITY (ELECTRONICS), TRANSISTORS), BONDING, DIES, CHEMICAL MILLING, VACUUM FURNACES, CONTROLLED ATMOSPHERES, ENCAPSULATION, INDUSTRIAL EQUIPMENT (U)

Ultrasonic bonding has been discarded in preference to a new-metallization ball-bonding technique. All pro duction FETs are being die-to-header bonded using a heavy gold plate on dice and headers. A slight modification has been made in the mask design to facilitate bonding. Mesa etching fixtures and slice preparation fixtures are complete and are in use in the production process. Various experiments have been run utilizing various dew point ambients, coating agents, and bakeouts. As a result, production units are being vacuum baked at 200C. and packaged in a dry nitrogen atmosphere of -60C. dew point or better. Life test racks are being constructed. A manual of Q.C. procedures has been prepared. (Author) (U)

AD- 606 191

SILICON TRANSISTOR CORP GARDEN CITY N Y

PRODUCTION ENGINEERING MEASURE TO INCREASE THE RELIABILITY OF THE TRANSISTOR TYPE 22N2034. (U)

DESCRIPTIVE NOTE: Quarterly progress rept. no. 4, 1 Apr-30 Jun 64,
JUN 64 29P Cocking,J. ;Courier,J. ;
Des Roches,F. ;Hughes.D. ;Martin,E. ;
CONTRACT: DA36 039AMC01482E

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*TRANSISTORS, RELIABILITY (ELECTRONICS)), PROCESSING, DISKS, SILICON, CLEANING, ABRASIVE BLASTING, SOLDERING, CHEMICAL MILLING, ENCAPSULATION, WELDING, HERMETIC SEALS, TESTS, CONTROLLED ATMOSPHERES, PERFORMANCE (ENGINEERING), NICKEL, PELLETS (U)

The report describes the processing developments in wafer cleaning, mesa delineation, scribing of water, pellet to nickel-plated header soldering, nickel-plated clip to pellet soldering, final etch of soldered unit, final test and encapsulation of etched units, and weld and hermetic seal tests for the transistor type 2N2034. (Author) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. ZOMO8

AD- 484 781 9/5

ROME AIR DEVELOPMENT CENTER GRIFFISS AFB N Y RELIABILITY BRANCH

DEVELOPMENT OF A MICROELECTRONICS CAPABILITY AND FACILITY AT RADC. (U)

DESCRIPTIVE NOTE: Technical rept.,
MAY 66 140P O'Connell ,Edward P. ;
Calabrese ,Donald W. ;Walsh ,Thomas W. ;Lane ,Clyde H. ;Farrell,John P. ;
PROJ: RADC-DS-63-6
MONITOR: RADC TR-65-439

UNCLASSIFIED REPORT

DESCRIPTORS: (*INTEGRATED CIRCUITS, PROCESSING), CHEMICAL MILLING, PHOTOGRAPHIC FILM, ELECTRIC TERMINALS, METAL FILMS, SUBSTRATES, CAPACITORS, DEPOSITION, OXIDES, RESISTORS, SEMICONDUCTOR DEVICES, CONTAMINATION, IMPURITIES, DIFFUSION, EPITAXIAL GROWTH, SILICON, MICROPHOTOGRAPHY (U)
IDENTIFIERS: PHOTORESIST, PHOTORESIST TECHNIQUES, PHOTORESISTS, THIN FILMS (U)

This report discusses the basic facilities required for conducting exploratory research in microelectronics, and specific information pertaining to silicon wafer processing, epitaxial growth, photolithography, diffusion, thin film processing, as well as material characteristics and limitations. Methods are described for obtaining precision drawings and reduction techniques that are recommended in photo mask making. Processing of photo resist materials, including solutions and methods of etching both metal and oxide masks, is presented. The results are given of bonding investigations using ultrasonic energy and various combinations of land and wire materials that have been successfully joined. Step-by-step procedures for fabricating thin film passive components are outlined. A negative resistance behavior that was observed in valve metal oxides and the circuit that utilized this phenomenon to produce voltage tunable oscillators from 2KHz to 2MHz is shown. The performance characteristics of two thin film amplifiers that were designed to operate at 455 K Hz and 30M Hz, respectively, are given. (U)

AD- 477 816 11/4 11/6 11/9

NARMCO RESEARCH AND DEVELOPMENT DIV WHITTAKER CORP SAN DIEGO CALIF

RESEARCH ON RESIN-IMPREGNATED, COLLIMATED BORON FILAMENTS AND IMPROVED HIGH-MODULUS, HIGH-STRENGTH FILAMENTS AND COMPOSITES. (U)

DESCRIPTIVE NOTE: Annual summary rept. 1 Oct 64-30 Sep 65,
DEC 65 264P Wilson ,Frank M. ;Lane, Edward K. ;
CONTRACT: AF33(615)-2150
MONITOR: AFML TR-65-382

