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AD-A255 331

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OCTOBER - DECEMBER 1991

AD-A255331 Words/Phrases(4 words max) that match Thesaurus Entries

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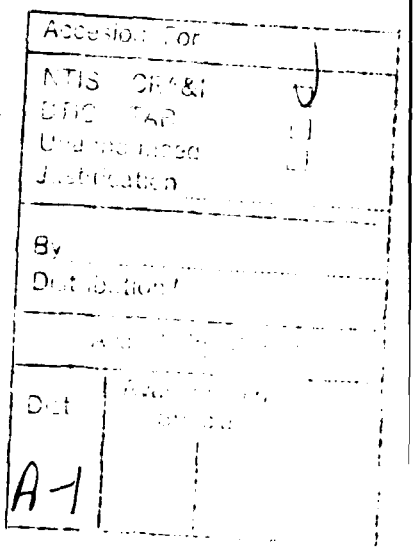

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INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest.

AFOSR does not maintain copies of technical reports for distribution. However, you may obtain any of these reports if you are registered with DTIC, by requesting the AD number of that report from the DTIC, Cameron Station, Alexandria, Virginia, 22314.

PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. The AFOSR is organized under the Air Force Systems Command, DCS/Technology.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

KEY TO READING THE DATA

The summaries consist of three indexes and the abstracts. From one of the indexes, locate the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts section. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field, and the second number is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

Supplementary Note - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal the article it appears in, and the volume number, date, and the page numbers of the journal.

Abstract - A brief summary describing the research of the report.

Descriptors - Key words describing the research.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.

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AD-A242054 REPORT DATE: 91 FINAL REPORT

Photodissociation Dynamics of Water Containing Clusters. I. Kr.H2O(+),
AD-A242018 REPORT DATE: 15 OCT 90 FINAL REPORT

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AD-A242419 REPORT DATE: 15 MAY 90 ANNUAL REPORT

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AD-A241960 REPORT DATE: 15 MAY 91 ANNUAL REPORT

Photodissociation of the Benzene Dimer Cation in the Gas Phase,
AD-A242056 REPORT DATE: 90 FINAL REPORT

A Planar Mie Scattering Technique for Visualizing Supersonic Mixing Flows,
AD-A241369 REPORT DATE: 91 FINAL REPORT

Precision Float Polishing.
AD-A241972 REPORT DATE: 11 SEP 91 ANNUAL REPORT

Predictive Probability as a Criterion for Model Selection.
AD-A242417 REPORT DATE: MAY 91 FINAL REPORT

Processing of Ceramics by Biopolymers. Ultrastructure-Property Relationships in Biocrystals.
AD-A243061 REPORT DATE: 09 OCT 91 FINAL REPORT

Quantum and Nonlinear Optics Research on Solid-State X-Ray Source and X-Ray Laser Using Low Energy Electron Beams, Relativistic Nonlinear Optics, Self-Bending Effect, Bistable and Robust Solitons, Hysteretic Resonances in Semiconductors, Nonlinear Sagnac Effect and Isolas, and Related Fields.
AD-A241806 REPORT DATE: JUN 90 FINAL REPORT

Quo Vadis, Graph Theory? An Alaskan Conference on the Future Directions of Graph Theory.
AD-A241789 REPORT DATE: 31 DEC 90 FINAL REPORT

Radar-Satellite Studies of the High-Latitude Ionosphere.
AD-A243275 REPORT DATE: 09 OCT 91 ANNUAL REPORT

Reactions of NF(a(1)Delta) with Nitrogen, Oxygen, and Carbon Atoms,
AD-A241623 REPORT DATE: 91 FINAL REPORT

Reactions of Polycyano Compounds with Chlorine Fluoride.
AD-A241968 REPORT DATE: 91 ANNUAL REPORT

Reactions of 5-(Perfluoroalkyl)Tetrazolates with Cyanogen, Nitrosyl, and Cyanuric Chlorides.
AD-A241992 REPORT DATE: 89 FINAL REPORT

TITLE INDEX

Research in Some Future Directions in Reliability and Quality Control.
AD-A242865 REPORT DATE: 25 SEP 91 FINAL REPORT

Revised Global Model of Thermosphere Winds Using Satellite and Ground-Based Observations,
AD-A243056 REPORT DATE: 01 MAY 91 ANNUAL REPORT

Ring Opening Metathesis Polymerization of 1,1-Diphenyl-1-Sila-Cyclopent-3-Ene,
AD-A241622 REPORT DATE: 12 JUL 91 FINAL REPORT

The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.
AD-A241465 REPORT DATE: 31 MAR 91 ANNUAL REPORT

Scanned Probe Microscopies: STM and Beyond.
AD-A241949 REPORT DATE: 28 FEB 91 FINAL REPORT

Secondary (Polyfluoroalkyl)chloroamines: Precursors to Fluoroazaalkenes.
AD-A241970 REPORT DATE: 90 ANNUAL REPORT

SIAM Workshop on Automatic Differentiation of Algorithms: Theory, Implementation and Application.
AD-A241512 REPORT DATE: 01 JAN 91 FINAL REPORT

Software Issues at the User Interface.
AD-A243032 REPORT DATE: MAY 91 ANNUAL REPORT

Some Highly Fluorinated Acyclic, Cyclic, and Polycyclic Derivatives of Cl2NCF2CF2NCl2 and Cl2C=NCCl2CCl2N=CCl2.
AD-A242449 REPORT DATE: 90 ANNUAL REPORT

Soot Formation and Inert Addition in Diffusion Flames,
AD-A241573 REPORT DATE: 90 FINAL REPORT

The Stability of a Characterization of the Bivariate Marshall-Olkin Distribution,
AD-A243231 REPORT DATE: 15 SEP 91 ANNUAL REPORT

Stereochemistry of Photocycloaddition of (E)-1,2-Dicyano- and (Z)-1,2-Diethoxyethylene to 5-Substituted Adamantanones.
AD-A241574 REPORT DATE: 91 FINAL REPORT

Strength and Microstructure of Ceramics.
AD-A243049 REPORT DATE: OCT 91 FINAL REPORT

Structure and Atomization Properties of Dense Turbulent Sprays,
AD-A241976 REPORT DATE: 90 FINAL REPORT

Studies of Baroclinic Flow.
AD-A243050 REPORT DATE: AUG 91 ANNUAL REPORT

Studies of Hetero-Epitaxy of GaAs Films on Si Substrate for Effective Control of Density and Internal Stress.
AD-A241882 REPORT DATE: OCT 91 FINAL REPORT

Study of Features of Binary Images Using Algebra Techniques.
AD-A242010 REPORT DATE: 04 APR 91 FINAL REPORT

TITLE INDEX

A Study of Gamma-Ray Generation from Channeled Electrons and Positions.
AD-A241993 REPORT DATE: 28 FEB 91 FINAL REPORT

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AD-A241920 REPORT DATE: 91 FINAL REPORT

Synthesis and Characterization of Dimethyltin(IV) Derivatives of Fluoro- and Oxyfluorochromates.
AD-A242488 REPORT DATE: 89 ANNUAL REPORT

Synthesis and Structure of a Highly Branched Polycarbosilane Derived from (Chloromethyl)trichlorosilane,
AD-A242052 REPORT DATE: 91 FINAL REPORT

Synthesis of Fluorinated Phosphic, Sulfonic, and Mixed Phosphonic/Sulfonic Acids.
AD-A241991 REPORT DATE: 23 JUL 91 FINAL REPORT

Synthesis of Fluorinated Tertiary Diamines and Diazanes.
AD-A242485 REPORT DATE: 90 ANNUAL REPORT

Synthesis of Functional Perfluorinated Resins, Branched Perfluorinated Ethers and Perfluoroalkanoyl Fluorides,
AD-A241889 REPORT DATE: 91 ANNUAL REPORT

The Synthesis of Highly Fluorinated Alkylcyclohexanes for Use as Oxygen Carriers and the 19F and 13C NMR Spectra of Alkylcyclohexanes,
AD-A242484 REPORT DATE: 90 ANNUAL REPORT

The Synthesis of Perfluoro Highly Branched Heterocyclic Fluorine Compounds by Direct Fluorination,
AD-A242166 REPORT DATE: 90 FINAL REPORT

Synthesis of Perfluorodicyclohexano-18-Crown-6 Ether,
AD-A242415 REPORT DATE: 91 FINAL REPORT

The Synthesis of the First Perfluorocryptand,
AD-A242414 REPORT DATE: 90 FINAL REPORT

Synthesis of Trans-1,2-Difluoroethenediylbis(Phosphonic Acid) and Other Unsaturated Phosphonic Acids.
AD-A241994 REPORT DATE: 90 ANNUAL REPORT

Technique for Three-Dimensional Measurements of the Time Development of Turbulent Flames,
AD-A241571 REPORT DATE: 15 JUN 91 FINAL REPORT

Techniques for the Design and Implementation of Highly Reliable Multi-Processing Systems.
AD-A242772 REPORT DATE: JUL 91 FINAL REPORT

Termolecular Association and Laser-Assisted Electron-(Excited) Atom Collisions.
AD-A241647 REPORT DATE: 23 AUG 91 ANNUAL REPORT

Theoretical Investigations of Chaotic Dynamics.
AD-A241790 REPORT DATE: AUG 91 FINAL REPORT

Thermospheric Dynamics at the South Pole,
AD-A243230 REPORT DATE: AUG 90 ANNUAL REPORT

Thinking Topologically about Photo Chemistry in Restricted Spaces,
AD-A242416 REPORT DATE: 91 FINAL REPORT

Three-Dimensional Visualization of Temporal Flow Sequences,
AD-A241569 REPORT DATE: 03 MAR 91 FINAL REPORT

Total Electron Content and Scintillation in the Vicinity of the Main Ionospheric through Over Northern Europe.
AD-A241205 REPORT DATE: 30 JUN 91 FINAL REPORT

Transition-Metal Fluoro Compounds Containing Carbonyl, Phosphine, Arsine and Stibine Ligands,
AD-A241625 REPORT DATE: 91 FINAL REPORT

Trifluoroamine Oxide: Reactions with Phosphorus Compounds and Selected Elements.
AD-A241969 REPORT DATE: 90 ANNUAL REPORT

Two-Dimensional Measurements of the Time Development of a Turbulent Premixed Flame.
AD-A241575 REPORT DATE: 89 FINAL REPORT

Two-Wavelength Single Laser CH and CH4 Imaging in a Lifted turbulent Diffusion Flame,
AD-A241371 REPORT DATE: 01 SEP 88 FINAL REPORT

Vorticity Induced by a Moving Elliptic Belt,
AD-A241890 REPORT DATE: 91 ANNUAL REPORT

The Wave Method for Determining the Asymptotic Damping Rates of Eigenmodes I: The Wave Equation on a Rectangular or Circular Domain.
AD-A243146 REPORT DATE: MAY 91 ANNUAL REPORT

ABSTRACTS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-B159 741L 9/3 19/12

SPACE POWER INC SAN JOSE CA

(U) New Efficient High Power Space-Based Laser.

DESCRIPTIVE NOTE: Final rept. Jun 89-Jun 91,

OCT 91 291P

PERSONAL AUTHORS: Lo, Dennis

REPORT NO. SPI-58-1

CONTRACT NO. F49620-89-C-0095

PROJECT NO. 1601

TASK NO. 01

MONITOR: AFOSR, XF
TR-10897, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Rice Univ., Iowa Laser Facility and Analatom, Inc.

ABSTRACT: (U) This report describes a two year investigation into the ionized excimer (exionimers) lasers. There are a wide variety of candidate exionimers that are potential lasers operating in the vacuum ultraviolet to soft x-ray region. Such short wavelengths have many potential advantages for space based laser weapons. Principally, short wavelengths enable tighter focussing over longer distances. Our work to date has focussed on the alkali-rare gas candidate group. Lowering the wavelength range of 190 to 60 nm. The principal activities included (1) experiments using e-beam pumping, (2) kinetics modeling of the e-beam experiments, (3) demonstration of discharge pumping of exionimer molecules, and (4) numerical quantum mechanical studies of new short wavelength exionimer species. The kinetics code predicted that an adequate upper state density is produced for laser action. The discharge experiment was the first to observe exionimer molecules under discharge pumping. The

numerical quantum studies predicted a series of previously unknown exionimer molecules in the VUV to soft-X-ray region.

DESCRIPTORS: (U) , CODING, DEMONSTRATIONS, DENSITY, ELECTRON BEAMS, EXCIMERS, FREQUENCY, IONIZATION, KINETICS, LASER WEAPONS, LASERS, MODELS, MOLECULES, NUMERICAL ANALYSIS, PUMPING, QUANTUM THEORY, REGIONS, SHORT WAVELENGTHS, SOFT X RAYS, SPACE BASED, SPACE WEAPONS, VACUUM ULTRAVIOLET RADIATION, X RAYS.

IDENTIFIERS: (U) PE63221C, WUAFOSR160101, VUV, XUV, *X Ray lasers, *Exionimers.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-B158 896L 12/9

GENERAL ELECTRIC CORPORATE RESEARCH AND DEVELOPMENT SCHENECTADY NY

(U) Geometric Reasoning for Object Recognition.

DESCRIPTIVE NOTE: Final rept. 1 Jan 89 - 31 Jul 91,

AUG 91 132P

PERSONAL AUTHORS: Mundy, Joseph L.; Kapur, Deepak

CONTRACT NO. F49620-89-C-0033

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-91-0890, AFOSR

UNCLASSIFIED REPORT

Distribution authorized to DoD only; Critical Technology; Aug 91. Other requests shall be referred to Air Force Office of Scientific Research, Building 410, Bolling AFB, DC 20332-6448.

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC reproductions will be in black and white.

ABSTRACT: (U) A new approach to the representation of objects for recognition and simulation based on geometric constraints is described. Geometric constraints provide a powerful language for encoding knowledge about generic classes of objects as well as general relationships between objects. New techniques for the solution of geometric constraint systems have been developed which combines the strengths of symbolic and numeric computation. The current system is able to represent scences of airfields or models of aircraft which involve hundreds of constraints. Constraints-based modeling results in significant productivity enhancements in the extraction of 3 -D models from imagery for aircrew training simulation. The final evaluation and testing of our model-based recognition system is described where recognition accuracy of 98 airfield monitoring in aerial images. This result demonstrates that practical reconnaissance tasks can be automated with current model-

AD-B158 896L

AD-B158 896L CONTINUED

based vision technology. A new approach to object recognition based on projective invariant features is described which leads to efficient indexing into large model databases. The concept of an integrated programming environment for research in image understanding is also described. This Image Understanding is also described. This Image Understanding Environment IU researchers. The development of a common environment will permit sharing of research results and reduce duplication of effort.

DESCRIPTORS: (U) , , ACCURACY, AIRBORNE, AIRCRAFT, COMPUTATIONS, COMPUTER PROGRAMMING, DATA BASES, EFFICIENCY, ENVIRONMENTS, FLIGHT CREWS, FLIGHT TRAINING, GEOMETRY, IMAGES, INDEXES, INTEGRATED SYSTEMS, LANDING FIELDS, MODELS, NUMBERS, PRODUCTIVITY, REASONING, RECOGNITION, RECONNAISSANCE, SHARING, SIMULATION, TEST AND EVALUATION.

IDENTIFIERS: (U) *Pattern recognition, *Image processing, *Computer vision, Aircraft models, WUAFOSR2304A7, PE61102F..

AD-B158 896L

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 275 4/1

HAYSTACK OBSERVATORY WESTFORD MA

(U) Radar-Satellite Studies of the High-Latitude Ionosphere.

DESCRIPTIVE NOTE: Annual progress rept. no. 2, Aug 90-Aug 91,

OCT 91 6P

PERSONAL AUTHORS: Foster, John C.

CONTRACT NO. AFOSR-89-0454

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0914, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the second year of this research program, work has continued on multi-instrument experiments investigating the effects of the large-scale convection electric field in the auroral and mid-latitude ionosphere. A radar-satellite study of electric field latitude structure during the February 8-9, 1986 great magnetic storm was completed and has provided an excellent example of the application of multi-instrument techniques to the investigation of magnetosphere-ionosphere coupling problems. Studies of the high-latitude boundary between auroral and polar cap latitudes have emphasized convection and ionospheric plasma structure near the dayside cusp and the transport of ionospheric plasma into the polar cap during storms. Mesoscale resolution electric field structure was addressed in a multi-instrument study involving the Canadian BARS radar facility and the Millstone Hill incoherent scatter radar.

DESCRIPTORS: (U) , AURORAE, BOUNDARIES, CANADA, CONVECTION, ELECTRIC FIELDS, HIGH LATITUDES, INCOHERENT SCATTERING, IONOSPHERE, LATITUDE, PLASMAS(PHYSICS), POLAR CAP, RADAR, RADAR STATIONS, RODS, STORMS, TEMPERATE REGIONS, TRANSPORT.

AD-A243 275

AD-A243 275 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2, *Aurorae, *Radar reflections.

AD-A243 275

AD-A243 231 12/3

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF APPLIED MATHEMATICS AND STATISTI CS

(U) The Stability of a Characterization of the Bivariate Marshall-Olkin Distribution,

SEP 91 10P

PERSONAL AUTHORS: Baxter, Laurence A.; Rachev, Svetlozar T.

CONTRACT NO. AFOSR-86-0136

MONITOR: AFOSR, XF
TR-91-0904, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Mathematical Analysis and Applications, v160 n2 p563-571, 15 Sep 91. Available only to DTIC users. No copies furnished by NTIS.

Reprint: The Stability of a Characterization of the Bivariate Marshall-Olkin Distribution.

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS, *BIVARIATE ANALYSIS, PROBABILITY, METRIC SYSTEM, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A243 230 4/1

WASHINGTON UNIV SEATTLE DEPT OF GEOPHYSICS

(U) Thermospheric Dynamics at the South Pole,

AUG 90 5P

PERSONAL AUTHORS: Hernandez, G.; Smith, R. W.; Roble, R. G.; Gress, J.; Clark, K. C.

CONTRACT NO. AFOSR-89-0316

MONITOR: AFOSR, XF
TR-91-0902, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Geophysical Research Letters, v17 n9 p1255-1258, Aug 90.

ABSTRACT: (U) A self-aligning Fabry-Perot spectrometer has been installed at Amundsen-Scott Station, Antarctica (Geographic South Pole) and has been used to determine neutral upper thermosphere winds and temperatures, obtained from the measurement of the Doppler shift and Doppler width of the line profiles of the OI 15,867 K (630 nm) line emission, during the austral winter of 1989 (April 1989 to September 1989). These first ground-based measurements of F-region neutral dynamics at the South Pole, show a rich variety of dynamic phenomena and strong couplings with the ionospheric plasma. Data for two contrasting days in April 1989 are presented here. The data of April 23 UT illustrate the diurnal variations of winds and temperatures during geomagnetic quiet-to-moderate conditions, while the data of April 27 UT illustrate diurnal variations during geomagnetically disturbed periods. These data are compared with the average pattern obtained at a similar geomagnetic latitude and conditions, but in the Northern Hemisphere (Longyearbyen, Spitsbergen) and with predictions of the average dynamics in the South Pole region made by the NCAR thermosphere-ionosphere general circulation model (TICCM). The measured winds at the South Pole have a stronger prevailing westward component in its diurnal cycle than is either observed at Longyearbyen (in the Northern Hemisphere) or predicted at South Pole by the TIGCM.

DESCRIPTORS: (U) , ALIGNMENT, ANTARCTIC REGIONS,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 230 CONTINUED

COUPLINGS, CYCLES, DIURNAL VARIATIONS, DOPPLER EFFECT, DOPPLER SYSTEMS, DYNAMICS, EMISSION SPECTRA, F REGION, FABRY PEROT INTERFEROMETERS, GEOGRAPHY, GEOMAGNETISM, GROUND BASED, IONOSPHERE, LATITUDE, LINE SPECTRA, MEASUREMENT, NEUTRAL, NORTHERN HEMISPHERE, PLASMAS(PHYSICS), PROFILES, REGIONS, SELF OPERATION, SPECTROMETERS, THERMODYNAMICS, THERMOSPHERE, WIDTH, WIND.

IDENTIFIERS: (U) *Thermosphere, Polar regions, Fabry perot spectrometers, Diurnal variations, TIGCM(Thermospheric Ionospleric General Circulation Model)

AD-A243 230

AD-A243 229 4/1

WASHINGTON UNIV SEATTLE DEPT OF GEOPHYSICS

(U) Austral Thermospheric Wind Circulation and Interplanetary Magnetic Field Orientation,

APR 91 8P

PERSONAL AUTHORS: Hernandez, G.; McCormac, F. G.; Smith, R. W.