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: all DDC reproductions will be in black and white. Original may be seen in DDC Headquarters.
DESCRIPTORS: (*BORON, *FIBERS), (*COMPOSITE MATERIALS, REINFORCING MATERIALS), TAPES, LAMINATED PLASTICS, ETCHING, IMPREGNATION, COMPRESSIVE PROPERTIES, FLEXURAL STRENGTH, TENSILE PROPERTIES, FINISHES, HEAT TREATMENT, MODULUS OF ELASTICITY, FILAMENTS, EPOXY RESINS, NITRIC ACID, PANELS (U)
IDENTIFIERS: BORON, FIBERS, BORON, FILAMENTS (U)

IAC ACCESSION NUMBER: MCIC-065528 PL-007727
IAC DOCUMENT TYPE: MCIC -HARD COPY-- PLASTC -HARD COPY--
Efforts were made to maximize the portion of the basic strength in boron filaments which could be utilized in composite tape, NOL-rings, laminate panels, and test specimens therefrom. The objective was approached by comparative studies of the effectiveness of various etchants, finishes, resin systems, and processing variables. The latter processing variables were those involved in the conversion of reeled boron filaments supplied as Government-furnished property into collimated, preimpregnated multifilament tape and then into press laminate panels and NOL-rings from which test specimens were cut and evaluated. Tensile strength utilization of boron fibers in NOL-ring composites was increased 50% by an as-received fiber treatment consisting of nitric acid etching for 20 seconds at 248 F followed by 2-second exposure to a nitrogen atmosphere at 1500 F. (U)

AD- 476 696 10/2

RCA LABS DIV RADIO CORP OF AMERICA PRINCETON N J

IMPROVED THIN-FILM SOLAR CELLS. (U)

DESCRIPTIVE NOTE: Final rept. 16 Nov 64-15 Nov 65,
JAN 66 65P Perkins ,David M. ;Hui ,
William L. ;Noel ,Gerald ;Pasierb,Edward F. ;

CONTRACT: AF33(615)-2259
PROJ: AF-8173
TASK: 817301-34
MONITOR: AFAPL TR-65-123

UNCLASSIFIED REPORT

DESCRIPTORS: (*SOLAR CELLS, FILMS), COSTS, WEIGHT, MANUFACTURING, ABSORPTION, GALLIUM COMPOUNDS, ARSENIC COMPOUNDS, OXIDES, SINGLE CRYSTALS, CRYSTAL GROWTH, THICKNESS, DOPING, GRAIN BOUNDARIES, PLATINUM, SILICON COATINGS, ETCHING, ANNEALING, DEGRADATION, HUMIDITY, TEMPERATURE, STABILITY (U)
IDENTIFIERS: ANTIREFLECTION COATINGS, THIN FILMS (U)

During this contract thin-film GaAs solar cells using semitransparent Pt layers as the barrier contact have been made and investigated to improve their photovoltaic characteristics. Studies of the GaAs film, grown by the close-spaced oxide transport process, and the barrier contact structure, consisting of the Pt film, gridding and antireflection coating, led to the fabrication of cells with the following maximum efficiencies: 5.1% for 0.2 cc, 4.5% for 2.0 cc and 3% for 4.0 cc. It was shown that degradation of these cells in room ambient is due to the post-evaporation etching used during the fabrication process. Stable cells were made with efficiencies of 2.8% for areas of 2.0 cc. Tests were made to evaluate the effects of temperature, vacuum, moisture, ultraviolet light, and proton radiation on the Pt-GaAs structure. (Author) (U)

AD- 476 469 13/8 9/5

WESTINGHOUSE ELECTRIC CORP ELKRIDGE MD MOLECULAR ELECTRONICS DIV

CONTINUOUS PROCESSES FOR FUNCTIONAL ELECTRONIC BLOCKS. (U)

DESCRIPTIVE NOTE: Final technical rept. 15 Jun 63-9 Nov 65.
NOV 65 354P
REPT. NO. 5377A
CONTRACT: AF33(657)-11204
PROJ: MM-8-133
MONITOR: AFML TR-65-398

UNCLASSIFIED REPORT

DESCRIPTORS: (*INTEGRATED CIRCUITS, PROCESSING), DESIGN, MACHINES, OPTIMIZATION, OXIDATION, ETCHING, DIFFUSION, PHOTOENGRAVING, PRODUCTION, AUTOMATION, QUALITY CONTROL, EPITAXIAL GROWTH, SILICON, CLEANING, SULFURIC ACID, NITRIC ACID, CONTROLLED ATMOSPHERES, DIBORANES, ARGON, NITROGEN, MATERIALS, REMOVAL, HYDROGEN COMPOUNDS, CHLORIDES, TESTS, ACCEPTABILITY (U)
IDENTIFIERS: HYDROGEN CHLORIDE (U)