CONTRACT NO. AFOSR-89-0316

MONITOR: AFOSR, XF
TR-91-0901, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Geophysical Research, v96 nA4 p5777-5783, 1 Apr 91.

ABSTRACT: (U) Ground-based high-resolution spectral measurements of the OI D emission at 15,867 k (630 nm; 1 K = 1 cm 1) from thermospheric altitudes at the geographic south pole are used to determine the relationship between the southern hemisphere high-latitude thermospheric wind circulation and the interplanetary magnetic field (IMF) during the austral winter of 1989. A clear dependence is shown between the thermospheric wind direction and magnitude and the IMF. In the midnight sector, the zonal wind magnitude is dependent on by, and the meridional component on Bz. The magnetic local times of the largest polar cap electric fields are also inferred for either sign of By. In addition, it is shown that the field angle Psi of the IMF in the Y-Z plane is also useful for ordering the neutral wind data. These groundbased wind measurements also reflect the polarity and magnitude of the IMF, at least near the observing station's magnetic midnight.

DESCRIPTORS: (U) , ANGLES, ANTARCTIC REGIONS, BZ AGENTS, ELECTRIC FIELDS, EMISSION, GEOGRAPHY, GROUND BASED, GROUND LEVEL, HIGH RESOLUTION, INTERPLANETARY SPACE, MAGNETIC FIELDS, MEASUREMENT, METEOROLOGICAL DATA, NEUTRAL, ORIENTATION(DIRECTION), POLAR CAP, SPECTROMETRY, WIND.

IDENTIFIERS: (U) *Thermosphere, Interactions, Interplanetary magnetic fields, *Magnetic fields.

AD-A243 229

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 146 20/4

TEXAS A AND M UNIV COLLEGE STATION DEPT OF MATHEMATICS

(U) The Wave Method for Determining the Asymptotic Damping Rates of Eigenmodes I: The Wave Equation on a Rectangular or Circular Domain.

DESCRIPTIVE NOTE: Journal paper 1 Jan-31 Dec 91,

MAY 91 24P

PERSONAL AUTHORS: Zhou, Jianxin; Chen, Goong

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0898, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in SIAM Jnl. of Control and Optimization, v29 n3 p656-677 May 91. Available only to DTIC users. No copies furnished by NTIS.

Reprint: The Wave Method for Determining the Asymptotic Damping Rates of Eigenmodes I: The Wave Equation on a Rectangular or Circular Domain.

DESCRIPTORS: (U) *VISCOUS FLOW, *DAMPING, REPRINTS, WAVE EQUATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, Geometrical theory of optics, Viscous boundary damping.

AD-A243 145 20/11

TEXAS A AND M UNIV COLLEGE STATION DEPT OF MATHEMATICS

(U) Asymptotic Locations of Eigenfrequencies of Euler-Bernoulli Beam with Nonhomogeneous Structural and Viscous Damping Coefficients.

DESCRIPTIVE NOTE: Journal paper 1 Jan-31 Dec 91,

MAR 91 24P

PERSONAL AUTHORS: Wang, Hankun; Chen, Goong

CONTRACT NO. AFOSR-91-0097

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0890, AFOSR

UNCLASSIFIED REPORT

Availability. Pub. in SIAM Jnl. of Control and Optimization, v29 n2 p347-367 Mar 91. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Asymptotic Locations of Eigenfrequencies of Euler-Bernoulli Beam with Nonhomogeneous Structural and Viscous Damping Coeffients.

DESCRIPTORS: (U) *BEAMS(STRUCTURAL), *DAMPING, REPRINTS, SLENDER BODIES, EIGENVALUES.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F, Euler Bernoulli Beams, Viscous damping, Slender beams, Eigen frequencies.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 144 12/2

TEXAS A AND M UNIV COLLEGE STATION DEPT OF MATHEMATICS

(U) Expcnential Decay of Energy of Evolution Equations with Locally Distributed Damping.

DESCRIPTIVE NOTE: Journal paper 1 Jan-31 Dec 91,

FEB 91 38P

PERSONAL AUTHORS: Chen, G.; Fulling, S. A.; Narcowich, F. J.; Sun, S.

CONTRACT NO. AFOSR-91-0097

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0900, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in SIAM Jnl. of Applied Mathematics, v51 n1 p266-301 Feb 91. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Exponential Decay of Energy of Evolution Equations with Locally Distributed Damping.

DESCRIPTORS: (U) *DAMPING, *EIGENVALUES, SCHRODINGER EQUATION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, Exponential stability, Evolution equations.

AD-A243 144

AD-A243 062 11/2

GORDON RESEARCH CONFERENCES INC KINGSTON RI

(U) Ceramics with Superelectrical and Supermechanical Properties.

DESCRIPTIVE NOTE: Final rept. for period ending 15 Jul 91,

OCT 91 11P

PERSONAL AUTHORS: Cruickshank, Alexander A.

CONTRACT NO. AFOSR-91-0311

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0920, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This conference was held from 29 July to 2 August, 1991, at the Holderness School in Plymouth, New Hampshire. The topics discussed included: how to achieve super-responses in ceramic materials by engineering of structural instabilities, spin-glass models of relaxor ferroelectrics, engineering of super-tough ceramics in zirconias, smart materials and structures, engineering and modelling of ferroelectrics for high strain actuators, small particle size effects in ferroelectrics, ferroelectric thin films for memory and optical applications, processing and properties of nanophase ceramics, microstructure-property relationships in ceramic superconductors and fundamental aspects of phase transformations in ceramics.

DESCRIPTORS: (U) , CERAMIC MATERIALS, FERROELECTRIC MATERIALS, INSTABILITY, NEW HAMPSHIRE, OPTICAL PROPERTIES, PARTICLE SIZE, PHASE TRANSFORMATIONS, STRUCTURAL PROPERTIES, SUPERCONDUCTORS, THIN FILMS.

IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F, *Ceramic materials, Ferroelectric materials, Dielectric films, Symposia.

AD-A243 062

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 061 7/6

WASHINGTON UNIV SEATTLE

(U) Processing of Ceramics by Biopolymers. Ultrastructure-Property Relationships in Biocrystals.

DESCRIPTIVE NOTE: Rept. no. 3 (Final) 1 Feb 90-31 Jan 91,

OCT 91 307P

PERSONAL AUTHORS: Sarikaya, Mehmet; Staley, James T.; Aksay, Ilahn A.

CONTRACT NO. AFOSR-88-0135, $AFOSR-89-0496

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0918, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Biopolymers obtained from bacterial sources were shown to be effective processing aids in the preparation of aqueous suspensions of submicron-sized ceramic powders. Potentially useful native bacterial polysaccharides was shown to be necessary to achieve suspension stability in aqueous systems. Alginates obtained from both alga and bacterial were also found to be effective processing aids. As in situ processing method was developed through the growth of alginate-producing bacterial in the presence of ceramic particles.

DESCRIPTORS: (U) , BACTERIA, CERAMIC MATERIALS, PARTICLES, PROCESSING, SOURCES, STABILITY, SUSPENSION DEVICES, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A243 061

AD-A243 058 6/5

OKLAHOMA STATE UNIV STILLWATER DEPT OF ZOOLOGY

(U) Development and Validation of Rapid In Situ Assays of Environmental Mutagenesis.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 89-30 Sep 90,

OCT 90 32P

PERSONAL AUTHORS: McBee, Karen

CONTRACT NO. AFOSR-89-0194

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0910, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) All field work at a site contaminated with polychlorinated biphenyls (PCBs) in Pryor, Oklahoma has been completed. Standard chromosome aberration assays on Peromyscus leucopus (white-footed mouse), Sigmodon hispidus (cotton rat), and Reithroduontomys fulvescens (fulvous harvest mouse) from the Pryor site and from three matched reference sites has been completed. All samples of spleen tissues for flow cytometric analyses (FCM) have been prepared. Trial runs for FCM analysis have been carried out and all FCM analyses should be completed by the end of the year. PCB tissue content analysis has been completed on seven animals randomly chosen from the Pryor sites and shows significant increases over background levels. Field analyses at a second site in Payne Country, Oklahoma contaminated with a mixture of radioactive and chemical wastes has been underway for one year. Data collection has involved monthly sampling for several demographic variables and tri-monthly sampling for cytogenetic and tissue residue variables. Field work for this year has been completed and slides are currently being analyzed. Laboratory validation experiments involving exposure to known levels of known clastogens have been initiated.

DESCRIPTORS: (U) , ANIMALS, ASSAYING, BACKGROUND,

AD-A243 058

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 058 CONTINUED

CHEMICALS, CHROMOSOMES, COTTON, DATA ACQUISITION, DEMOGRAPHY, DISTORTION, ENVIRONMENTS, LABORATORY TESTS, MATCHING, MUTATIONS, OKLAHOMA, POLYCHLORINATED BIPHENYLS, RATS, SAMPLING, SITES, SPLEEN, TISSUES(BIOLOGY), VALIDATION, VARIABLES, WASTES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A243 057 6/3

WELLESLEY COLL MA

(U) Melatonin Action on the Circadian Pacemaker in Siberian Hamsters.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 89-31 Aug 91,

SEP 91 14P

PERSONAL AUTHORS: Darrow, Janet M.

CONTRACT NO. AFOSR-90-0067

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0911, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research investigates the effect of the hormone melatonin on the circadian clock of mammals, by examining daily activity rest cycles and body temperature rhythms in melatonin-infused Siberian hamsters, under a variety of environmental lighting conditions. In experiments simulating jet-lag conditions, melatonin significantly accelerated re-adjustment of sleep/wake rhythms to phase-shifted light cycles. Within days after an 8-hr phase-advance of the light/dark cycle, all melatonin-treated hamsters, but none of the saline-treated controls, had achieved the proper phase relationship with the new photoschedule. These results are consistent with reports of melatonin treatment reducing jet lag in humans. Under conditions of constant darkness, daily melatonin infusions synchronized the hamster activity/rest rhythm. IN constant light, melatonin also acted as a weak entraining agent and prevented the internal desynchronization which occurs in Siberian hamsters and in many mammals exposed to constant light. These results offer encouragement about Siberian hamsters as an appropriate model system to investigate melatonin action on the circadian clock.

DESCRIPTORS: (U) , BIOLOGICAL RHYTHMS, CIRCADIAN RHYTHMS, CLOCKS, CYCLES, DAILY OCCURRENCE, DARKNESS, HAMSTERS, HUMANS, ILLUMINATION, LIGHT, MAMMALS, MODELS, REST.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 057 CONTINUED

IDENTIFIERS: (U) WUAFOSR2312A3, PE61102F, Jet lag, Melatonin, *Circadian, Clock, Sleep wake cycles.

AD-A243 056 4/2

WASHINGTON UNIV SEATTLE

(U) Revised Global Model of Thermosphere Winds Using Satellite and Ground-Based Observations,

MAY 91 33P

PERSONAL AUTHORS: Hedin, A. E.; Biondi, M. A.; Burnside, R. G.; Hernandez, G.; Johnson, R. M.

CONTRACT NO. AFOSR-89-0316

MONITOR: AFOSR, XF
TR-91-0903, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Geophysical Research, v96 nA5 p7657-7688, 1 May 91. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Revised Global Model of Thermosphere Winds Using Satellite and Ground-Based Observations.

DESCRIPTORS: (U) *THERMOSPHERE, *WIND VELOCITY, OPTICAL INTERFEROMETERS, RADAR REFLECTIONS, ATMOSPHERE MODELS, METEOROLOGICAL SATELLITES, REPRINTS.

IDENTIFIERS: (U) Atmospheric explorer E satellite, Dynamics explorer E satellite, HWM90 Model, HWM87 Model.

AD-A243 055 20/6 12/6

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) III-V Modulation and Switching Devices for Optical System Applications.

DESCRIPTIVE NOTE: Final rept. 15 Apr 88-14 Oct 91,

OCT 91 19P

PERSONAL AUTHORS: Singh, Jasprit

CONTRACT NO. AFOSR-88-0168

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR, XF
TR-91-0927, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Optical computing has been a blue sky dream for scientists for over a decade. In several areas optical processing has made great strides. These areas include optical communication, optical memory, optical scanning, etc. However, the optical computer still remains a dream. Earlier spectacular successes in very high speed optical switches based upon non-linear optical effects in III-V compound semiconductor structures have not led to useful applications. Even in optical communication, the full potential of optics remains unrealized because of lack of more tailorable devices such as wavelength selective detectors. (Author)

DESCRIPTORS: (U) , BLUE(COLOR), DETECTORS, DREAMS, FREQUENCY, GROUP III COMPOUNDS, GROUP IV COMPOUNDS, GROUP V COMPOUNDS, MEMORY DEVICES, MODULATION, NONLINEAR SYSTEMS, OPTICAL COMMUNICATIONS, OPTICAL EQUIPMENT, OPTICAL PROCESSING, OPTICAL PROPERTIES, OPTICAL SCANNING, OPTICAL STORAGE, OPTICS, SEMICONDUCTORS, SKY, STRUCTURES, SWITCHES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4, *Optical computers, *Group III V semiconductors, *Switching circuits, Characteristic curves, Memory cells.

AD-A243 055

AD-A243 054 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) New Experimental Challenges in Elemental Fluorine Chemistry; An Emerging Technology.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-30 Nov 90,

OCT 91 27P

PERSONAL AUTHORS: Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

MONITOR: AFOSR, XF
TR-91-0926, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A controlled fluorination method using elemental fluorine has been used to synthesize a large variety of new compounds from hydrogen-containing precursors including perfluoroethers, perfluoropolyethers, perfluoro crown ethers, and perfluorocryptands. Polyesters were converted to polyethers using a combination of direct fluorination of the carbon hydrogen bonds and fluorination by SF4 of the carbonyl groups. A process was developed for partial fluorination of gas separation was increased significantly.

DESCRIPTORS: (U) , CARBON, CARBONYL COMPOUNDS, CHEMICAL BONDS, CONTROL, CONVERSION, ETHERS, FLUORINATION, FLUORINE COMPOUNDS, FLUOROPOLYMERS, GASES, HYDROGEN, HYDROGEN BONDS, POLYETHERS, PRECURSORS, SEPARATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A243 054

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 053 5/8 5/7

OREGON UNIV EUGENE DEPT OF PSYCHOLOGY

(U) Language Comprehension as Structure Building.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 89-31 Jul 91,

OCT 91 15P

PERSONAL AUTHORS: Gernsbacher, Morton A.

CONTRACT NO. AFOSR-89-0258

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0924, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research investigated language comprehension, and in particular, the general, cognitive processes and mechanisms that underlie language comprehension. These general, processes and mechanisms were investigated using a simple framework Gernsbacher (1990) refers to as the 'Structure Building Framework'. According to the Structure Building Framework, the goal of comprehension is to build a coherent, mental representation of 'structure'. To do this, comprehenders must first lay a foundation. Next, they develop the structure by mapping on information when that incoming information is coherent or related to previous information. However, if the incoming information is less coherent or related, comprehenders shift to initiate a new substructure. Thus, most representations comprise several branching substructures. These structure building processes are accomplished by two mechanisms: enhancement, which boosts the activation of some representations, and suppression, which dampens the activation of other representations.

DESCRIPTORS: (U) , ACTIVATION, COGNITION, COHERENCE, COMPREHENSION, LANGUAGE, MENTAL ABILITY, STRUCTURES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, *Cognition, *Comprehension, Information processing.

AD-A243 053

AD-A243 053 CONTINUED

*Psycholinguistics, Structure building frameworks, Languages, Structural properties.

AD-A243 053

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 052 5/8

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) The Cognitive, Perceptual, and Neural Bases of Skilled Performance.

DESCRIPTIVE NOTE: Annual technical rept. 15 Mar 90-14 Mar 91,

MAR 91 36P

PERSONAL AUTHORS: Grossberg, Stephen B.

CONTRACT NO. AFOSR-90-0175

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0913, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report reviews progress from the Boston University, Northeastern University, and Harvard University/Cambridge University research groups of our AFOSR University Research Initiative grant. The report lists books and articles, summaries of research, and selected abstracts of key articles. The report also encloses the program (see next page) and the abstract book of an AFOSR-supported conference that was held at the Wang Institute of Boston University on May 11-13, 1990. The topic of the conference was Neural Networks for Automatic Target Recognition. There were fifteen invited speakers and thirty-eight contributed posters. Three hundred scientists and students attended from twenty countries and thirty-five states of the United States.

DESCRIPTORS: (U) , ABSTRACTS, AUTOMATIC, BOOKS, NEURAL NETS, STUDENTS, TARGET RECOGNITION, UNITED STATES, UNIVERSITIES.

IDENTIFIERS: (U) WUAFOSR3484A4, PE61103D, *Cognition, *Perception(Psychology), Skills, Performance(Human).

AD-A243 052

AD-A243 051 6/4

FLORIDA UNIV GAINESVILLE DEPT OF PSYCHOLOGY

(U) Mechanisms of Temporal Pattern Discrimination by Human Observers.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 90-30 Sep 91,

OCT 91 11P

PERSONAL AUTHORS: Sorkin, Robert D.

CONTRACT NO. AFOSR-91-0065

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF
TR-91-0915, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Several studies of temporal pattern perception were conducted, using tasks where the listener discriminated whether or not two tonal sequences formed the same temporal pattern. Performance was modeled using the Pattern Correlation Model, which assumes that the listener estimates the correlation between the pattern of intervals marked by the tones in each sequence. The model was applied to experiments where the sequences were (a) compressed or expanded in time; (b) presented at different frequencies and to different ears; (c) onset delayed from 1 to 1500 ms; and (d) subject to [illegible] repetitions within each sequence. Other experiments have concerned: (1) the discrimination of rhythmicity; (2) visual information processing as a function of spatial position and time stress; and (3) modeling and computer simulation of systems for group signal detection.

DESCRIPTORS: (U) , AUDIO TONES, COMPUTERIZED SIMULATION, CORRELATION, DETECTION, HUMANS, INFORMATION PROCESSING, INTERVALS, MODELS, OBSERVERS, PATTERNS, POSITION(LOCATION), SEQUENCES, SIGNALS, SPATIAL DISTRIBUTION, STRESSES, TIME, VISUAL SIGNALS.

IDENTIFIERS: (U) WUAFOSR2313A6, PE61102F, *Pattern recognition, *Auditory perception, Sequence

AD-A243 051

AD-A243 051 CONTINUED

discrimination, Audio tones, Sequences, Time dependence, Delay, Auditory signals, Group signal detection, Temporal pattern perception, Performance(Human).

AD-A243 050 20/4 8/3 4/2

FLORIDA STATE UNIV TALLAHASSEE GEOPHYSICAL FLUID DYNAMICS INST

(U) Studies of Baroclinic Flow.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 90-30 Sep 91,

AUG 91 20P

PERSONAL AUTHORS: Pfeffer, Richard L.

CONTRACT NO. AFOSR-89-0462, $AFOSR-90-0009

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0916, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Prof. R. Krishnamurti and Dr H. Yang have completed their investigation of finite amplitude Hele-Shaw convection with an imposed shear. Their interest was also to determine the effect of convective transport of momentum upon the mean flow. Analysis of approximate solutions of the barotropic vorticity equation subject to periodic boundary conditions continues. In another study, considerable progress has been made in solving the nonlinear steady state barotropic vorticity equation for parameters which correspond to a series of laboratory experiments involving forced flow of a rotating fluid over bottom topography. In these experiments, the fluid is contained in a rotating circular cylindrical annulus with a differentially rotating, rigid, radially sloping, lid in contact with the top surface of the fluid. The fluid is forced into motion by the rotation of the lid. In another effort, the dynamics of equilibrium states in a sheared barotropic channel flow is being investigated. This flow is relevant to meteorological flows and the object of this work is to understand the population of certain states, called free modes, and comprehend how the actual flow in phase space is attracted from one state to another. The present research effort has investigated new parallel computing techniques and fast algorithms for the efficient use of parallel computers in solving shallow water equations. Progress has been made toward

AD-A243 050 CONTINUED

understanding the development and nonlinear behavior of traveling baroclinic waves in the atmosphere and their interaction with topographically and thermally forced planetary waves.

DESCRIPTORS: (U) , ALGORITHMS, BAROMETRIC PRESSURE, BEHAVIOR, BOUNDARIES, CHANNEL FLOW, COMPUTERS, CONVECTION, EFFICIENCY, EQUATIONS, FLOW, FLUIDS, HEAT, LABORATORY TESTS, MEAN, METEOROLOGY, MOMENTUM, MOTION, NONLINEAR SYSTEMS, PARALLEL PROCESSING, PLANETS, POPULATION, PROBLEM SOLVING, ROTATION, SHALLOW WATER, SOLUTIONS(GENERAL), SURFACES, TRANSPORT, VORTICES, WAVES.

IDENTIFIERS: (U) Atmosphere models, *Ocean models, *Fluid dynamics, Mathematical prediction, Model tests, Shear properties, Channel flow, Vorticity, Baroclinic flow, Traveling waves, Topography, Nonlinear systems, WUAFOSR2310A1, PE61102F.

AD-A243 049 11/2

NATIONAL INST OF STANDARDS AND TECHNOLOGY GAITHERSBURG MD CERAMICS DIV

(U) Strength and Microstructure of Ceramics.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 89-30 Sep 91,

OCT 91 170P

PERSONAL AUTHORS: Lawn, Brian R.

CONTRACT NO. AFOSR-ISSA-90-0003, $AFOSR-ISSA-91-0002

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0892, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Results of a program on the toughness properties of monophase and two phase ceramics that toughen by bridging are presented. Fracture mechanics models describing this behavior, in the particular context of strength, are developed. Results of strengths tests confirming the essential predictions of the theory are presented. Innovative processing routes suggested by the models are shown to lead to two phase composites with impressive flaw insensitivity. A partial list of publications included in this report are: (1) The role of crystallization of an intergranular glassy phase in determining grain boundary residual stresses in debased aluminas; (2) In situ measurements of bridged crack interfaces in scanning electron microscopes; (3) Cyclic fatigue from frictional degradation at bridging grains in alumina; (4) Microstructure, toughness curves and mechanical properties of alumina ceramics; (5) Fabrication of flaw tolerant aluminum titanate reinforced alumina; and (6) Influence of grain size and degree of crystallization of intergranular glassy phase on the mechanical behaviour of a debased alumina.

DESCRIPTORS: (U) , ALUMINUM OXIDES, BEHAVIOR, CERAMIC MATERIALS, COMPOSITE MATERIALS, CRACKS, CRYSTALLIZATION, CYCLES, DEGRADATION, DOCUMENTS, FATIGUE,

AD-A243 049 CONTINUED

FRACTURE(MECHANICS), FRICTION, GRAIN BOUNDARIES, GRAIN SIZE, INTERFACES, MECHANICAL PROPERTIES, MICROSTRUCTURE, MODELS, PREDICTIONS, PROCESSING, RESIDUAL STRESS, ROUTING, SCANNING ELECTRON MICROSCOPES, STRENGTH(GENERAL), TEST AND EVALUATION, THEORY, TOUGHNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2, *Ceramics, *Microstructures, *Strength(Mechanics), Grain size, Crystallization, Fracture(Mechanics), Toughness, Advanced composites, Cracking(Fracturing), Aluminum oxides, Scanning electron microscopy, Bridging, Tensile tests, Processing, Micromechanics.

AD-A243 036 20/6

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) An Experimental Investigation of Chemically-Reacting, Gas-Phase Turbulent Jets.

DESCRIPTIVE NOTE: Master's thesis,

APR 91 97P

PERSONAL AUTHORS: Gilbrech, Richard J.

CONTRACT NO. AFOSR-90-0304

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XF
TR-91-0895, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A new high pressure combustion facility was built to investigate mixing in axisymmetric, turbulent jets exiting into quiescent reservoirs. The facility uses fluorine and nitric oxide, diluted with nitrogen, for chemical product formation that is accompanied by heat release. The average temperature was measured by a set of long, thin, resistance wire thermometers stretched across the jet centerline at 16 downstream locations from x/do = 30 to 240. The Reynolds number was varied through density, i.e., pressure, while the jet exit velocity and exit diameter were held constant. The main result of the work is that the flame length, as estimated from the temperature measurements, varies with changes in Reynolds number, suggesting that the mixing process is not Reynolds number independent up to Re = 150,000. Additionally, the measurements revealed a 'mixing virtual origin,' defined as the far-field flame length extrapolated to phi = 0, that increases with increasing Re for Re 20,000 and then decreases with increasing Re for Re = 20,000. The transition of the jet flow from a momentum-dominated to a buoyancy-dominated regime was identified in another set of experiments.

DESCRIPTORS: (U) , AXISYMMETRIC, CHEMICALS, DIAMETERS, EXITS, FAR FIELD, FLAMES, FLUORINE, HEAT, JET FLOW,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 036 CONTINUED

LENGTH, MEASUREMENT, MIXING, NITROGEN, NITROGEN OXIDES, RELEASE, RESERVOIRS, RESISTANCE THERMOMETERS, RESISTORS, REYNOLDS NUMBER, TEMPERATURE, TURBULENT FLOW, VELOCITY, WIRE.

IDENTIFIERS: (U) *Turbulence, Turbulent jets, Mixing flame length, temperature measurements, PE61102F, WUAFOSR2308BS.

AD-A243 035 20/4

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Chemical Reactions in Turbulent Mixing Flows.

DESCRIPTIVE NOTE: Annual rept. 16 Apr 90-14 May 91,

SEP 91 197P

PERSONAL AUTHORS: Dimotakis, Paul E.; Broadwell, James E.; Leonard, Anthony

CONTRACT NO. AFOSR-90-0304

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0906, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this research is to conduct fundamental investigations of turbulent mixing, chemical reaction and combustion processes in subsonic and supersonic flows. This program comprises experimental, analytical, computational, and modeling efforts, and a diagnostics development and data-acquisition effort, the latter as dictated by specific needs of the experiments. Our approach has been to carry out a series of detailed theoretical and experimental studies primarily in two, well-defined, fundamentally important flow fields: free shear layers and axisymmetric jets. To elucidate molecular transport effects, experiments and theory concern themselves with both liquids and gases, primarily in moderate to high Reynolds number flows. The computational studies are, at present, focused at fundamental issues pertaining to the computational simulation of both compressible and incompressible flows. Modeling has been focused on both shear layers and turbulent jets, with an effort to include the physics of the molecular transport processes, as well as formulation of models that permit the full chemical kinetics of the combustion process to be incorporated.

DESCRIPTORS: (U) , CHEMICAL REACTIONS, COMBUSTION, COMPRESSIBLE FLOW, COMPUTATIONS, DIAGNOSIS(GENERAL),

AD-A243 035

AD-A243 035 CONTINUED

EXPERIMENTAL DATA, FLOW, FLOW FIELDS, FORMULATIONS, GASES, HIGH RATE, INCOMPRESSIBLE FLOW, JET FLOW, LAYERS, MIXING, MODELS, MOLECULAR PROPERTIES, PHYSICS, REACTION KINETICS, REYNOLDS NUMBER, SHEAR PROPERTIES, SIMULATION, SUBSONIC FLOW, SUPERSONIC FLOW, THEORY, TRANSPORT PROPERTIES, TURBULENT FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, *Turbulence, Shear layers, Jets, Mixing, Combustion, Numerical simulation, Fractals, Light detection diagnostics turbulent mixing modeling.

AD-A243 032 12/5

COLORADO UNIV AT BOULDER DEPT OF COMPUTER SCIENCE

(U) Software Issues at the User Interface.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 90-30 Jun 91,

MAY 91 19P

PERSONAL AUTHORS: McBryan, Oliver A.

REPORT NO. CU-CS-527-91

CONTRACT NO. AFOSR-89-0422

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0907, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Reviewed were software issues that are critical to the successful integration of parallel computers into mainstream scientific computing. Clearly a compiler is the most important software tool available to a user on most systems. Discussed were compilers from the point of view of communication compilation - their ability to generate efficient communication code automatically. Illustrated were two example of distributed memory computers where almost all communication is handled by the compiler rather than by explicit calls to communication libraries. Closely related to compilation is the need for high quality debuggers. While single node debuggers are important, parallel machines of interprocess communication and synchronization. They have developed a powerful simulation tool which was developed for such systems and which has proved essential in porting large applications to distributed memory systems.

DESCRIPTORS: (U) , CODING, COMMUNICATION AND RADIO SYSTEMS, COMPILERS, COMPUTER PROGRAMS, COMPUTERS, DISTRIBUTION, EFFICIENCY, INTEGRATION, INTERFACES, LIBRARIES, MEMORY DEVICES, PARALLEL PROCESSING, PARALLEL PROCESSORS, SIMULATORS, USER NEEDS.

AD-A243 032 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3, *Compilers, *Man computer interface, *Parallel processing, Supercomputers, High level languages.

AD-A243 031 5/8

PENNSYLVANIA UNIV PHILADELPHIA

(U) The Dynamics of Visual Representation, Attention, Encoding, and Retrieval Processes.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 90-30 Sep 91,

OCT 91 5P

PERSONAL AUTHORS: Sternberg, Saul

CONTRACT NO. AFOSR-91-0015

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XF
TR-91-0905, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the Annual Technical Report of work supported by a grant entitled The dynamics of visual representation: Attention, encoding, and retrieval processes. After a section describing the objectives of the work, the report provides a synopsis of the principal accomplishments thus far, under the following headings: Relations between the transformation revealed by two paradigms, Influence of reciting direction on location-probe performance in the probed-reciting/location-probe mixture, Improvements in the timing of spoken responses, Representation of location information, Initial results from a double-location-probe procedure, Completion of analyses and publication supporting stages in mental operations, Effects of two kinds of degradation on encoding arrays of characters, and Effects of legibility on order of processing.

DESCRIPTORS: (U) , ARRAYS, CODING, DEGRADATION, DYNAMICS, INFORMATION RETRIEVAL, MODELS, POSITION(LOCATION), PROCESSING, RESPONSE, SPEECH, TIME, VISION.

IDENTIFIERS: (U) WUAFOSR2313BS, *Psychology, *Information-processing, *Visual, Memory, Reaction-time.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 030 19/1

COLUMBIA UNIV NEW YORK

(U) Dynamics and Stabilization of Materials Possessing High Energy Content.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 91,

OCT 91 8P

PERSONAL AUTHORS: Turro, Nicholas J.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0919, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of the research supported by this AFOSR grant were to create new knowledge concerning the nature and behavior of high energy content materials adsorbed at the liquid liquid, liquid-solid, and the solid-gas interfaces. The strategy employed was to use photochemical reactions and photophysical parameters as probes to characterize the structure and dynamics of high energy species. The reactions of radical pairs produced by photochemical excitation of ketones and the electron transfer process between a metal complex and an electron acceptor were employed as general photochemical probes of a range of interfacial regions. The techniques used were a battery of time resolved spectroscopic methods including optical absorption, optical emission, nuclear magnetic resonance and electron spin resonance. The objects achieved were the development of a framework which now allows both the chemistry of high energy species adsorbed at interfaces to be controlled and manipulated and the structure and dynamics of the interfacial region to be better understood.

DESCRIPTORS: (U) , CHEMISTRY, DYNAMICS, ELECTRON ACCEPTORS, ELECTRON SPIN RESONANCE, ELECTRON TRANSFER, EMISSION, EXCITATION, GASES, HIGH ENERGY, INTERFACES, KETONES, LIQUIDS, MATERIALS, METALS, NUCLEAR MAGNETIC RESONANCE, OPTICAL PROPERTIES, PARAMETERS, PHOTOCHEMICAL

AD-A243 030

AD-A243 030 CONTINUED

REACTIONS, PHYSICAL PROPERTIES, PROBES, RADIATION ABSORPTION, REGIONS, SOLIDS, SPECTROSCOPY, STABILIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Electron transfer, Time resolved spectroscopy, Optical absorption, High energy species, Interfacial regions.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A243 026 4/1 8/12

KANSAS UNIV LAWRENCE DEPT OF PHYSICS AND ASTRONOMY

(U) Evaluation of Solar Flares and Electron Precipitation by Nitrate Distribution in Antarctica.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 90-31 Oct 91,

OCT 91 47P

PERSONAL AUTHORS: Dreschhoff, Gisela A.; Zeller, Edward J.

CONTRACT NO. AFOSR-88-0065

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0912, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Most of the time devoted to project research was spent in Antarctica. A firm core was drilled by hand to a depth of 29 meters at Windless Bight on the Ross Ice Shelf. The main result is that all of the major peaks identified as resulting from ionization caused by SPEs that were found in the 1988-89 core could also be identified in the analytical sequence from the 1990-91 core. Following the Antarctic field season, a set of snow samples were obtained that had been collected by the International Trans-Antarctica Expedition. The analysis of these samples showed nitrate flux that correlates closely with known spatial distribution of electron precipitation in the south polar region. A new apparatus has been build for field analysis on a continuous basis of nitrate and conductivity in a melt derived from the vertical melting of ice cores.

DESCRIPTORS: (U) , ANTARCTIC REGIONS, CORES, DISTRIBUTION, ELECTRONS, FLUX(RATE), ICE, IONIZATION, LAND ICE, MELTING, NITRATES, POLAR REGIONS, PRECIPITATION, ROSS SEA, SAMPLING, SEASONS, SEQUENCES, SNOW, SOLAR FLARES, SOUTH(DIRECTION), VERTICAL ORIENTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2311A1, *Electron precipitation, *Polar cap.

AD-A243 026

AD-A242 961 6/4

ROCHESTER UNIV NY CENTER FOR VISUAL SCIENCE

(U) Orientation in Space.

DESCRIPTIVE NOTE: Final rept. 1 Mar-31 Dec 90,

JUN 90 22P

PERSONAL AUTHORS: Aslin, Richard

CONTRACT NO. AFOSR-90-0192

PROJECT NO. 2313

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0921, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This meeting was motivated by recent progress in our understanding of how visual information specifying the spatial relations of objects and the layout of the environment controls an observer's perceptual judgments and motor performance. This meeting was intended to spread knowledge of these new advances and to foster their discussion and refinement. Eighteen leaders in this field who are also excellent expositors presented 45-minute addresses at a meeting lasting two and a half days. Presentations were organized into sessions on retinotopic calibration, perceptual stability, the metrics of 3-D space, perceptual adaptation, and eye-hand coordination. Each session was followed by a 30-minute discussion of the presentations led by a moderator/discussant selected to challenge the speakers and to foster productive interaction with the audience.

DESCRIPTORS: (U) , ADAPTATION, CALIBRATION, CONTROL, ENVIRONMENTS, MOTORS, PERCEPTION, SPATIAL DISTRIBUTION, STABILITY, VISION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A9, *Perceptual stability, Perceptual adaptation, *Retinotopic calibration.

AD-A242 961

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 902 4/2

COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

(U) Numerical Simulation of Cirrus Clouds - Fire Case Study and Sensitivity Analysis,

AUG 91 142P

PERSONAL AUTHORS: Heckman, Scot T.

REPORT NO. CSU-ATSP-483

CONTRACT NO. AFOSR-88-0143

MONITOR: AFOSR, XF
TR-91-0776, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The October 28, 1986 FIRE (First ISCCP Regional Experiment) case was simulated using the Regional Atmospheric Modeling System. This three dimensional, mesoscale model was applied in non-hydrostatic and nested-grid mode using explicit, bulk microphysics and radiation. The simulation resulted in very good agreement between observed and model predicted dynamic and cloud fields. We verified cloud height, thickness, areal extent and microphysical composition against GOES satellite imagery, lidar, and aircraft measurements taken during the FIRE Cirrus IFO (Intensive Field Observation). The simulated cirrus lifecycle is examined to determine possible formation, maintenance and dissipation mechanisms. Sensitivity simulations were run to determine long and short wave radiative forcing. Also, a simulation was run with no condensate to examine cloud feedbacks on the environment. Cloud top generation zones, fallstreaks, and layering were simulated. Longwave radiation appeared to be instrumental in developing weak convective activity in the lower layer thereby increasing it's optical depth. Cloud top cooling and cloud base heating affected the flow around the cloud. Secondarily, the effects of three upper boundary conditions on cirrus clouds were studied in a synoptic setting.

DESCRIPTORS: (U) , CASE STUDIES, CIRRUS CLOUDS, FIRES, MATHEMATICAL MODELS, NUMERICAL ANALYSIS, AIRCRAFT, ATMOSPHERE MODELS, BOUNDARIES, CASE STUDIES, CIRRUS CLOUDS, CLOUD COVER, CLOUDS, CONVECTION, COOLING, DEPTH,

AD-A242 902

AD-A242 902 CONTINUED

DISSIPATION, DYNAMICS, FEEDBACK, FIRES, HEATING, HEIGHT, HIGH FREQUENCY, IMAGES, LAYERS, LIFE CYCLES, LONG WAVELENGTHS, LOW STRENGTH, MATHEMATICAL MODELS, MEASUREMENT, NUMERICAL ANALYSIS, OBSERVATION, OPTICAL PROPERTIES, OPTICAL RADAR, PHYSICS, RADIATION, RADIO WAVES, SATELLITE PHOTOGRAPHY, SENSITIVITY, SIMULATION, THICKNESS.

IDENTIFIERS: (U) *Digital simulation, *Cirrus clouds, *Atmosphere models, Synoptic meteorology, RAMS(Regional Atmospheric Modeling System), FIRE(First ISCCP Regional Experiment), Theses.

AD-A242 902

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 901 9/5 12/6

CARNEGIE-MELLON UNIV PITTSBURGH PA CENTER FOR EXCELLENCE IN OPTICAL DATA PROC ESSING

(U) Optical Associative Processors and Directed Graphs.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 90-31 Jul 91,

AUG 91 52P

PERSONAL AUTHORS: Casasent, David

CONTRACT NO. AFOSR-90-0355

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0819, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The thrust of this research concerns associative processors. Many new aspects exist in this effort: large storage capacity, use of storage density as a measure of efficiency, use of new output recollection vector encoding schemes, general 1:1 and pattern recognition many:1 associative processors, new algorithms and architectures and applications and laboratory realization.

DESCRIPTORS: (U) , ALGORITHMS, ASSOCIATIVE PROCESSING, CAPACITY(QUANTITY), DENSITY, EFFICIENCY, MEASUREMENT, OPTICAL PROCESSING, PATTERN RECOGNITION, STORAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1, *Optical processing, *Computers, *Associative processing, Algorithms, Air Force research.

AD-A242 865 12/5

GEORGE WASHINGTON UNIV WASHINGTON DC

(U) Research in Some Future Directions in Reliability and Quality Control.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 May 91,

SEP 91 6P

PERSONAL AUTHORS: Singpurwalla, Nozer D.

CONTRACT NO. AFOSR-89-0381

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0879, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research in reliability and quality control covering topics in software certification and testing, tracking (software) reliability growth, Bayesian acceptance sampling and life testing, accelerated life testing and the setting of optimum warranties.

DESCRIPTORS: (U) , ACCELERATED TESTING, ACCEPTABILITY, BAYES THEOREM, COMPUTER PROGRAMS, GROWTH(GENERAL), GUARANTEES, LIFE TESTS, OPTIMIZATION, QUALITY CONTROL, RELIABILITY, SAMPLING, SETTING(ADJUSTING), TRACKING.

IDENTIFIERS: (U) PE61102, WUAFOSR2304A5, *Computer program reliability, *Quality control, Guarantees.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 772 12/5 12/6

STANFORD UNIV CA COMPUTER SYSTEMS LAB

(U) Techniques for the Design and Implementation of Highly Reliable Multi-Processing Systems.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-31 Jul 91,

JUL 91 11P

PERSONAL AUTHORS: Luckham, David C.

CONTRACT NO. AFOSR-87-0150

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0923, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research focuses on specification languages for multi-processor systems, with particular emphasis on applications to Ada software. The research, however, applies generally to specifying distributed systems containing both software and hardware components, and to software systems implemented in any programming language. The primary goals are (1) design of a high level specification language for distributed systems, and (2) design and development of prototype tools for applying this language to development of highly reliable multi-processor Ada software.

DESCRIPTORS: (U) , ADA PROGRAMMING LANGUAGE, COMPUTER PROGRAMS, DISTRIBUTION, HIGH LEVEL LANGUAGES, LANGUAGE, MULTIPLE OPERATION, MULTIPROCESSORS, PROCESSING, PROGRAMMING LANGUAGES, PROTOTYPES, RELIABILITY, SPECIFICATIONS.

IDENTIFIERS: (U) *Specification languages, *Multiprocessors, High level languages, Ada, PE61102F, WUAFOSR2304A2.

AD-A242 772

AD-A242 511 6/5

DARTMOUTH MEDICAL SCHOOL HANOVER NH

(U) Multimodal Interactions in Sensory-Motor Processing.