IAC ACCESSION NUMBER: MCIC-063356
IAC DOCUMENT TYPE: MCIC -HARD COPY--

The primary goal of this continuous processing program was to substantially improve the oxidation, etching, and diffusion processes as they apply to functional electronic blocks and other planar semiconductor devices. Machines were designed to perform the manufacturing steps in the major areas within the scope of the program: furnace systems and wet chemical and photoengraving processes. Wafers were processed through continuous furnaces at a much higher capacity than with batch furnaces and with distributions comparable to those of high quality batch results. Dendritic web processed through the same furnaces was compared to web and to wafers processed by standard batch methods; the results indicated a definite superiority of the web silicon in conjunction with the continuous processing technique. In the wet chemical and photoengraving areas, where the majority of the tweezer handling occurs, a series of processing machines was designed to be compatible with an 18-wafer universal carrier as a transport device. (U)

AD- 467 531

TEXAS INSTRUMENTS INC DALLAS

DEVELOPMENT OF GALLIUM ARSENIDE-PHOSPHIDE GRADED BAND-GAP BASE TRANSISTOR STRUCTURES. (U)

DESCRIPTIVE NOTE: Summary engineering rept., 23 Jun 64-23 Jun 65.
JUL 65 1V
REPT. NO. TI-08-65-99
CONTRACT: NObsr91238
PROJ: SR0080301
TASK: 9346

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*TRANSISTORS, GALLIUM ALLOYS), (*GALLIUM ALLOYS, EPITAXIAL GROWTH), ARSENIC ALLOYS, PHOSPHORUS ALLOYS, PROCESSING, VAPOR PLATING, CHLORIDES, ARSENIC COMPOUNDS, PHOSPHORUS COMPOUNDS, X RAY DIFFRACTION, REFLECTION, DIFFUSION, MAGNESIUM, CONFIGURATION, SULFUR, ELECTRODES, MANUFACTURING, ZINC, IMPURITIES, INJECTION (U)

The developments leading to fabrication of graded band-gap base transistor structures in gallium arsenide-phosphide are described. The material for the transistors was produced by epitaxial vapor phase deposition on GaAs substrates, using an open-tube flow system, with PCl3 and AsCl3 vapors carried over GaAs feed in a hydrogen stream. The desired composition grading for the base region was obtained by continuously varying the AsCl3-to-PCl3 ratio of the entering gases. Deposit compositions were determined by x-ray diffraction and optical reflectivity techniques, combining the latter with incremental etching to evaluate graded deposits. The transistors (n-p-n) were made by diffusing magnesium to form the base region and either alloying Au-Ge-S or diffusing sulfur through an SiO film to form the emitter. The best results were obtained with the diffused emitter. Good p-n junction diodes were also made using epitaxially Zn-doped Ga(As,P).

(U)

AD- 464 486

MITRE CORP BEDFORD MASS

FABRICATION OF GLASS MASKS, AND THEIR APPLICATION TO THIN-FILM CIRCUIT DEPOSITION, (U)

MAY 65 20P Everett,P. ;Roderick,R. ;
REPT. NO. W-06760
CONTRACT: AF19 628 2390
PROJ: 508
MONITOR: ESD TDR-64-634

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*TEMPLATES, GLASS), (*SEMICONDUCTING FILMS, MANUFACTURING), (*GLASS, MATERIALS), PRINTED CIRCUITS, INORGANIC ACIDS, FLUORIDES, RESISTORS, MINIATURE ELECTRONIC EQUIPMENT, INTEGRATED CIRCUITS, PRECISION FINISHING, PHOTO ENGRAVING, (U)PHOTO ENGRAVING (U)
IDENTIFIERS: HYDROFLUORIC ACID, THIN FILMS (U)

This report describes a process which has been developed for the etching of glass masks. A discussion of the requirements for these masks in thin-film circuit deposition precedes a detailed description of the process. Six masks were produced by the process, and measurements were made to determine the tolerances obtained. (Author)

(U)

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. Z0MOS

AD- 450 549

SIGNETICS CORP SUNNYVALE CALIF

AN ECONOMICAL FLAT PACKAGE FOR INTEGRATED CIRCUITS. (U)

DESCRIPTIVE NOTE: Interim development rept. no. 1, 15 June15 Sep 64.
SEP 64 22P
CONTRACT: NObsr91298

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:
DESCRIPTORS: (*PACKAGING, INTEGRATED CIRCUITS), (*INTEGRATED CIRCUITS, PACKAGING), CIRCUIT INTERCONNECTIONS, METAL FILMS, CHEMICAL MILLING, ELECTROPLATIG, PRODUCTION, MANUFACTURING, SILICON, ALUMINUM (U)

The schedule for making the first seal of the metal leads to the package substrate is complete. By a process of electroplating and etching metal film interconnections have been laid down, but many problems remain in this area. A few circuits were assembled on this substrate and where all previous steps were satisfactory, electrical continuity has been established. (Author) (U)

CORPORATE AUTHOR - MONITORING AGENCY

AEROSPACE CORP EL SEGUNDO CALIF IVAN A GETTING LABS

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