DESCRIPTIVE NOTE: Annual technical rept. Jul 90-Jul 91,

AUG 91 108P

PERSONAL AUTHORS: Reuter-Lorenz, Patricia A.; Hughes, H. C.; Fendrich, Robert; Nozawa, G.; Gazzaniga, M. S.

CONTRACT NO. AFOSR-89-0437

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0762, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We describe our progress in (a) delineating the functional architecture of the human saccadic and attentional orienting systems (section 2) based on analyses of reaction times; (b) development of accurate surface maps of the human neocortex in vivo from reconstructions of MR scans (section 3). Work carried out under AFOSR funding (2 in 90-91 year) provides the basis for our current model, which identifies two serially organized component processes in saccade generation (section 1.1). The early component is sensory; it's most noteworthy feature being the mode of convergence of visual and auditory information in the saccadic control system (section 1.2). In the subsequent pre-motor component, the processing time is partially determined by the state of fixation. Fixation point offsets facilitate saccade latencies by decreasing premotor processing times via disinhibition. These sensory and motor facilitatory mechanisms can be combined to optimize human saccadic performance (section 1.1). The ultimate goal is to provide a model which accounts for human oculomotor performance in terms of physiologically plausible component subprocesses.

DESCRIPTORS: (U) , ACCURACY, AUDITORY SIGNALS, COMPUTER ARCHITECTURE, CONVERGENCE, INTERACTIONS, MAPS, MODELS, MOTORS, MULTIMODE, PROCESSING, REACTION TIME,

AD-A242 511

AD-A242 511 CONTINUED

SENSES(PHYSIOLOGY), SURFACES, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, *Multimodal signals, *Saccadic eye movements, Response latency.

AD-A242 492 7/3 20/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) A New General Method for Preparation of Pentafluorosulfur-Substituted Fluorocarbons: Synthesis of Perfluoroneopentylsulfur Pentafluoride Using Elemental Fluorine as a Reagent,

90 3P

PERSONAL AUTHORS: Huang, Hsu-Nan; Lagow, Richard J.

CONTRACT NO. OSR-88-0084

PROJECT NO. 23

TASK NO. B2

MONITOR: AFOSR
TR-91-0839

UNCLASSIFIED REPORT

Availability: Pub. in Chemistry of Materials, v2 n5 p477-478 1990. Available only to DTIC users only. No copies furhished by NTIS.

ABSTRACT: (U) The reaction of elemental fluorine with neopentyl mercaptan resulted in a 24.5% yield of perfluoroneopentylsulfur pentafluoride. The 19F and 13C(19F) NMR assignments of this novel compound are reported. This new material shows promise as a dielectric material and for providing an electron capture atmosphere in high voltage devices and extraterrestrial satellites. We wish to report the synthesis of a very sterically crowded and extraordinarily interesting new compound, perfluoroneopentylsulfur pentafluoride. The reaction chemistry is unusual, and one might have predicted that such a compound would be unstable and that it might not be isolable due to steric difficulties. However, we have found that it is a stable organofluorine compound with very unusual properties.

DESCRIPTORS: (U) , ARTIFICIAL SATELLITES, ATMOSPHERES, CHEMICAL AGENTS, CHEMICAL REACTIONS, DIELECTRICS, ELECTRON CAPTURE, FLUORIDES, HIGH VOLTAGE, MATERIALS, ORGANIC COMPOUNDS, SPACE ENVIRONMENTS, STABILITY, SULFUR COMPOUNDS, SYNTHESIS, THIOLS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 492 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Fluorinated hydrocarbons, *Dielectric material, Direct Fluorination, Perfluoroneopentylsulfur pentafluoride, Neopentyl mercaptan, Organofluorine compounds, Reprints.

AD-A242 492

AD-A242 488 7/3 7/2

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Synthesis and Characterization of Dimethyltin(IV) Derivatives of Fluoro- and Oxyfluorochromates.

DESCRIPTIVE NOTE: Journal article,

89 5P

PERSONAL AUTHORS: Mallela, Siva P.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0860, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Organometallics, v8 p2751-2754 1989. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Dimethyltin fluoride reacts with CrO2F2 to yield a (CH3)2Sn containing derivative, while with CrOF4 and CrF3 only (CH3)2SnF derivatives are obtained. Anhydrous HF is found to be necessary for the reactions to proceed at room temperature, and, in its absence, (CH3)2SnF2 did not react with CrO2F2 even at high temperature. The vibrational data are consistent with a linear C-Sn-C group in each of these derivatives. Reaction of CrO2F2 with elemental fluorine in the presence of either CsF or NOF provides a one-step direct route to CsCrOF5 or NOCrOF5 salts. Reaction of either CrO2F2 or CrO3 with COF2 in the presence of CsF is another simple, convenient, new synthetic route to the CsCrOF5 salt.

DESCRIPTORS: (U) , FLUORIDES, HIGH TEMPERATURE, METHYL RADICALS, ROOM TEMPERATURE, SYNTHESIS, TIN COMPOUNDS, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Organometallics, *Fluorine compounds, Oxyfluorides, *Dimethyltin fluoride, Fluorinated tin derivatives, Chromium difluorid dioxide, Hydrofluoric acid, Cesium compounds, Nitrosyl compounds, Reprints.

AD-A242 488

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 487 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Carbonyl Difluoride: Reactions with Metal-Phosphine Complexes.

DESCRIPTIVE NOTE: Journal article,

91 7P

PERSONAL AUTHORS: Gupta, O. D.; Kirchmeier, Robert L.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0859, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluorine Chemictry, v52 p1-6 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Carbonyl difluoride (COF2) is a versatile and nondestructive fluorine-transfer reagent as demonstrated by the ready introduction of fluorine into a variety of P-H, N-H or C-H containing compounds. Furthermore, metal oxides may be converted into metal fluorides of high purity using COF2. Christie et al have shown that FC103 can be prepared by using COF2 with alkali metal chlorates, MC103. While we have observed that some phosphines are easily oxidatively fluorinated with COF2, attempts to oxidatively fluorinate PF3, PC13, and PC12 with COF2 failed. This was attributed to the high electronegativity of the atoms groups bound to phosphorus. In this study we report the oxidative fluorination of phosphines via decomposition of a selected group of nickel phosphine complexes.

DESCRIPTORS: (U) , ALKALI METALS, ATOMS, CARBONYL COMPOUNDS, CHLORATES, DECOMPOSITION, FLUORIDES, FLUORINATION, FLUORINE, HIGH RATE, METAL COMPOUNDS, METALS, NICKEL, OXIDATION, OXIDES, PHOSPHINE, PHOSPHORUS, PURITY.

AD-A242 487

AD-A242 487 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Oxidative fluorination, Fluorinated phosphoranes, Nickel complexes, 1,2-Bis(Diphenylphosphino) ethane and 1,3-Bis(Diphenylphosphino) propane, Reprints.

AD-A242 487

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 486 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Fluorinated Three- and Four-Nitrogen Compounds and Their Reactions.

DESCRIPTIVE NOTE: Journal article,

90 5P

PERSONAL AUTHORS: Sarwar, Ghulam; Kirchmeier, Robert L.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0858, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorg. Chem., v29 p4255-4258 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) At first glance, with the exception of compounds of carbon, it would appear that molecules containing catenated atoms of other elements are relatively unstable. While there is no element that can compete with carbon in numbers of atenated atoms, it should be noted that it is possible to prepare stable catenated species of other elements, especially if fluorine atoms or fluorinated groups or other electronegative species are present in the molecule. Thus, it is expected that stable catenated nitrogen compounds should exist, since (CP3)3N and CF3N2CF3 are both extremely stable molecules. We and others have been able to synthesize highly stable perfluoroalkyl substituted tetrazanes (Rf)2NN(Rf)N(Rf)N(Rf)2.

DESCRIPTORS: (U) , ATOMS, CARBON, FLUORINATION, FLUORINE, MOLECULES, STABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Perfluoroalkyl tetrazanes, *Poly-fluorodiazanes, Trifluoroacetonitrile, Nitrogen-chlorine bond insertion, Polyfluoroolefin insertion into nitrogen-nitrogen bonds,

AD-A242 486

AD-A242 486 CONTINUED

Reprints.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 485 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Synthesis of Fluorinated Tertiary Diamines and Diazanes.

DESCRIPTIVE NOTE: Journal article,

90 12P

PERSONAL AUTHORS: Patel, Nimesh R.; Kirchmeier, Robert L.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-91-0857

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluorine chemistry, v48 p395-405 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) While the potential uses for fluorinated tertiary amines and diamines, as well as diazanes, are quite broad, e.g., as refrigerants, flame retardant coatings, hydraulic fluids, heat transfer media, turbine impellants, dielectrics, lubricants, fuel additives, blood substitutes and as curing agents for fluoroepoxy resins, the single predominant method of preparation is electrochemical fluorination. The products obtained by this method are generally isomeric mixtures of poly and perfluorinated amines or diamines. They are difficult to purify and are obtained in yields ranging from 5 to 50%. Thus the use of these materials has been hampered and much of the data reported in the literature is suspect because of impurities present in the samples originally studied.

DESCRIPTORS: (U) , AMINES, BLOOD SUBSTITUTES, COATINGS, CURING AGENTS, DIELECTRICS, ELECTROCHEMISTRY, EPOXY RESINS, FLAME INHIBITORS, FLUORINATION, FLUOROPOLYMERS, FUEL ADDITIVES, HEAT TRANSFER, HYDRAULIC FLUIDS, IMPURITIES, ISOMERS, LUBRICANTS, MEDIA, MIXTURES,

AD-A242 485

AD-A242 485 CONTINUED

POLYMERS, PREPARATION, REFRIGERANTS, SYNTHESIS, TURBINES.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, *2-Azapropene, Bis(Polyfluoroalkoxy) ethers, *Diamines, Polyfluoroalkoxy imines, Alkenes, Nitrile insertion, *Diazamines, Photolytic reactions, SF5C1, CF3C(O)C1, Reprints.

AD-A242 485

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 484 6/1

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The Synthesis of Highly Fluorinated Alkylcyclohexanes for Use as Oxygen Carriers and the 19F and 13C NMR Spectra of Alkylcyclohexanes,

90 15P

PERSONAL AUTHORS: Lin, Wen-Huey; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-91-0838

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluorine Chemistry, v50 p345-358 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) There is current interest in fluorocarbons as synthetic blood substitutes. As a satisfactory candidate, the perfluorocarbon-based emulsion must be non toxic, chemically inert, biologically compatible, and have high oxygen-dissolving capacity, long-term stability as well as short dwelling time. Highly branched molecules and cyclic compounds are expected to create more intermolecular 'holes' in their liquid structures which could accommodate greater amounts of oxygen. Furthermore, branched molecules tend to form more stable water emulsions than unbranched ones. Therefore, we were interested in the fluorination of branched alkylcyclohexanes.

DESCRIPTORS: (U) , BLOOD SUBSTITUTES, CYCLIC COMPOUNDS, EMULSIONS, FLUORINATION, HOLES(OPENINGS), LIQUIDS, LONG RANGE(TIME), MOLECULE MOLECULE INTERACTIONS, MOLECULES, OXYGEN, STABILITY, STRUCTURES, SYNTHESIS, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Fluorination, *Alkylcyclohexanes, *Oxygen carriers, Fluorocarbons, *Blood substitutes, Reprints.

AD-A242 484

AD-A242 449 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Some Highly Fluorinated Acyclic, Cyclic, and Polycyclic Derivatives of Cl2NCF2CF2NCl2 and Cl2C=NCCl2CCl2N=CCl2.

DESCRIPTIVE NOTE: Journal article,

90 8P

PERSONAL AUTHORS: Sarwa, Ghulam; Kirchmeier, Robert L.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0862, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Heteroatom Chemistry, v1 n2 p167-173 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The chemistry of the nitrogen halogen bond has long attracted interest because of the ease with which reactions occur and the range of compounds of varying properties that can be prepared. These compounds in turn are often viable precursors to stable high-nitrogen and high-fluorine materials. We and others have taken advantage of this high reactivity to insert perfluoroalkenes and polyfluoroalkenes into the nitrogen chlorine bond(s) of RfNCl2 to prepare either secondary polyfluoroalkyl or perfluoroalkylchloroamines or tertiary polyfluoroalkyl or perfluoroalkylamines. Nitriles can be inserted into RfRfNCl to form precursors to polyfluoroalkyl and perfluoroalkyl tetrazanes as well as other high nitrogen compounds.

DESCRIPTORS: (U) , BONDING, CHEMISTRY, CHLORINE, HALOGENS, HIGH RATE, NITRILES, NITROGEN, NITROGEN COMPOUNDS, PRECURSORS, REACTIVITIES, VIABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2,

AD-A242 449

AD-A242 449 CONTINUED

*Polyfluorobisazomethine, *Polyfluoroalkenes, Nitrogen chlorine bonds, Secondary fluoroalkylchloromines, Tertiary fluoroalkylamines, Acyclic, Cyclic, Bicyclic compounds fluorine concentrations, Reprints.

AD-A242 419 7/5 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Photodissociation of CO(-3): Product Kinetic Energy Measurements as a Probe of Excited State Potential Surfaces and Dissociation Dynamics.

DESCRIPTIVE NOTE: Rept. 15 Nov 89-14 Nov 90,

MAY 90 11P

PERSONAL AUTHORS: Snodgrass, Joseph T.; Roehl, Coleen M.; Van Koppen, Petra A.; Palke, William E.; Bowers, Michael T.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0855, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chem. Phys., v92 n10 p5935-5943, 15 May 90. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The photodissociation process CO3- + hv = O- + CO2 has been investigated at photon energies of 2.41, 2.50, 2.54, 2.60 and 2.71 eV. Experiments were conducted by crossing a mass-selected, 8 keV ion beam with a linearly polarized laser beam, and measuring the kinetic energy distributions of the charged photodissociation products. By varying the angle between the ion beam and laser polarization, angular distributions were obtained at photon energies of 2.41 and 2.54 eV. The photon energy dependence of the average photofragment kinetic energies shows conclusively that photodissociation at these photon energies does not proceed by a direct dissociation process on a repulsive potential surface, or by a statistical vibrational predissociation process on a bound surface. The photofragment angular distributions are isotropic, providing further evidence that precludes direct photodissociation on a repulsive potential surface. Ab initio calculations were performed using the GAUSSIAN86 programs. These calculations indicate that

AD-A242 419 CONTINUED

ground state CO3- has a planar D3h geometry, and 2A2' electronic symmetry. This ground state correlates adiabatically to the CO2- + O dissociation asymptote, not the lower energy O- + CO2 asymptote.

DESCRIPTORS: (U) , ANGLES, DISSOCIATION, DISTRIBUTION, DYNAMICS, ENERGY, GROUND STATE, ION BEAMS, KINETIC ENERGY, LASER BEAMS, LASERS, LOW ENERGY, MEASUREMENT, PHOTODISSOCIATION, PHOTOFRAGMENT SPECTROSCOPY, PHOTONS, POLARIZATION, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Photodissociation, *Kinetic energy, *Dissociation dynamics, Anions, Excited states, Reprints, *Carbonate ion.

AD-A242 418 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Nucleophilic Substitution Reactions of Polyfluoroalkylsulfonamides.

DESCRIPTIVE NOTE: Journal article,

JUL 91 9P

PERSONAL AUTHORS: Guo, Cai-Yun; Kirchmeier, Robert L.; Shreeve, Jean ne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0856, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluorine Chemistry, v52 p29-36 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The sulfonamides CF3SO2N(CH3)Na and CF3SO2N(H)Na have been reacted with polyfluoro cyclic, acyclic and inorganic chlorine and bromine containing species. Nucleophilic displacement of chlorine or bromine in 1,2 dichloro-perfluorocyclobutene, 1,2 dichloroperfluorocyclopentene, benzyl bromide, cyanuric chloride and oxalyl chloride has been found to occur under mild conditions to give good yields of N substituted polyfluoroalkyl and polyfluoroaryl sulfonamides. The effects of solvent and substrate structure on the conditions necessary for reaction to occur, and the yields obtained of the desired products are discussed. Reactions of fluorocarbons with a variety of nucleophiles have been an area of intense study over the last forty years. An excellent discussion on the behavior of fluorocarbons with nucleophiles appears in the older literature.

DESCRIPTORS: (U) , BROMINE, CHLORIDES, CHLORINE, CHLORINE COMPOUNDS, CYANOGEN, DISPLACEMENT, ELECTRON DONORS, FLUORINATED HYDROCARBONS, INORGANIC COMPOUNDS,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 418 CONTINUED

NUCLEOPHILIC REACTIONS, ORGANIC COMPOUNDS, SUBSTITUTION REACTIONS, SUBSTRATES, SULFONAMIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Sulfonamides, *Nucleophilic reactions, Polyfluoro compounds, Nucleophilic displacement, Polyfluoroaryl sulfonamides, Polyfluoroalkyl sulfonamides, Reprints.

AD-A242 417 12/3

RHODE ISLAND UNIV KINGSTON DEPT OF ELECTRICAL ENGINEERING

(U) Predictive Probability as a Criterion for Model Selection.

DESCRIPTIVE NOTE: Final rept. 1 Mar 89-28 Feb 91,

MAY 91 6P

PERSONAL AUTHORS: Kay, Steven

CONTRACT NO. AFOSR-89-0298

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-91-0877

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of the International Conference on Acoustics, Speech, and Signal Processing, p2415-2418, 14-17 May 91. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Predictive Probability as a Criterion for Model Selection.

DESCRIPTORS: (U) *PROBABILITY DENSITY FUNCTIONS, *MODELS, *SELECTION, BAYES THEOREM, MATHEMATICAL PREDICTION, PARAMETERS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 416 12/2 7/5

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Thinking Topologically about Photo Chemistry in Restricted Spaces,

91 21P

PERSONAL AUTHORS: Turro, Nicholas J.; Garcia-Garibay, Miguel

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0830, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Photochemistry in Organized and Constrained Media, n.d. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Topological geometry has been described as a qualitative but precise geometry because it is precise in defining the topological features of a geometric form. Geometry is at the heart of chemical thinking, so that it is natural to ask whether topological geometry can be of use to chemists. In the authors' view, organic chemistry has fluorished because organic chemists have traditionally thought topologically, i.e., qualitatively but precisely. In this account, we present a description of topological methods in terms of that should appeal to chemists and that can be employed to analyze problems involving microheterogeneous systems and restricted reaction spaces. Some examples will be given of how topology works for geometric forms. Then examples that apply topological thinking to the supramolecular level of chemical analysis will be given.

DESCRIPTORS: (U) , CHEMICAL ANALYSIS, CHEMISTS, GEOMETRIC FORMS, GEOMETRY, LIMITATIONS, ORGANIC CHEMISTRY, PHOTOCHEMICAL REACTIONS, PRECISION, RESPONSE, TOPOLOGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Topology, *Photochemical reactions *Qualitative analysis,

AD-A242 416

AD-A242 416 CONTINUED

Euclidean geometry, Faujasite zeolites, Chemical structures, Restricted spaces, Supramolecular structure, Reprints.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 415 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Synthesis of Perfluorodicyclohexano-18-Crown-6 Ether.

91 5P

PERSONAL AUTHORS: Lin, Tzuhn-Yuan; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-91-0836

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chem. Soc., Chemical Communications, v12 p12-14 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Two isomers of perfluorodicyclohexano 18 crown 6 ether, the cis syn cis and cis anti cis isomers, have been prepared and their structures have been established by X ray crystallography. Perfluoro crown ethers are becoming important for FNMR imaging applications in humans and are particularly effective as brain and spinal diagnostics when administered to the cerebrospinal fluid compartment. Scale up of the synthesis of perfluoro 15 crown 5 and other biological applications of these new compounds3 are being studied. We report here the synthesis and crystal structures of two structural isomers of perfluorodicyclohexano- 18 crown 6 ether: the cis syn cis and cis-anti-cis isomers. Presently such complex oxygen-containing fluorocarbons are inaccessible by synthetic techniques other than the controlled elemental fluorine reaction techniques developed in this laboratory. A solution of the starting material, dicyclohexano-18-crown-6 ether (mixture of cis syn cis and cis-anti-cis isomers; Aldrich), in dry acetonitrile was dried over 4 angstrums molecular sieves and the crown ether recrystallized before use. In a typical experiment, a solution dicyclohexano 18 crown 6 ether (ca. 1 g) in dry methylen chloride was mixed with NaF (20 g) to make a slush, and the methylene chloride removed in vacuo.

AD-A242 415

AD-A242 415 CONTINUED

DESCRIPTORS: (U) , BIOLOGY, BRAIN, CEREBROSPINAL FLUID, CHLORIDES, COMPARTMENTS, CRYSTAL STRUCTURE, CRYSTALLOGRAPHY, ETHERS, HUMANS, IMAGES, ISOMERS, MATERIALS, METHYLENES, MOLECULAR SIEVES, STARTING, STRUCTURAL PROPERTIES, SYNTHESIS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Organic compounds, Oxygen-containing fluorocarbons, Direct fluorination, Perfluoro crown ethers, Perfluorocyclohexano-18-crown-6 ether, *Aromatic compound, Reprints, *Ethers.

AD-A242 415

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 414 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The Synthesis of the First Perfluorocryptand,

90 3P

PERSONAL AUTHORS: Clark, Wayne D.; Lin, Tzuhn-Yuan
Meleknia, Simin D.; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-91-0840

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Organic Chemistry, v55 p5933-5934 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Using carefully controlled reactions of elemental fluorine, we have prepared and characterized the first perfluorocryptand, specifically perfluoro-4,7,13,16,21,24-hexaoxa-1,10-diazabicyclo(8.8.8)hexacosane. This is a very stable, inert, high boiling clear oil. We report in this paper the synthesis of the first perfluorocryptand, perfluoro-4,7,13,16,21,24-hexaoxa-1,10-diazabicyclo hexacosane, which is the perfluorocryptand. This is a very stable inert, high-boiling clear oil and was obtained in 28% yield by direct fluorination of the starting hydrocarbon cryptand. The substitution of fluorine into cryptand systems is sure to produce some interesting effects. Indeed, the presence of fluorocarbon groups in crown ethers has been shown to increase the rate of ion transport through a polymer membrane. The presence of fluorine in partially fluorinated cyclams has been shown to reduce the basicities of such compounds.

DESCRIPTORS: (U) , CONTROL, ETHERS, FLUORINATED HYDROCARBONS, FLUORINATION, FLUORINE, HYDROCARBONS, ION EXCHANGE, MEMBRANES, POLYMERS, RATES, STARTING, SUBSTITUTES, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Organic compounds, *Aromatic compounds, Direct fluorination, Perfluorination, Perfluorocryptand, Cryptands, Hexacosane, Oil, Reprints, Diazobicyclo compounds.

AD-A242 414 CONTINUED

AD-A242 414

DTIC REPORT BIBLIOGRAPHY , SEARCH CONTROL NO. T85001

AD-A242 166 7/4

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The Synthesis of Perfluoro Highly Branched Heterocyclic Fluorine Compounds by Direct Fluorination,

90 17P

PERSONAL AUTHORS: Lin, Wen-Huey; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0833, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluorine Chemistry, v50 p15-30 1990. Availablel only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The direct fluorination of hexamethyleneimine, heptamethyleneimine, 2,6-dimethylmorpholine, thiomorpholine, 1,4-dimethylpiperazine and piperazine produced the corresponding perfluorinated products. The 19F NMR spectrum of perfluoro N,N1 - difluoropiperazine was found to be temperature-dependent. Recently efforts have been extended to the investigation of fluorinating heterocyclic nitrogen compounds with elemental fluorine. Several new fluorocarbons with intact C-N bonds were prepared and are now reported. The syntheses of perfluoro N-fluoro-hexamethyleneimine, perfluoro N-fluoroheptamethyleneimine, perfluor N-fluoro-2,6-dimethylmorpholine, N-fluortetrafluorosulfide perfluorothiomorpholine, perfluoro N,N1-difluoropiperazine, and perfluoro N,N1-bis(trifluoromethyl)-piperazine by the very general direct fluorination techniques developed in our laboratory were undertaken in order to produce perfluorinated heterocyclic compounds with correct volatility for oxygen-carriers and blood-substitutes studies.

DESCRIPTORS: (U) , FLUORINATED HYDROCARBONS, FLUORINATION, FLUORINE COMPOUNDS, HETEROCYCLIC COMPOUNDS,

AD-A242 166

AD-A242 166 CONTINUED

NITROGEN COMPOUNDS, SYNTHESIS, VOLATILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Fluorination, Heterocyclic fluorine compounds, *Oxygen carriers, Blood substitutes, Reprints.

AD-A242 166

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 165 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Oxadiazoles with NF2-Containing Substituents.

DESCRIPTIVE NOTE: Journal article,

JUL 91 12P

PERSONAL AUTHORS: John, Earnest O.; Kirchmeier, Robert L.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0861, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluorine Chemistry, v47 p333-343 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Compounds that contain nitrogen fluoride, nitrogen chloride, NC1F and -N=N- moieties have been of considerable interest as candidates for high energy roles. The oxidizing properties of substituted tetrazoles that contain the -NF2 group when combined with possible fuels such as hydrazines have been examined. Earlier we, and others, reported the high yield synthesis of (difluoroamino)difluoro-acetonitrile, NF2CF2CN, in our case by the reaction of tetra-fluorohydrazine with 1,1-difluoroethene in the presence of KF, and the subsequent synthesis of oxadiazoles and tetrazolates.

DESCRIPTORS: (U) , CHLORIDES, FLUORIDES, FUELS, HIGH ENERGY, HIGH RATE, HYDRAZONES, NITROGEN, NITROGEN COMPOUNDS, OXADIAZOLES, OXIDATION, SUBSTITUTES, SYNTHESIS, TETRAZOLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Oxalyl chloride, *Sodium-5-(Difluoroamino) difluoromethyltetrazolate, Sodium-5-pentafluoroethyltetrazolate, *Perfluoroacyl acid chlorides, 2,5-Disubstituted 1,3,4-oxadiazoles, Reprints.

AD-A242 165

AD-A242 164 7/6

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) A Facile Synthesis for Functional Perfluoropolyether Oligomers, Diacids, Diesters, and Surfactants.

91 11P

PERSONAL AUTHORS: Persico, Daniel F.; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0837, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Polymer Science: Part A: Polymer Chemistry, v29 p233-242 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Linear polyester precursors provide a convenient low cost synthesis for fluorocarbon surfactants, diacids, diesters, and intermediates. A reaction scheme starting with hydrocarbon linear polyesters followed by conversion of the ester to a perfluoro ester by direct fluorination and subsequent treatment with nonstoichiometric amounts of sulfur tetrafluoride produce upon hydrolysis of ester units, remaining in the polymer, low molecular weight perfluoropolyether diacids. Alternatively, this technique can be altered slightly to produce diesters and other functional perfluorocarbon intermediates.

DESCRIPTORS: (U) , CONVERSION, ESTERS, ETHERS, FLUORIDES, FLUORINATED HYDROCARBONS, FLUORINATION, FLUOROPOLYMERS, HYDROCARBONS, HYDROLYSIS, LOW COSTS, OLIGOMERS, POLYESTER FIBERS, POLYESTER PLASTICS, PRECURSORS, RESPONSE, STARTING, SULFUR, SURFACE ACTIVE SUBSTANCES, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Perfluropolyether oligomers, Diacids, Diesters, Surfactants, Reprints.

AD-A242 164

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 163 7/6

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The Direct Fluorination of Acetone,

91 8P

PERSONAL AUTHORS: Clark, Wayne D.; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0828, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluorine Chemistry, v52 p37-43 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A synthesis for hexafluoroacetone using elemental fluorine is reported. Previously hexafluoroacetone and other ketones have been difficult to prepare using fluorination based syntheses. Hexafluoroacetone is a moderately toxic, reactive, nonflammable gas. The inductive effect of fluorine causes the carbonyl bond to become highly susceptible to attack by nucleophilic reagents. This reactivity makes hexafluoroacetone a useful reagent in the synthesis of new polymers, pharmaceuticals, and agrochemicals. The commercial production of hexafluoroacetone involves a halogen exchange reaction between hexachloroacetone and hydrogen flouride using a chromium catalyst. Other methods for the synthesis of hexafluoroacetone have been explored.

DESCRIPTORS: (U) , ACETONES, ATTACK, BONDING, CARBONYL COMPOUNDS, CATALYSTS, CHEMICAL AGENTS, CHROMIUM, DRUGS, EXCHANGE REACTIONS, FIRE RESISTANCE, FLUORINATION, HALOGENS, HYDROGEN, KETONES, POISONOUS GASES, POLYMERS, REACTIVE GASES, REACTIVITIES, SYNTHESIS, TOXICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Direct fluorination, Hexafluoroacetone, Reprints.

AD-A242 163

AD-A242 063 20/5

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Evaporation of Covalent Clusters: Unimolecular Decay of Energized Size-Selected Carbon Cluster Ions (Cn(+), 5 Less Than or Equal to n Less than or Equal to 100),

APR 90 8P

PERSONAL AUTHORS: Radi, P. P.; Hsu, M. T.; Brodbelt-Lustig, J.; Rincon, M.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0852, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v92 n8 p4817-4821, 15 Apr 90. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The unimolecular decay of energized size selected carbon clusters is investigated. The clusters are produced in a laser generated plasma on the surface of a graphite rod. Directly extracted cations that decay on a time scale are probed in a double-focusing, reverse geometry mass spectrometer. The unimolecular decomposition rates are extracted from metastable fraction measurements. We observe a dramatic discontinuous increase in the decay rate constant as a function of cluster size around mass C30+ (factor of 5 to 10). Additionally, low rate constants, relative to the neighbors, are found for C50+, C60+ and C70+. The results are rationalized by postulating a phase transition from small rigid clusters for larger molten entities.

DESCRIPTORS: (U) , CARBON, CATIONS, CLUSTERING, CONSTANTS, COVALENT BONDS, DECAY, DECOMPOSITION, ENERGY, EVAPORATION, EXTRACTION, GEOMETRY, GRAPHITE, LASERS, LOW RATE, MASS SPECTROMETERS, MOLECULES, PHASE TRANSFORMATIONS, PLASMAS(PHYSICS), RATES, REVERSIBLE, RIGIDITY, RODS, SCALE, SIZES(DIMENSIONS), TIME.

AD-A242 063

AD-A242 063 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, Reprints.

AD-A242 062 7/6 7/5 9/3

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Energetics, Structure and Photodissociation Dynamics of the Cluster Ar N2(+).

DESCRIPTIVE NOTE: Rept. for 25 Nov 89-14 Nov 90,

JUL 90 9P

PERSONAL AUTHORS: Bowers, Michael T.; Kim, Hyun-Sook

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0851, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v93 n2 p1158-1164, 15 Jul 90. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A mass selected ion beam of ArN2+ clusters is brought to a spatial focus and crossed with the polarized output of an Argon Ion Laser. Photofragment ions are mass and energy analyzed using an electrostatic analyzer and detected using single ion counting methods. Photoproducts observed over the photon energy range of 2.1 to 3.5 eV are Ar+/N2 and N2+/Ar with the former favored by about a factor of three. Analysis of the data indicate the upper state is purely repulsive leading to strongly translationally and vibrationally excited products. The absolute cross section has an onset at about 600 nm and smoothly increases to 357 nm. In order to reasonably interpret the data it is suggested the higher energy asymptote diabatically correlates to the ground state of ArN2+ and the lower energy asymptote diabatically correlates to the repulsive state accessed by the photon. Detailed dynamics in the region where the curves cross are responsible for the observed product distribution. Application of an impulsive model indicates the ground state of ArN2+ is linear.

DESCRIPTORS: (U) , ARGON LASERS, COUNTING METHODS, CROSS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 062 CONTINUED

SECTIONS, DISTRIBUTION, DYNAMICS, ELECTROSTATIC ANALYZERS, ENERGETIC PROPERTIES, ION BEAMS, IONS, MODELS, OUTPUT, PHOTODISSOCIATION, PHOTOFRAGMENT SPECTROSCOPY, POLARIZATION, PULSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Ion clusters, *Photodissociation, *Argon lasers, Chemical equilibrium, Reprints.

AD-A242 058 7/5

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Photodissociation of the Benzene Dimer Cation in the Gas Phase,

90 6P

PERSONAL AUTHORS: Snodgrass, J. T.; Dunbar, R. C.; Bowers, M. T.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0854, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v94 n9 p3648-3651 1990. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Photodissociation of the Benzene Dimer Cation in the Gas Phase.

DESCRIPTORS: (U) *BENZENE, *DIMERS, *CATIONS, *PHOTODISSOCIATION, VAPOR PHASES, CLUSTERING, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 057 14/2

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) The Mechanism and Photodissociation Dynamics of the (S. SO2)+ Cluster at 308 nm,

90 23P

PERSONAL AUTHORS: Snodgrass, Joseph T.; Bunn, Thomas L.; Bowers, Michael T.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0853, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in International Jnl. of Mass Spectrometry and Ion Processes, v102 p45-65 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A pulsed laser technique has been developed for studying the photodissociation of ions and ion clusters in a fast ion beam. The experiments were conducted using a reverse geometry double focusing mass spectrometer. Ions were produced via multiphoton ionization by crossing a continuous supersonic jet with a 20nm plus of a HeCl excimer laser. These ions were accelerated to 8 keV, mass selected by a magnet, and brought to a spatial focuses where they were intercepted by the focused 308nm output of a second pulsed XeCl excimer laser. The major ions produced in the ion source were S+, SO+ and clusters of these ions with SO2. Photodissociation of the (S.SO2)+ cluster ion was investigated. The predominant product channel leads to S+ + SO products, but small amounts of S+ + SO2 and SO2+ + S products were also observed. Photofragment kinetic energy distributions were measured for each product channel. Production of S + SO2+ products in their ground electronic states if favored. In contrast, S+ + SO2 products are formed with S+ in electronically excited spin-orbit states. The observation of a strong SO+ + SO photodissociation channel is a surprising result.

AD-A242 057 CONTINUED

DESCRIPTORS: (U) , CHANNELS, CLUSTERING, CROSSINGS, DISTRIBUTION, DYNAMICS, ELECTRONIC STATES, ENERGY, GROUND STATE, ION BEAMS, ION SOURCES, IONS, KINETIC ENERGY, ORBITS, PHOTODISSOCIATION, PHOTOFRAGMENT SPECTROSCOPY, PHOTOIONIZATION, PRODUCTION, PULSED LASERS, SPIN STATES, SUPERSONIC AIRCRAFT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 054 7/6

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Phosphorescence from a Bromonaphthalene Lumophore as a Photophysical Probe of Polymer Conformation and Interpolymer Interactions,

91 8P

PERSONAL AUTHORS: Turro, Nicholas J.; Caminati, Gabriella; Kim, Jinbaek

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0834, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Macromolecules, v24 n14 p4054-40604 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Phosphorescence from a Bromonaphthalene Lumophore as a Photophysical Probe of Polymer Conformation and Interpolymer Interactions.

DESCRIPTORS: (U) *POLYELECTROLYTES, MACROMOLECULES, FLUORESCENCE, PHOSPHORESCENCE, ACRYLIC ACID, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F, BNPAA(Bromonapthalene labeled poly(Acrylic Acid)), Fluroescent probes.

AD-A242 053 7/3 7/2

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Novel Synthesis of Unusual Classes of Fluorocarbon Organosulfur Compounds Using Elemental Fluorine as a Reagent,

91 7P

PERSONAL AUTHORS: Huang, Hsu-Nan; Roesky, Herbert; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0835, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorganic Chemistry,v30 n4 p789-794 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The reactions of elemental fluorine with branched alkyl mercaptans, alkanesulfonyl fluorides, alkyl thioethers, cyclic alkyl thioethers, alkyl sulfones, and an alkanesultone have been studied. The synthesis and characterizations of perfluoro isobutylsulfur pentafluoride, perfluoroneopentylsulfur pentafluoride, perfluoropropylsulfur pentafluoride, perfluorotetramethylenesulfu- tetrafluoride, perfluoro 1, 4 thioxane tetrafluoride, perfluoro 2 propanesulfonyl fluoride, 1,1,1,3,3,3 hexafluoro 2 propanesulfonyl fluoride, perfluorotetramethylene sulfone, perfluorobutanesulfonyl fluoride, perfluoro 1,4 butane sultone, and perfluoropropanesulfonyl fluoride are discussed. The 19-F and 13-C(19-F) NMR assignments of the fluorinated products are also reported.

DESCRIPTORS: (U) , ALKYL RADICALS, CHEMICAL AGENTS, CYCLES, ETHERS, FLUORIDES, FLUORINATED HYDROCARBONS, FLUORINATION, ORGANIC SULFUR COMPOUNDS, SULFONES, SULFUR COMPOUNDS, SYNTHESIS, THIOLS.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F, *Fluorination,

AD-A242 053

AD-A242 053 CONTINUED

*Organic compounds, *Fluorocarbon organosulfur compounds.

AD-A242 052 7/3 7/6 11/2

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Synthesis and Structure of a Highly Branched Polycarbosilane Derived from (Chloromethyl) trichlorosilane,

91 10P

PERSONAL AUTHORS: Whitmarsh, Chris K.; Interrante, Leonard V.

CONTRACT NO. AFOSR-89-0439

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0841, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Organometallics, v10 n5 p1336-1344, 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A highly branched hydridopolycarbosilane has been prepared by Grignard coupling of (chloromethyl) trichlorosilane, followed by reduction with lithium aluminum hydride. Trapping studies show that the initial step in the polymerization is a nearly quantitative formation of the Grignard compound Cl3SiCH2MgCl. This Grignard compound undergoes head-to-tail (Si-C) coupling almost exclusively, and due to its trifunctional SiCl3 tail , a complicated, branched, polycarbosilane polymer results, which contains the following structural units: SiCl3CH2-,-SiCl2CH2-,>SiClCH2-, and yields SiCH2-. The chloropolycarbosilane undergoes side reactions with ether, leading to incorporation of small amounts of ethyl and ethoxy functionality. During the reduction step the ethoxy groups are eliminated, yielding a polymer with the approximate formula (SiH1.85Et0.15CH2)n, which has been characterized by 1H, 13C, and 29Si NMR, IR, GPC, and elemental analysis. This polymer is of interest as a precursor to near stoichiometric silicon carbide.

DESCRIPTORS: (U) , ALUMINUM COMPOUNDS, FORMULATIONS, LITHIUM HYDRIDE, POLYMERIZATION, SIDE REACTIONS, SILICON

AD-A242 053

AD-A242 052

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 052 CONTINUED

CARBIDES, STOICHIOMETRY, STRUCTURAL PROPERTIES, SYNTHESIS, TRICHLOROSILANE.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F, *Grignard reactions, *Organometallic compounds, Polycarbosilane, Ceramic precursors, Silicon carbides.

AD-A242 051 14/4 12/3

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Characteristic Curves for Photographic Emulsions from Nonlinear Fitting: A Study of Statistical and Model Error,

MAY 91 8P

PERSONAL AUTHORS: Tellinghuisen, Joel

CONTRACT NO. AFOSR-90-0030

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0842, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Applied Optics, v30 n13 p1723-1729, 1 May 91. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Characteristic Curves for Photographic Emulsions from Nonlinear Fitting: A Study of Statistical and Model Error.

DESCRIPTORS: (U) *PHOTOGRAPHIC EMULSIONS, *CURVATURE, *FITTING FUNCTIONS(MATHEMATICS), *STATISTICAL ANALYSIS, *ERROR ANALYSIS, *NONLINEAR ANALYSIS, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303A2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 039 7/4

OHIO UNIV ATHENS DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Luminescence and Electroluminescence Properties of Nd, Tm, Yb Doped GaAs and Some II-VI Compounds.

DESCRIPTIVE NOTE: Annual rept. 15 Jul 90-14 Aug 91,

AUG 91 23P

PERSONAL AUTHORS: Lozykowski, Henry J.

REPORT NO. UT-5473-1

CONTRACT NO. AFOSR-90-0322A

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0817, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the progress accomplished during the first year of research on luminescence and electroluminescence properties of Nd, Tm, Yb doped GaAs and some II-IV compounds. The photoluminescence study of GaAs:Yb shows no 4f emission. The PL spectra of CdS:Nd were recorded and about 20 sharp emission lines were observed. This indicates that in CdS, Nd3+ occupies different symmetry sites. The PL of CdS:Yb at 9.3 K reveals five sharp lines in the 985 nm - 990 nm range and a strong broader line at 998.3 nm. Electroluminescence of ZnS:Tm embedded in a Boric matrix was observed for the first time. Strong emission was observed at room temperature as well as at low temperature revealing only five groups of strong sharp lines which are assigned to transitions within the 4f shell of Tm3+. EL intensity was investigated as a function of voltage, temperature and frequency. The voltage dependence of the EL intensity shows that the direct impact excitation mechanism is a dominant one. Photoluminescence spectra of InP:Yb at different temperatures consist of sharp peaks related to Yb3+ transition.

AD-A242 039 CONTINUED

DESCRIPTORS: (U) , ELECTROLUMINESCENCE, EXCITATION, GALLIUM ARSENIDES, GROUP II-VI COMPOUNDS, IMPACT, INTENSITY, LOW TEMPERATURE, LUMINESCENCE, PHOTOLUMINESCENCE, ROOM TEMPERATURE, SHARPNESS, SITES, SPECTRA, SYMMETRY, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1, *Photoluminescence, *Electroluminescence, Spectroscopy polarization, GaAs, Some II-IV compounds doped with rare earth.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 035 20/5

OKLAHOMA STATE UNIV STILLWATER

(U) Intramolecular Energy Transfer and Mode-Specific Effects in Unimolecular Reactions of Disilane,

JUL 91 17P

PERSONAL AUTHORS: Schranz, Harold W.; Raff, Lionel M.; Thompson, Donald L.

CONTRACT NO. AFOSR-89-0085

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-91-0769, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in J. Chem. Phys., v95 n1 p106-120, 1 Jul 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Intramolecular energy transfer rates and pathways in disilane Si2H6 have been investigated in detail by analysis of the envelope functions of the time variation of the uncoupled normal-mode kinetic energies and by a new method that involves the Fourier transform of the local-mode bond energies. The results show that the total intramolecular vibrational relaxation (IVR) rate out of a given mode is generally much faster than the total dissociation rate. However, many of the individual mode-to-mode rate coefficients are significantly smaller than this rate. Consequently, IVR is not globally rapid on the time scale of the reactions. The Si-Si and local modes relax over a much longer time scale than the Si-H modes. This observed decoupling of sets of internal modes is interpreted to mean that phase space is not explored ergodically on the time scale of the reactions, even at internal energies significantly greater than the dissociation thresholds. Reprints

DESCRIPTORS: (U) , DISSOCIATION, ENERGY, ENERGY TRANSFER, ENVELOPE(SPACE), FOURIER TRANSFORMATION, FUNCTIONS, INTERNAL, KINETIC ENERGY, MOLECULAR ENERGY LEVELS, MOLECULAR PROPERTIES, MOLECULES, NORMALITY, RATES,

AD-A242 035

AD-A242 035 CONTINUED

REACTION KINETICS, REPRINTS, SCALE, SILANES, TIME, VARIATIONS, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A242 035

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 027 21/2 21/5

GENERAL ELECTRIC CORPORATE RESEARCH AND DEVELOPMENT SCHENECTADY NY

(U) Local Extinction Mechanisms in Non-Premixed Turbulent Combustion.

DESCRIPTIVE NOTE: Final rept. 1 May 88-30 Jun 90,

AUG 91 78P

PERSONAL AUTHORS: Correa, S. M.; Gulati, A.

CONTRACT NO. F49620-88-C-0066

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XF
TR-91-0871, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The goal of this research was a quantitative understanding of turbulence-chemistry interactions pertinent to future aeropropulsion combustors. For example, (1) flameout and relight in turbine combustors are related to interactions of turbulence with chain-branching reactions; (2) hydrogen burnout in supersonic combustors is related to interactions with recombination reactions; and (3) emissions of NOx, CO, smoke and other observables are related to nonequilibrium in the populations of intermediate species such as oxyhydrogen radicals and C(x) HCy). A bluff-body stabilized turbulent diffusion flame, time-and space-resolved lase Raman measurements of major species, and a nonequilibrium computational fluid mechanics code were applied to the problem. Principal conclusions include: (1) Turbulent jet flames are being abandoned in the search for more intensely turbulent flames (2) An axisymmetric bluff-body stabilized turbulent diffusion flame burner is a reasonable choice for combustion research at high Reynolds numbers, approaching blowoff. (3) Raman scattering for measurements of major species and temperature can be

AD-A242 027

AD-A242 027 CONTINUED

extended into the sooting/chemiluminescent environment of methane flames. Space- and time-resolved Raman scattering measurements were made in bluff-body stabilized CO/H2/N2 and CH4 flames at conditions approaching blowoff. (4) A thermochemical submodel based on partial equilibrium in the oxyhydrogen radical pool was developed for the 27.5% CO/32.3% H2/40.2% N2-air system. The chemistry can be described in terms of two scalars. The elliptic form of the time-averaged Navier Stokes equations with k-epsilon closure was solved using an iterative finite-volume/ pressure-correction algorithm.

DESCRIPTORS: (U) , AERONAUTICS, BLOWOFF, BURNERS, BURNOUT, CHEMILUMINESCENCE, CHEMISTRY, COMBUSTION, COMBUSTORS, ENVIRONMENTS, EXTINCTION, FLAMEOUT, FLAMES, HIGH RATE, HYDROGEN, INTERACTIONS, JET FLAMES, LIGHT SCATTERING, MEAN, MEASUREMENT, METHANE, NAVIER STOKES EQUATIONS, POPULATION, PROPULSION SYSTEMS, RAMAN SPECTRA, RECOMBINATION REACTIONS, REYNOLDS NUMBER, SCALAR FUNCTIONS, SMOKE, SUPERSONIC CHARACTERISTICS, TIME, TURBINES, TURBULENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308BS, *Combustion, *Turbulence, Gas turbines, *Flames, Extinction, Reaction kinetics, *Combustion products, Strained flames, Turbulent combustion, Roman scattering, Turbulence chemistry, Soot, Hydrocarbons, Hydrogen, Nitrogen, Air, Mathematical models, Nitrogen oxides, Carbon monoxide.

AD-A242 027

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 018 20/5

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Photodissociation Dynamics of Water Containing Clusters. I. Kr.H2O(+),

OCT 90 13P

PERSONAL AUTHORS: Bowers, Michael T.; Kim, H-S.; Kuo, C-H.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0849, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v93 n8 p5594-5604, 15 Oct 90. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The mass selected KrxH2O+ cluster is photodissociated in the range 514 to 357 nm using lines from an Argon Ion laser. Product branching ratios are measured and shown to be a strong function of photon wavelength; Kr+/H2) products dominate at 357 nm (90%) but are equal in intensity to H2O+/Kr products at 514 nm. A small KrH+/OH product is observed at all wavelengths, representing the first observation of a photoinduced intracluster proton transfer reaction. The total cross section is estimated to be 2x10-19 cm2 at 514 nm. Laser polarization studies indicated the Kr+/H2O products come from direct accessing of a repulsive upper state (intracluster charge transfer reaction). Both Kr+(2P3/2) and Kr+(2P1/2) spin orbit states are formed but their branching ratio is very strongly dependent on wavelength: 100% Kr+(2P3/2) at 514 nm and 100% Kr+(2P1/2) at 357 nm and variable amounts of each in between.

DESCRIPTORS: (U) , ARGON LASERS, CHARGE TRANSFER, CROSS SECTIONS, DYNAMICS, FREQUENCY, IONS, LASERS, OBSERVATION, ORBITS, PHOTODISSOCIATION, PHOTONS, POLARIZATION, PROTON REACTIONS, PROTONS, RATIOS, RESPONSE, SPIN STATES, WATER.

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F.

AD-A242 018

AD-A242 014 20/9

CLARK UNIV WORCESTER MA DEPT OF MATHEMATICS AND COMPUTER SCIENCE

(U) Mathematical Modeling in Plasma Physics.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 88-1 Jun 91,

JUN 91 4P

PERSONAL AUTHORS: Sternberg, Natalia

CONTRACT NO. AFOSR-88-0232

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0845, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the conducted research was to find improved mathematical models for the physical processes that occur in radio frequency discharges. Existing models of the plasma sheath have been studied and new ones have been developed for the bounded plasma problem. Numerical algorithms and analytical formulas have been found for solving the equations governing these models, and physical characteristics of the sheath have been obtained.

DESCRIPTORS: (U) , ALGORITHMS, EQUATIONS, MATHEMATICAL MODELS, PHYSICAL PROPERTIES, PLASMA SHEATHS, PLASMAS(PHYSICS), RADIOFREQUENCY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9, *Electric discharges.

AD-A242 014

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 010 12/9 12/1

NEBRASKA UNIV LINCOLN DEPT OF COMPUTER SCIENCE AND ENGINEERING

(U) Study of Features of Binary Images Using Algebra Techniques.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 89-30 Nov 90,

APR 91 11P

PERSONAL AUTHORS: Bhattacharya, Prabir

CONTRACT NO. AFOSR-90-0046

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-91-0827, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of this project was to investigate features of binary images by considering a special case of the Image Algebra methodology obtained by representing digitized images (both monochrome and colored) by certain polynomials in two variables with coefficients from the binary field. Since polynomials can be easily manipulated and our proposed operators can be described conveniently in terms of algebraic operations on these polynomials, this approach provides a significant foundation for practical applications which would be of significant interest to AFOSR. Our specific objectives have been as follows. We have developed algebraic operators in the context of the polynomial approach to determine the contour, magnification and shrinking, and a sequence of approximations (from finer to coarser) of a binary image. Further, we have extended our techniques to process gray images and do operations such as template decomposition, shape decomposition, connected component labelling. Also, we have developed an algebraic system to process colored images. Also, we have developed some fast sequential and parallel thinning algorithms. We have also extended the polynomial approach to three dimensional by developing equivalents of the standard morphological operations and applying these to do a number of operations for the

AD-A242 010

AD-A242 010 CONTINUED

understanding of three dimensional objects.

DESCRIPTORS: (U) , ALGEBRA, ALGORITHMS, APPROXIMATION(MATHEMATICS), COEFFICIENTS, COLORS, DECOMPOSITION, DIGITAL SYSTEMS, GRAY(COLOR), IMAGES, MAGNIFICATION, METHODOLOGY, MORPHOLOGY, POLYNOMIALS, SEQUENCES, SHAPE, TEMPLATES, THREE DIMENSIONAL, VARIABLES.

IDENTIFIERS: (U) WUAFOSR2304A7, *Image processing, *Binary notation, *Algebra, Applied mathematics.

AD-A242 010

AD-A242 007 9/5

SQM TECHNOLOGY INC LA JOLLA CA

(U) Development of an Electromagnetic Microscope for Eddy Current Evaluation of Materials.

DESCRIPTIVE NOTE: Annual technical rept.,

AUG 91 24P

PERSONAL AUTHORS: Podney, Walter N.

REPORT NO. SQMT-91-101R

CONTRACT NO. F49620-90-C-0058

MONITOR: AFOSR, XF
TR-91-0785, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Superconductive quantum interference devices (SQUIDs) offer new technology for locating material flaws electromagnetically that promises to increase sensitivity and depth of field as well as to enhance resolution and imaging. The ultrahigh sensitivity of SQUIDs to magnetic flux allows use of microscopic pickup loops in a gradiometer configuration to give high resolution. To realize the advantages of SQUID technology for Air Force requirements in evaluating the integrity of airframes, SQM Technology, Inc. is developing an electromagnetic microscope that uses an array of microscopic pickup loops for imaging micro flaws in aluminum. The prototype comprises a triangular array of microscopic gradiometers that are coupled to SQUID sensors through a flexible, cryogenic umbilical, which enables convenient scanning. Development to date shows three main accomplishments: (1) a planar, azimuthal gradiometer configuration enables suppressing source interference, (2) instrument noise at drive currents of 1 A or so at frequencies below a few kilohertz is of the order of SQUID noise, and (3) a cryogenic umbilical can provide adequate cooling over a four to six foot length.

DESCRIPTORS: (U) , AIR FORCE, AIRFRAMES, ALUMINUM, AZIMUTH, CEPHALOPODA, CONFIGURATIONS, COOLING, COUPLING(INTERACTION), CURRENTS, DEFECTS(MATERIALS), DEPTH, DETECTORS, DRIVES, EDDY CURRENTS, ELECTROMAGNETISM, FEET, FLUX(RATE), GRADIOMETERS, HIGH RESOLUTION, IMAGES,

AD-A242 007

AD-A242 007 CONTINUED

INSTRUMENTATION, INTERFERENCE, LENGTH, LOOPS, MAGNETIC FIELDS, MICROSCOPES, MICROSCOPY, MILITARY REQUIREMENTS, NOISE, PLANAR STRUCTURES, QUANTUM ELECTRONICS, SENSITIVITY, SOURCES, SUPERCONDUCTORS, TEST AND EVALUATION.

IDENTIFIERS: (U) *Electromagnetic microscopes, SQUID(Superconductive Quantum Interference Devices), Superconductivity, Air Force.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 994 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Synthesis of Trans-1,2-Difluoroethenediylbis(Phosphonic Acid) and Other Unsaturated Phosphonic Acids.

DESCRIPTIVE NOTE: Journal article,

90 5P

PERSONAL AUTHORS: Su, Debao; Guo, Cai-Yum; Willett, Roger D.; Scott, Brian; Kirchmeier, Robert L.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-91-0863

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Am. Chem. Soc., v112 p3152-3155 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The synthesis and characterization of perfluoro- and polyfluorophosphonic acids is a topic that continues to receive a great deal of attention, as evidenced by the large number of reports found in the literature. For example, several routes to a variety of perfluoroalkylphoshonic and bis(perfluoroalkylphosphonic acids) as well as to the polyfluoroalkyl acids have been published. The cyclic polyfluoroalkanediylbis(phosphates) and the mixed phosphonic/sulfonic and sulfonic/carboxylic and phosphonic/carboxylic acids have also been reported. Much of the interest in these compounds stems from their potential use as phosphate mimics (difluoromethylenephosphonates) in biological systems, as metal chelating agents, or as fuel cell electrolytes.

DESCRIPTORS: (U) , ACIDS, BIOLOGY, CHELATING AGENTS, ELECTROLYTES, FUEL CELLS, METALS, PHOSPHATES, REPORTS, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2,

AD-A241 994

AD-A241 994 CONTINUED

Polyfluorophosphonic acids, *Olefinic linkages, X-ray crystal structure, (O(HO)P(O)CF=CFP(O)(OH)O)2- and Zn(H2O)62+, Polyfluoro cyclic, Acyclic alkene phosphonates, Triethyl phosphite, Bis(Phosphonic acids), Reprints.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 993 20/7

STANFORD UNIV CA

(U) A Study of Gamma-Ray Generation from Channeled Electrons and Positions.

DESCRIPTIVE NOTE: Final rept. 1 Mar 86-28 Feb 91,

FEB 91 3P

PERSONAL AUTHORS: Pantell,

CONTRACT NO. F49620-86-K-0015

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-91-0843

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary purpose of the experiments on the linac were to demonstrate that channeling radiation can be an inexpensive source of bright, hard x-rays with picosecond duration. Channeled particle trajectories are similar to the trajectories in a magnetic wiggler, but the equivalent magnetic field would have to be about ten megagauss. Indeed, a photon flux of 10 to the 19th power photons/sr-keV-sec was measured over a picosecond duration at a wavelength of 0.42 A. Our peak current levels were about 10 to the 13th power times greater than the currents used in previous channeling experiments and average currents were about 10 to the 8th power times greater. To perform these measurement a spectrometer was developed capable of operating at high photon fluxes with several percent energy resolution at x-ray wavelengths, and in a bremsstrahlung background. This was accomplished using a graphite crystal Bragg reflector, a photomultiplier detector, and specially designed. In addition to the high power channeling radiation research, we also studied channeling radiation in superlattices, both theoretically and experimentally. Superlattices offer a means for increasing the radiation, utilizing the periodicity of the layers. The Madey storage ring was to provide a bright positron current source for seeking x-ray laser action by means of channeling radiation. A current density of 10 to 100 million A/sq cm could be

AD-A241 993 CONTINUED

obtained, which would provide significant stimulated gain over a picosecond time interval. (The time duration is determined by the interval over which the crystal remains intact.)

DESCRIPTORS: (U) , BACKGROUND, BRAGG ANGLE, BREMSSTRAHLUNG, BRIGHTNESS, CRYSTALS, CURRENT DENSITY, DETECTORS, ELECTRIC CURRENT, ELECTRONS, ENERGY, FLUX(RATE), FREQUENCY, GAIN, GAMMA RAYS, GRAPHITE, HOMING, MAGNETIC FIELDS, PARTICLE TRAJECTORIES, PEAK POWER, PHOTOMULTIPLIER TUBES, PHOTONS, POSITRONS, REFLECTORS, RESOLUTION, RINGS, SOURCES, SPECTROMETERS, STIMULATION(GENERAL), STORAGE, SUPERLATTICES, TIME INTERVALS, TRAJECTORIES, X RAY LASERS, X RAYS.

IDENTIFIERS: (U) *Particle beams, *Wiggler magnets, *X Rays.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 992 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Reactions of 5-(Perfluoroalkyl)Tetrazolates with Cyanogen, Nitrosyl, and Cyanuric Chlorides.

DESCRIPTIVE NOTE: Journal article,

89 6P

PERSONAL AUTHORS: John, Earnest O.; Kirchmeier, Robert L.; Shreeve, Jean ne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-91-0865

UNCLASSIFIED REPORT

Availability: Pub. in Inorg. chem., v28 p4629-4633 1989.
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Compounds with high nitrogen content, especially tetrazoles and their salts, are high-energy materials and may explode when exposed to mechanical, thermal, or electrical stimulation. Tetrazoles as well as their salts that contain the NF2 moiety are useful oxidizers when chemically combined with fuels such as anhydrous hydrazine. Sodium azide and hydrazoic acid may undergo 1,3-dipolar or HI type addition reactions. However, 1,3-dipolar addition is the most commonly observed mechanism in reactions with acetylene and nitriles. An exothermic reaction occurs between sodium azide and (difluoroamino)difluoroacetonitrile, NF2CF2CN (1), to give sodium 5-((difluoroamino)difluoromethyl) tetrazolate.

DESCRIPTORS: (U) , ACETYLENE, ADDITION REACTIONS, CHLORIDES, CYANOGEN, ELECTRIC CURRENT, EXOTHERMIC REACTIONS, FUELS, HIGH ENERGY, HYDRAZINES, HYDRAZOIC ACID, MATERIALS, NITRILES, NITROGEN, OXIDIZERS, SODIUM AZIDES, STIMULATION(GENERAL), TETRAZOLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Tetrazoles,

AD-A241 992

AD-A241 992 CONTINUED

Nitroso, Cyano and cyanuric tetrazolates, 5-((difluoroamino)difluoromethyl)tetrazoic acid, Copper tetrazolate complexes, Reprints.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 991 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Synthesis of Fluorinated Phosphic, Sulfonic, and Mixed Phosphonic/Sulfonic Acids.

DESCRIPTIVE NOTE: Journal article,

JUL 91 6P

PERSONAL AUTHORS: Su, Debao; Cen, Wenbiao; Kirchmeier, Robert L.; Shreeve, Jean ne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0864, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Can. Jnl. chem., v67 p1795-1799 1989. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Many fluorinated sulfonic and phosphonic acids exhibit properties that make them potentially useful as electrolytes in fuel cells. They are much stronger acids than their nonfluorinated analogues, and are generally more stable. In addition, oxygen solubility is greatly enhanced, and volatility at elevated temperatures may be lower. In fuel cell applications, these factors combine to provide increased conductivity, enhanced oxygen reduction kinetics, and longer term system stability when compared to phosphoric acid as the electrolyte. The primary acid used in fuel cells today is H3PO4. However, it has many drawbacks, including low oxygen solubility and anion adsorption on the catalyst surface. There is a need to develop new compounds that have the desirable properties of H3PO4 but fewer of the less desirable ones, in order to enhance the usefulness of fuel cells as alternative energy sources.

DESCRIPTORS: (U) , ACIDS, CATALYSTS, ELECTROLYTES, ENERGY, FLUORINATION, FUEL CELLS, HIGH TEMPERATURE, KINETICS, MIXING, OXYGEN, PHOSPHONIC ACIDS, REDUCTION, SOLUBILITY, SOURCES, STABILITY, SULFONIC ACIDS, SURFACES, SYNTHESIS, VOLATILITY.

IDENTIFIERS: (U) *Fluorinated phosphonic acids, Fluorinated sulfonic acids, Mixed phosphonic/sulfonic acids, Fuel cell electrolytes, Sodium salts of fluorophosphonic acids, (Sulfomonofluoromethyl)-phosphonic acid, Reprints.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 979 20/5 7/5 7/6

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Observation of Small Doubly Charged Niobium Clusters,

MAY 91 10P

PERSONAL AUTHORS: Radi, P. P.; von Helden, G.; Hsu, M. T.; Kemper, P. R.; Bowers, M. T.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0850, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v179 n5 & 6 p531-538, 3 May 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Small doubly charged niobium clusters are observed in a molecular beam emerging from a laser vaporization supersonic expansion source if electron impact ionization is utilized in the expansion region. Doubly charged clusters from n = 2 to n = 15 are readily detected. The doubly charged dimer cation has the same charge to mass ratio as the very abundant singly charged monomer. However, the doubly charged dimer can be detected with collision induced charge exchange reactions and collision induced dissociation. The kinetic energy released into the fragment ions of the cluster decay process allows us to estimate the charge separation in the parent (4.3 A for the dimer and 5.7 A for the trimer). The results strongly imply that predictions of the stability of doubly charged clusters on the basis of binding energy of the neutral and coulomb repulsion energy alone do not suffice and that particular bonding conditions can yield metastable states with substantial lifetimes.

DESCRIPTORS: (U) , BONDING, CLUSTERING, COLLISIONS, DECAY SCHEMES, DIMERS, DISSOCIATION, ELECTRON IMPACT SPECTRA, EXPANSION, IONIZATION, KINETIC ENERGY, MASS, METASTABLE STATE, MOLECULAR BEAMS, MONOMERS, NIOBIUM,

AD-A241 979

AD-A241 979 CONTINUED

NUCLEAR BINDING ENERGY, PREDICTIONS, RATIOS, REGIONS, SEPARATION, STABILITY, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Ion clusters, *Electric current, *Dimers, *Charge separation, *Kinetic energy, Reprints.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 976 20/5

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Structure and Atomization Properties of Dense Turbulent Sprays,

90 9P

PERSONAL AUTHORS: Faeth, G. M.

CONTRACT NO. AFOSR-89-0516

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0825, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion/the Combustion Institute (23rd), p1345-1352, 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Aspects of the structure and atomization properties of the near injector (dense spray) region of turbulent sprays are reviewed, considering the following: spray breakup regimes, dense-spray structure, and liquid breakup processes. The discussion is limited to nonevaporating sprays that are representative of cool dense spray regions of combusting sprays where vaporization rates usually are modest.

DESCRIPTORS: (U) , ATOMIZATION, COOLING, HIGH DENSITY, INJECTORS, LIQUIDS, RATES, REGIONS, SPRAYS, TURBULENCE, VAPORIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, *Multiphase flow sprays.

AD-A241 976

AD-A241 972 20/2

NEW MEXICO UNIV ALBUQUERQUE CENTER FOR HIGH TECHNOLOGY MATERIALS

(U) Precision Float Polishing.

DESCRIPTIVE NOTE: Annual interim technical rept. 1 Feb 90-31 Jan 91,

SEP 91 25P

PERSONAL AUTHORS: Jungling, Kenneth

CONTRACT NO. AFOSR-90-0145

PROJECT NO. 2301

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0844, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) Technology Transfer of the float polishing process from Japan has begun. Initially crystalline quartz was float polished. All of this work was reported at the Science of Optical Finishing Conference at Monterey, California. Photo-acoustic spectroscopy measurements indicated that float polishing removed a substantial portion of subsurface damage. Next, Corning 7940 substrates were float polished. After 230 microns of material had been removed through float polishing, there were no signs of any surface defects. Future directions to further develop float polishing for optical surfaces are discussed. Crystalline quartz was chosen for polishing based upon previous studies using a rather crude, single spindle polishing machine. The float polishing technique was utilized in the fabrication of disc-shaped quartz resonators, having a diameter of 6.35 mm and a polished thickness of 104 microns to increase the fracture strength of the resonators. We were able to remove all the subsurface damage that manifests itself in lower stress failures.

DESCRIPTORS: (U) , CALIFORNIA, CRYSTALS, DAMAGE,

AD-A241 972

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 972 CONTINUED

DEFECTS(MATERIALS), FLOATS, FRACTURE(MECHANICS), JAPAN, OPTICAL MATERIALS, OPTICAL PROPERTIES, POLISHES, POLISHING, PRECISION FINISHING, QUARTZ, RESONATORS, STRENGTH(MECHANICS), SUBSURFACE, SURFACES, SYMPOSIA, TECHNOLOGY TRANSFER.

IDENTIFIERS: (U) WUAFOSR2301A9.

AD-A241 972

AD-A241 970 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Secondary (Polyfluoroalkyl)chloroamines: Precursors to Fluoroazaalkenes.

DESCRIPTIVE NOTE: Journal article,

90 3P

PERSONAL AUTHORS: Sarwar, Ghulam; Kirchmeier, Robert L.; Shreeve, Jean ne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0869, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorg. Chem., v29 p571-572, 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) There are a very large number of fluorinated azaalkenes, and there is an excellent review of synthetic methods for and reported chemistry of these compounds. A facile, nearly quantitative route to azaalkenes provided by the photolysis of RfN(CF2CFXCl)Cl (Rf = CF3, C2F5; X = Cl,F) has been reported. We now have extended this reaction by taking advantage of recently synthesized precursors to synthesize azaalkenes. Chlorine fluoride can be reacted smoothly with Cl2C = NC-Cl2CCl2N = CCl2 to saturate the carbon-nitrogen double bond and partially fluorinate the compound. Repeated photolysis and reaction with chlorine fluoride provide a high yield. Gases and volatile liquids were handled in a conventional Pyrex glass vacuum system fitted with a Heise Bourdon tube and Televac thermocouple gauges. Volatile starting materials and products were quantitated by using PVT techniques. Infrared spectra were recorded on a Perkin-Elmer 1710 Fourier transform infrared spectrometer with a 10-cm gas cell equipped with KBr windows. 19F NMR spectra were measured on a JEOL FX-90Q Fourier transform nuclear magnetic resonance spectrometer with CCl3F as reference and CDCl3 as solvent.

AD-A241 970

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 970 CONTINUED

DESCRIPTORS: (U) , CHEMISTRY, CHLORINE, FLUORIDES, GASES, GLASS, HIGH RATE, INFRARED SPECTRA, LIQUIDS, PHOTOLYSIS, PRECURSORS, SYNTHESIS, VACUUM APPARATUS, VOLATILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Chlorine fluoride, Fluoroazaalkenes, Photolysis, Fluoride ion isomerization, Dechlorofluorination, Triphenyl phosphine, Reprints.

AD-A241 969 7/2

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Trifluoroamine Oxide: Reactions with Phosphorus Compounds and Selected Elements.

DESCRIPTIVE NOTE: Journal article,

90 3P

PERSONAL AUTHORS: Gupta, O. D.; Kirchmeier, Robert L.; Shreeve, Jean ne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0868, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorg. Chem. v29 p573-574, 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Earlier, we reported the utilization of carbonyl difluoride (COF2) as a versatile and nondestructive fluorine-transfer reagent and compared it with sulfinyl fluoride in a similar role. The conversion of inorganic oxides to fluorides under mild conditions was also demonstrated by using carbonyl difluoride. Carbon dioxide is the only volatile product, and it is removed easily from the reaction vessel and absorbed in aqueous alkali. Although this procedure has definite advantages over other methods, it also suffers from the fact that inorganic oxides that have high melting points could not be converted to fluorides and, in other cases, onlyoxyfluorides are formed. While fluorides have also been prepared by using vigorous fluorinating reagents, such as elemental fluorine or bromine trifluoride, or milder reagents, such as anhydrous hydrogen fluoride or sulfur tetrafluoride, none of these reagents is invariably the reagent of choice.

DESCRIPTORS: (U) , ALKALI METAL COMPOUNDS, BROMINE, CARBON DIOXIDE, CARBONYL COMPOUNDS, CHEMICAL AGENTS, CONVERSION, FLUORIDES, FLUORINATION, HIGH TEMPERATURE,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 969 CONTINUED

HYDROGEN FLUORIDE, INORGANIC MATERIALS, MELTING POINT, OXIDES, PHOSPHORUS COMPOUNDS, SULFUR, UTILIZATION, VOLATILITY, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Nondestructive fluorination, Trifluoroamine oxide, Phosphines, Phosphites, Carbonyl fluoride, Sulfinyl fluoride, Oxidative fluorination, Metals, Reprints.

AD-A241 969

AD-A241 968 7/2

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Reactions of Polycyano Compounds with Chlorine Fluoride.

DESCRIPTIVE NOTE: Journal article,

91 4P

PERSONAL AUTHORS: Foropoulos, Jerry, Jr.; Shreeve, Jean ne M.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0867, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Inorg. Chem. v30 p2699-2701, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Dihaloperfluoroalkylamines continue to be of interest as isolable intermediates. Straightforward, high-yield syntheses of chlorofluoroamines have made these compounds readily available in useful quantities. Dichloroperfluoroalkylamines are commonly used for generation of perfluoroalkyldiazenes via photolytic or thermal processes. We have sought to produce new N,N-dichloroperfluoro(polyfluoro)alkylamines by the reaction o' ClF with compounds possessing two or more cyano groups. In this way, new compounds with multiple-NCl2 functionalities should result that could lead to new heterocycles or possibly azo polymers. Compounds that contain two -NCl2 gro ps are known; e.g., with ClF, cyanogen gives Cl2NCF2CF2NCl2. However H2NCN was observed to lose NCl3 upon reaction with an excess of ClF, which suggests that Cl2NCF2NCl2 was an intermediate. Perfluoromalonomitrile, also gives a bis-NCl2 derivative. Compounds with two or more cyano groups undergo rapid reaction to produce the respective derivatives in nearly quantitative yields.

DESCRIPTORS: (U) , CHLORINE, CYANIDES, CYANOGEN, DIAZO

AD-A241 968

AD-A241 968 CONTINUED

COMPOUNDS, FLUORIDES, PHOTOLYSIS, POLYMERS, QUICK REACTION, THERMAL PROPERTIES, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Tetracyanoethene, Chlorine fluoride, Cyclic diazene, Dichloro(trifluoromethyl)amine malononitrile, 1,1-dicyano-2,2-bis(trifluoromethyl)ethene, Reprints.

AD-A241 968

AD-A241 961 7/2

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) On the Structure, Reactivity and Relative Stability of the Large Carbon Cluster Ions C62(+), C60(+) and C58(+)

NOV 90 9P

PERSONAL AUTHORS: Radi, Peter P.; Hsu, Ming-Teh; Rincon, Marina E.; Kemper, Paul R.; Bowers, Michael T.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0848, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v174 n3/4 p223-229, 9 Nov 90. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Since a spheroidal structure for large carbon clusters was first proposed by Kroto, Smalley and co-workers, a large number of experimental and theoretical investigations have been performed to test the hypothesis. Because there is no direct experimental method for the structural determination of large ionic species in the gas phase, and rigorous ab initio electronic structure calculations are confined to much smaller systems, evidence for the suggested geometry is rather inconclusive and more experimental and theoretical data are needed to gain further insight. The investigation of the unimolecular dissociation of metastable carbon cluster ions, as well as photodissociation experiments, showed that large even numbered cluster ions decay dominantly by the loss of a neutral C2 fragment.

DESCRIPTORS: (U) , CARBON, CLUSTERING, COMPUTATIONS, DECAY, DETERMINATION, DISSOCIATION, ELECTRONICS, EXPERIMENTAL DATA, HYPOTHESES, IONS, METASTABLE STATE, MOLECULES, PHOTODISSOCIATION, REACTIVITIES, SPHERES, STABILITY, STRUCTURAL PROPERTIES, THEORY, VAPOR PHASES.

AD-A241 961

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 961 CONTINUED

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F, Reprints.

AD-A241 960 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Photodissociation of CO3 (-) (dot) H2O: Observation of the O (-) (dot) H2O + CO2 Product Channel,

MAY 91 9P

PERSONAL AUTHORS: Roehl, Coleen M.; Snodgrass, Joseph T.; Deakyne, Carol A.; Bowers, Michael T.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0847, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v94 n10 p6546-6552, 15 May 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The importance of molecular negative ions and ionic clusters in ionospheric chemistry has prompted numerous laboratory studies over the past decade. Besides providing chemical and physical data necessary for atmospheric modeling, these studies also report on the thermochemistry, kinetics, and spectroscopy of various species. Work done on the CO3- ion and its weakly bound clusters is a case in point. CO3- is believed to be a dominant ion in the mesosphere and is found throughout other regions of the earth's atmosphere. Hydrates of CO3- have also been detected and are found to exhibit similar photophysical characteristics to CO3-. Photodissociation experiments have proven valuable in the study of such weakly bound negative ions and ionic clusters.

DESCRIPTORS: (U) , ANIONS, ATMOSPHERE MODELS, CHEMISTRY, EARTH ATMOSPHERE, IONOSPHERIC CHEMISTRY, LABORATORY TESTS, MESOSPHERE, MOLECULAR IONS, PHOTODISSOCIATION, PHYSICAL PROPERTIES, REPORTS, SPECTROSCOPY, THERMOCHEMISTRY.

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F, Reprints.

AD-A241 961

AD-A241 960

AD-A241 959 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) On the Structure and Photodissociation Dynamics of Ar3(+).

MAY 91 9P

PERSONAL AUTHORS: Bowers, Michael T.; Palke, William E.; Robins, Kathleen; Roehl, Coleen; Walsh, Sherrieb

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0846, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v180 n3 p235-240, 17 May 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) New ab initio calculations are reported that indicate argon is a linear, asymmetric molecule with equilibrium bond lengths R1 = 2.47 angstroms and R2 = 2.73 angstroms. The potential energy surface is very shallow along the asymmetric stretch coordinate indicating excursions of the least bound argon atom of 0.5 to 0.7 angstroms in the vibrational ground state. These calculations indicate Ar3+ is essentially an Ar2+.Ar cluster and support the interpretation of DeLuca and Johnson on the origin of the uv (300 nm) and visible (550 nm) photodissociation bands. New data is provided on the photodissociation dynamics as well, and implication of these data on the detailed dynamics discussed.

DESCRIPTORS: (U) , ARGON, ASYMMETRY, ATOMS, BANDS(STRIPS), DYNAMICS, GROUND STATE, MOLECULES, PHOTODISSOCIATION, POTENTIAL ENERGY, SURFACES, VIBRATION.

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F.

AD-A241 949 20/5

UNITED ENGINEERING TRUSTEES INC NEW YORK

(U) Scanned Probe Microscopies: STM and Beyond.

DESCRIPTIVE NOTE: Final rept. 1 Dec 90-28 Feb 91,

FEB 91 6P

PERSONAL AUTHORS: Stewart, Charles

CONTRACT NO. AFOSR-91-0099

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR, XF
TR-91-0794, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This conference dealt with an array of scanning probe and other microscopy techniques based on various physical and chemical properties. Some of them are: Scanning Tunneling Microscopy STM, Scanning Electrochemical Microscopy SEM, Scanning Capacitance Microscopy SCM, Scanning Force Microscopy SFM, Atomic Force Microscopy AFM, Magnetic Force Microscopy, Photon STM, Ballistic Electronic Microscopy, Photo Tunneling Microscopy, Evanescent Field Optical Microscopy.

DESCRIPTORS: (U) , ARRAYS, BALLISTICS, CAPACITANCE, CHEMICAL PROPERTIES, ELECTROCHEMISTRY, ELECTRON MICROSCOPY, ELECTRONIC SCANNERS, ELECTRONICS, MAGNETIC FIELDS, MICROSCOPY, OPTICAL ANALYSIS, PHOTOGRAPHS, PHYSICAL PROPERTIES, PROBES, SCANNING, TUNNELING, TUNNELING(ELECTRONICS).

IDENTIFIERS: (U) WUAFOSR2306C1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 948 12/7

TEMPLE UNIV PHILADELPHIA PA DEPT OF COMPUTER AND INFORMATION SCIENCES

(U) Event Oriented Design and Adaptive Multiprocessing.

DESCRIPTIVE NOTE: Final rept. 1 Jan 89-30 Apr 90,

AUG 91 77P

PERSONAL AUTHORS: Lefkovitz, David

CONTRACT NO. AFOSR-89-0157

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0795, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The work performed under this contract relates to the performance design of real time (RT) systems. Performance requirements specify time and reliability factors such as response time, throughput, precision, and fail safe/recovery characteristics. The most fundamental performance requirement of an RT system is response time, which is defined as the time elapsed between the appearance of a particular system input and the appearance of a specified output. In RT systems response time can be as critical as algorithmic or functional correctness. The research performed under this contract had two major objectives. One was to analyze the current state of research in RT design, particularly for mixed asynchronous/synchronous systems, and to map into a classification. The classification could then serve two purposes. One, to determine whether there exists a unifying concept in RT design; the other, to determine whether there are serious gaps in our knowledge about these systems. the second objective of the contract was to develop a design technique to handle a part of the problem indicated as lacking by the classification.

DESCRIPTORS: (U) , ADAPTIVE SYSTEMS, ASYNCHRONOUS SYSTEMS, FAIL SAFE, INPUT, MIXING, MULTIPROCESSORS, PERFORMANCE(ENGINEERING), REACTION TIME, REAL TIME, RECOVERY, RELIABILITY, REQUIREMENTS, SYNCHRONISM.

AD-A241 948

AD-A241 948 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2, *Real time, *Systems engineering, ESDS(Embedded Software Design Simulator), Reaction time.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 944 11/6

GORDON RESEARCH CONFERENCES INC KINGSTON RI

(U) Gordon Research Conference on Physical Metallurgy 1991.

DESCRIPTIVE NOTE: Final rept. 1 Apr-17 Sep 91,

SEP 91 19P

PERSONAL AUTHORS: Cruickshank, Alexander M.; Perepezko, John H.

CONTRACT NO. AFOSR-91-0173

MONITOR: AFOSR, XF
TR-91-0876, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The 1991 Gordon Research Conference on Physical Metallurgy was held July 29-August 2, 1991 at the Plymouth College South location in Plymouth, New Hampshire. The Conference topic was Foundations of Microstructure Development. The study of microstructural development in metals and alloys is cornerstone of physical metallurgy. From an understanding of the compositional, thermodynamic and kinetic constraints, new levels of control and the development of new microstructures may be possible. The discussion was organized to present state-of-the-art developments in such keynote issues as alloy phase stability, crystal growth and solidification, diffusion in ordered alloys and multicomponent systems, interfacial structure and phase decomposition kinetics. There was a balanced coverage between theoretical and modeling analysis and critical experimental work involving verification tests and applications. In addition, an industrial perspective in the areas of aluminum alloys, aerospace materials and electronic materials was included in the program.

DESCRIPTORS: (U) , AEROSPACE SYSTEMS, ALLOYS, ALUMINUM ALLOYS, CONTROL, CRYSTAL GROWTH, DECOMPOSITION, ELECTRONIC EQUIPMENT, FOUNDATIONS(STRUCTURES), INDUSTRIES, INTERFACES, KINETICS, MATERIALS, METALS, MICROSTRUCTURE, MODELS, NEW HAMPSHIRE, PHASE, PHYSICAL METALLURGY, POSITION(LOCATION), SOLIDIFICATION, SOUTH(DIRECTION), STABILITY, TEST AND EVALUATION, THEORY, UNIVERSITIES, VERIFICATION.

AD-A241 944 CONTINUED

IDENTIFIERS: (U) Gordon research conference, Physical metallurgy, Phase transformations, Solidification, Interfaces, Diffusion, Elastic strain, Ordered alloys, Phase equilibria.

AD-A241 944

AD-A241 944

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 920 21/2

COMBUSTION INST PITTSBURGH PA

(U) Symposium (International) on Combustion (23rd), Support of The Combustion Institute, Held in Orleans, France on July 22 - 27, 1990.

DESCRIPTIVE NOTE: Final rept.

91 1973P

CONTRACT NO. AFOSR-90-0332

MONITOR: AFOSR, XF
TR-91-0826, AFOSR

UNCLASSIFIED REPORT

Availability: The Combustion Institute, 5001 Baum Boulevard, Pittsburgh, PA 15213. HC $193.00. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) One of the important activities of The Combustion Institute during the period of Grant AFOSR-90-0332 DEF, effective September 15, 1990, was the Twenty-Third International Symposium on Combustion. The proceedings were published in a volume as a permanent record. It includes the Hottel Lecture, four invited papers, three invited mini-reviews, and 230 contributed papers, all refereed by the Program Subcommittee. Peter P. Gray, Master of Gonville and Caius College, Cambridge University, gave the Hottel Lecture on The Non-linear Role of Chemistry in Combustion. Papers were organized five Colloquia: Reaction Kinetics in Combustion; Laminar Flames; Turbulent Combustion; Combustion in Practical Systems; Combustion of Solid Fuels. Topical sessions included Detonations, Diagnostic Methods, Fire, High Temperature Synthesis, Ignition, Microgravity Combustion, Non-Steady Flames, Propellants, Soot, and Spray and Droplet Combustion. There were 307 poster presentations of work-in-progress presented at the conference. Over 1,000 scientists from 25 countries attended the symposium.

DESCRIPTORS: (U) , CHEMISTRY, COMBUSTION, DETONATIONS, DROPS, FLAMES, FRANCE, HIGH TEMPERATURE, IGNITION, LAMINAR FLOW, NONLINEAR SYSTEMS, PROPELLANTS, REACTION KINETICS, SOLID FUELS, SOOT, STEADY STATE, SYMPOSIA, SYNTHESIS, TURBULENCE.

AD-A241 920

AD-A241 915 20/2

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Investigation of the Optical and Electronic Properties of Crystalline Organic Materials.

DESCRIPTIVE NOTE: Final rept. 15 Jun 89-14 Jun 90,

JUN 90 281P

PERSONAL AUTHORS: ,Forrest, Stephen R.

CONTRACT NO. AFOSR-87-0273

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0824, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have done extensive investigations of the optical and electronic properties of heterojunctions containing crystalline organic semiconductors. Using the new, ultrahigh vacuum process of organic molecular beam deposition (OMBD), we have grown heterojunctions consisting of organic semiconductors in contact with other organic semiconductors, as well as with inorganic semiconductors. Multiple quantum well structures consisting of two dissimilar organic semiconductors have been grown for the first time, and these structures show evidence for quantum confinement of excitons. Detailed studies of the optical and electronic properties of all heterojunction types are discussed in this report, which is taken from the thesis entitled, 'Growth and Characterization of Heterojunctions and Multiple Quantum Well Structures Based on Crystalline Organic Semiconductors' by F. F. So, University of Southern California, 1991.

DESCRIPTORS: (U) , CALIFORNIA, CONFINEMENT(GENERAL), CRYSTALS, DEPOSITION, ELECTROMAGNETIC PROPERTIES, EXCITONS, HETEROJUNCTIONS, INORGANIC MATERIALS, MOLECULAR BEAMS, OPTICAL PROPERTIES, ORGANIC MATERIALS, QUANTUM ELECTRONICS, QUANTUM THEORY, SEMICONDUCTORS, STRUCTURES, THESES, ULTRAHIGH VACUUM, UNIVERSITIES.

AD-A241 915

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 915 CONTINUED

IDENTIFIERS: (U) WUAFOSR2306B1.

AD-A241 912 14/2

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Advanced Tomographic Imaging Methods for the Analysis of Materials.

DESCRIPTIVE NOTE: Final rept. 15 Nov 90-14 Nov 91,

AUG 91 235P

PERSONAL AUTHORS: Ackerman, Jerome L.; Ellingson, William A.

CONTRACT NO. AFOSR-91-0087

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0797, AFOSR

UNCLASSIFIED REPORT

Availability: Materials Research Society, 9800 McKnight Rd., Pittsburgh, PA 15237, PC$44.00. No copies furnished by DTIC/NTIS.

SUPPLEMENTARY NOTE: Proceedings of a symposium held in Boston, Massachusetts, November 28-30, 1990.

ABSTRACT: (U) Nuclear magnetic resonance (NMR) imaging is being vigorously pursued as a nondestructive characterization tool for materials. The promise of measuring spin concentration, molecular mobility (via the spin-lattice (T1) and spin spin (T2) relaxation times), and chemical structure (by largely unrealized localized spectroscopy techniques) at various locations within a sample has resulted in initial applications in a wide variety of nonmedical areas. Sizes have ranged from tree trunks of 25-cm diameter to 'microscopic' studies on millimeter-sized objects at 50-100 um resolution. Because standard NMR imaging techniques are limited to observing molecularly mobile components, applications to date have concentrated on bulk elastomers, solvent diffusion, and liquids in porous inorganic materials such as ceramics and oil cores. Techniques are being developed for imaging of highly rigid materials, which is the subject of other papers in this proceedings. For standard NMR imaging

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 912 CONTINUED

techniques, the primary requirement for increased resolution is powerful gradients.

DESCRIPTORS: (U) , CERAMIC MATERIALS, CORES, DIFFUSION, ELASTOMERS, IMAGES, INORGANIC MATERIALS, MATERIALS, MICROSCOPY, MOBILE, MOBILITY, MOLECULAR STRUCTURE, MOLECULES, NUCLEAR MAGNETIC RESONANCE, OILS, POROUS MATERIALS, RELAXATION, REQUIREMENTS, RIGIDITY, SOLVENTS, SPECTROSCOPY, SPINNING(MOTION), TOMOGRAPHY, TREES.

IDENTIFIERS: (U) PE61102F, WUAFSOR2306A2.

AD-A241 900 12/9

YALE UNIV NEW HAVEN CT

(U) Neural Networks for Model-Based Recognition.

DESCRIPTIVE NOTE: Annual rept. 1 May 90-1 May 91,

JUN 91 95P

PERSONAL AUTHORS: Gindi, Gene R.

CONTRACT NO. AFOSR-90-0224

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR, XF
TR-91-0663, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This annual progress report describes first-year progress in theoretical and applied fronts for neutral-net object recognition via graph matching. On the theory front, a learning scheme is applied to our previously hand-designed graphs, and a Bayesian approach to weighted graph matching is described. On an applied front, our networks are applied to recognition of machined parts. Continuing progress on the application of continuation optimization methods to our networks is reported.

DESCRIPTORS: (U) , BAYES THEOREM, GRAPHS, LEARNING, MATCHING, METHODOLOGY, NEURAL NETS, OPTIMIZATION, RECOGNITION, WEIGHTING FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B3, *Neural nets, Algorithms, Heuristic methods.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 892 6/1

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Luminescence of Ruthenium(II) Polypyridyls: Evidence for Intercalative Binding to Z-DNA,

91 9P

PERSONAL AUTHORS: Friedman, Alan E.; Kumar, Challa V.; Turro, Nicholas J.; Barton, Jacqueline K.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0831, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Nucleic Acids Research, v19 n10 p2595-2602, 1991. Available to DTIC users only. No copies furnished by DTIC.

ABSTRACT: (U) There has been considerable interest in understanding those factors which govern the sequence specific recognition of DNA by proteins and smaller natural products. Our laboratory has focused on shape selective interactions with nucleic acids through the design of synthetic transition metal complexes which bind DNA Deoxyribonucleic acid with conformational selectivity. Among the complexes prepared have been those which bind preferentially to A-DNA, Z-DNA, cruciforms as well as one which appears to target unique tertiary folds in RNA. Indeed a high level of site-specificity can be achieved based solely upon considerations of shape. It is likely that such indirect readout plays a substantial role in site recognition by proteins.

DESCRIPTORS: (U) , DEOXYRIBONUCLEIC ACIDS, INTERACTIONS, METAL COMPLEXES, NATURAL RESOURCES, NUCLEIC ACIDS, PROTEINS, RECOGNITION, SEQUENCES, SHAPE, SITES, TRANSITION METALS.

IDENTIFIERS: (U) *DNA, Ruthenium, Luminescence, Isomers, Nucleic acids, Reprints, *Deoxyribonucleic acids, PE61102F, WUAFOSR2303B2.

AD-A241 892

AD-A241 890 20/4

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF COMPUTER SCIENCE

(U) Vorticity Induced by a Moving Elliptic Belt,

91 10P

PERSONAL AUTHORS: Ribbens, Calvin J.; Wang, C.-Y.; Watson, Layne T.; Alexander, Kevin A.

CONTRACT NO. AFOSR-89-0497

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0886, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in *Computers Fluids*, v20 n2 p111-119, 1991. Available to DTIC users only. No copies furnished by NTIS.

Reprint: Vorticity Induced by a Moving Elliptic Belt.

DESCRIPTORS: (U) *VISCOUS FLOW, *RECIRCULATION, *VORTICES, CAVITIES, DIFFUSION, CURVATURE, BOUNDARY LAYER, CLOSURES, ELLIPSES, CORES, REYNOLDS NUMBER, ASPECT RATIO, APPROXIMATION(MATHEMATICS), PARTIAL DIFFERENTIAL EQUATIONS, DISTRIBUTION, REPRINTS.

IDENTIFIERS: (U) Hermite collocation, Elliptical partial differential equations, Closed streamlines, Vorticity, PE61102F, WUAFOSR2304A1.

AD-A241 890

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 889 7/3 7/6

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Synthesis of Functional Perfluorinated Resins, Branched Perfluorinated Ethers and Perfluoroalkanoyl Fluorides,

91 6P

PERSONAL AUTHORS: Huang, Hsu-Nan; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0829, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Chem. Soc. Perkin Trans. v1 p871-875, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Functional group containing perfluorinated resins have been prepared by carefully controlling direct fluorination of poly-(3-methyloxetane-3-methanol). Branched perfluorinated ethers such as bis(perfluoroneopentyl) ether and perfluoro-(2,2-dimethylbutyl methyl ether) have also been synthesized by direct fluorination of alkanols. The by products, perfluoroalkanoyl fluorides, are useful intermediates. Sulphonic or carboxylic acid containing perfluorinated polymers such as NAFION or FLEMION, are useful in very aggressive environments: e.g., chlor alkali cells, fuel cells, batteries, etc. In addition, the presence of 'superacid' ionic functional groups and the unusual ion clustered morphology of NAFION has extended its use as a catalyst for organic reactions, and as a chromatographic stationary phase.

DESCRIPTORS: (U) , ALKALI METAL COMPOUNDS, CARBOXYLIC ACIDS, CATALYSTS, CELLS, CHROMATOGRAPHS, CLUSTERING, ENVIRONMENTS, ETHERS, FLUORIDES, FLUORINATION, FLUOROPOLYMERS, FUEL CELLS, IONS, MORPHOLOGY, POLYMERS, STATIONARY, SYNTHESIS.

AD-A241 889 CONTINUED

IDENTIFIERS: (U) *Fluorination, *Fluoropolymers, Perfluorinated resins, Perfluorinated ethers, Pefluoroalkanoyl fluorides, *Synthesis(Chemistry), Reprints, PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 886 20/4

WASHINGTON UNIV SEATTLE DEPT OF APPLIED MATHEMATICS

(U) Eddy Breakdown and Structure Development.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 89-30 Jun 91,

SEP 91 4P

PERSONAL AUTHORS: Criminale, W. O.

CONTRACT NO. AFOSR-89-0404

PROJECT NO. 2307

TASK NO. BS

MONITOR: AFOSR, XF
TR-91-0874, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research addressed a class of exact solutions for the Navier Stokes equations which: are valid for basic flows with shear; can be time-dependent and non parallel, fully three-dimensional, and offer closed-form functions for the perturbation field. Linearized initial-value problems can be completely solved by this method. Problems which were studied in the course of the research included the elliptic vortex, linear initial value problems, and exact solutions to the Navier Stokes equations.

DESCRIPTORS: (U) , ELLIPSES, FLOW, FUNCTIONS, NAVIER STOKES EQUATIONS, PERTURBATIONS, VORTICES.

IDENTIFIERS: (U) *Eddies(Fluid Mechanics), Three dimensional flow, Boundary value problems, Vortices, Turbulent flow, Mathematical models, Problem solving, Shear flow, Perturbations, Linear systems, Ellipses, PE61102F, WUAFOSR2307BS.

AD-A241 883 6/1

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Interaction of Horse Plasma Gelsolin with the Hydrophobic Fluorescent Probe 2-(N-Methylanilino) Naphthalene-6-Sulfonic Acid.

DESCRIPTIVE NOTE: Rept. for 1989-1990,

MAR 91 10P

PERSONAL AUTHORS: Ruiz Silva, B. E.; Burtnick, L. D.; Turro, N. J.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0832, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Biochemistry International, v23 n5 p905-913 Mar 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Addition of horse plasma gelsolin to solutions of the fluorescent probe 2-(N methyl-anilino) naphthalene 6 sulfonic acid (MANS) results in both a considerable enhancement and blue shift of the MANS emission indicative of hydrophobic interaction between MANS and gelsolin. Titrations suggest each gelsolin to bind two to three molecules of MANS, with a dissociation constant for each site of 0.24 microns. The peptide bond circular dichroism of gelsolin is unaffected by interaction with MANS, and viscosity data indicate that MANS does not inhibit the effects of gelsolin on actin polymerization. Fluorescence polarization data confirm gelsolin to be a globular protein and thermal denaturation studies suggest a cooperative melting transition for plasma gelsolin near 46 C.

DESCRIPTORS: (U) , ADDITION, BLUE(COLOR), BONDING, CIRCULAR, DICHROISM, DISSOCIATION, FLUORESCENCE, HORSES, HYDROPHOBIC PROPERTIES, INTERACTIONS, MELTING, MOLECULES, MUSCLE PROTEINS, PEPTIDES, PLASMAS(PHYSICS), POLARIZATION,

AD-A241 883

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 883 CONTINUED

POLYMERIZATION, SHIFTING, TRANSITIONS, VISCOSITY.

IDENTIFIERS: (U) *Horse plasma gelsolin, Fluorescence, WUAFOSR2303B2, PE61102F.

AD-A241 882 9/3

CALIFORNIA UNIV BERKELEY

(U) Studies of Hetero-Epitaxy of GaAs Films on Si Substrate for Effective Control of Density and Internal Stress.

DESCRIPTIVE NOTE: Final rept. 15 Apr 88-14 Jul 91,

OCT 91 7P

PERSONAL AUTHORS: Wang, Shyh

CONTRACT NO. AFOSR-88-0174

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-91-0883, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Using various growth technique and different buffer structures, we have been able to reduce dislocation density to below 10 to the 6th power cm-2 and internal stress below 10 to the ninth power dynes/sq cm. The improvements lead to the restoration of TE polarization as the dominant polarization in DH GaAs/Si lasers for the first time and bring us hope that we are close to achieving long operating life for lasers fabricated with lattice-mismatched films. However impressive these improvements are, they are still some distance away from those needed for long life lasers with dislocation density below 10 to the third power cm-2 and internal stress below 2 x 10 to the eighth power dynes/sq cm. Two possible approaches remaining unexplored for further improvements include (1) use of oxygen-free Si, especially near the surface upon which GaAs film is to grow and (2) use of quaternary quantum well as the laser-active region. The former is to smooth the transition between mechanically strong Si substrate and more ductile III-V film, thus to minimize defect generation at the interface. The purpose of the latter is three-fold. Decreasing the active layer thickness reduces the probability of intercepting dislocations. It also lowers the laser threshold and thus lessens the chance of thermal generation of dislocations. Finally, it is well

AD-A241 882 CONTINUED

known that quaternary (GaInAsP) lasers are more forgiving in terms of laser degradation and hence have much longer life than GaAs lasers. Using the new approaches in conjunction with the various growth techniques already tried with some degree of success, we believe that we are on the verge of making long-life a reality for lattice-mismatched lasers.

DESCRIPTORS: (U) , BUFFERS, CONTROL, DEGRADATION, DENSITY, DISLOCATIONS, DUCTILITY, FILMS, GALLIUM ARSENIDE LASERS, GALLIUM ARSENIDES, GROUP III COMPOUNDS, GROUP V COMPOUNDS, GROWTH(GENERAL), INTERNAL, LASERS, LAYERS, LONG LIFE, POLARIZATION, STRESSES, STRUCTURES, SUBSTRATES, THERMAL PROPERTIES, THICKNESS, THRESHOLD EFFECTS.

IDENTIFIERS: (U) *Dislocation density, *Internal stress, GaAs/Si lasers, *Gallium arsenide lasers, Lattice mismatched lasers, Long life lasers, Photoluminescence, WUAFOSR2305C1, PE61102F.

AD-A241 882

AD-A241 854 12/1 12/4

CORNELL UNIV ITHACA NY DEPT OF COMPUTER SCIENCE

(U) Complexity Issues in Numerical Optimization.

DESCRIPTIVE NOTE: Final rept. 1 Nov 90-30 Apr 91,

SEP 91 3P

PERSONAL AUTHORS: Vavasis, Steven A.

CONTRACT NO. AFOSR-91-0878.

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR, XF
TR-91-0878, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A conference on complexity issues in numerical optimization was held in Ithaca, NY on March 22-23, 1991. The conference featured 17 invited speakers, each of whom gave a 45 minute presentation. The conference was supported primarily by the Air Force Office of Scientific Research, with additional support from the Cornell Mathematical Sciences Institute and SIAM. Topics discussed included: Strongly polynomial algorithms for linear programs with algebraic coefficients; New results for the Steiner tree problem, Complexity results for following the center of a linear inequality system as the data is parametrically deformed; Continuous methods for inductive inference problems, Computational complexity of inner and outer j-radii; Parallel complexity of linear programming, and New iterative methods for linear inequalities.

DESCRIPTORS: (U) , ALGEBRA, ALGORITHMS, COEFFICIENTS, COMPUTATIONS, INEQUALITIES, ITERATIONS, LINEAR PROGRAMMING, LINEAR SYSTEMS, MATHEMATICS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARALLEL ORIENTATION, POLYNOMIALS, SYMPOSIA, TREES.

IDENTIFIERS: (U) *Numerical analysis, *Optimization, PE61102F, WUAFOSR2304A8.

AD-A241 854

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 849 7/4

ARIZONA UNIV TUCSON

(U) Ceramics Derived from Organo-Metallic Precursors.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 88-31 Mar 91,

OCT 91 155P

PERSONAL AUTHORS: Uhlmann, Donald R.

CONTRACT NO. F49620-88-C-0064

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0887, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work carried out under the present grant was directed principally to the wet chemical synthesis of various oxide ceramics in film, fiber and powder forms. These include (1) chemical synthesis of high temperature oxide superconductors, the formation of glasses of such superconductors, their subsequent crystallization behavior, and the wet chemical synthesis of barrier layers for use with superconducting thin films; (2) ceramic-organic hybrid composites (POLYCERAMS); (3) synthesis and dielectric properties of POLYCERAMS (4) novel optical materials comprising of non-linear organic dyes in POLYCERAM hosts; (5) wet chemical coating of fibers for composites and synthesis of bulk transformation - toughened ceramics; (6) seeded transformation of alumina gels from different precursors; (7) ferroelectric powders, films and fibers; and (8) second harmonic generation from ferroelectric thin films.

DESCRIPTORS: (U) , ALUMINUM OXIDES, BARRIERS, CERAMIC MATERIALS, CHEMICALS, COATINGS, CRYSTALLIZATION, DIELECTRIC PROPERTIES, DYES, FERROELECTRIC MATERIALS, GELS, GLASS, HARMONIC GENERATORS, HIGH TEMPERATURE, LAYERS, NONLINEAR SYSTEMS, OPTICAL MATERIALS, ORGANIC COMPOUNDS, ORGANOMETALLIC COMPOUNDS, OXIDES, POWDERS, PRECURSORS, SEEDING, SUPERCONDUCTORS, SYNTHESIS, SYNTHESIS(CHEMISTRY), THIN FILMS, TRANSFORMATIONS.

AD-A241 849

AD-A241 849 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR230303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 847 13/13 12/3

CLARK ATLANTA UNIV GA

(U) Analysis of Active Controller Effects on Flexible Structures Using Computer Algebra.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-30 Jun

AUG 91 40P

PERSONAL AUTHORS: Bota, Kwabena

CONTRACT NO. F49620-89-C-0075

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0888, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The combined system consisting of the baseline flexible structure modified by the system of active controllers is considered as a unified dynamical system. Techniques based on computer algebra (MACSYMA) are used to derive expressions for the transfer functions of the modified system, using the known transfer functions of the baseline flexible structure and the feedback gains of the active controller. The roots of the characteristics polynomial of this transfer function give the system resonant frequencies and damping parameters. Using the computer algebraic system MACSYMA, expressions for these parameters which are explicitly dependent on the output feedback gains of the active controller, are presented. For lightly coupled modes, simple relations are obtained between the modal parameters and the coordinates of the sensor/actuator pairs as well as the displacement and velocity feedback gains. These results permit the parametric study of the placement of the resonant frequencies and damping parameters of the combined system, as functions of the feedback gains. Numerical examples are used to illustrate the application of these results to the calculation of active controller feedback gains based on the requirement that certain modes have specified modal damping while the closed-loop frequencies remain unchanged.

AD-A241 847 CONTINUED

DESCRIPTORS: (U) , ACTUATORS, ALGEBRA, BASE LINES, CLOSED LOOP SYSTEMS, COMPUTERS, CONTROL, COUPLING(INTERACTION), DAMPING, DETECTORS, DISPLACEMENT, DYNAMICS, FEEDBACK, FLEXIBLE STRUCTURES, FREQUENCY, OUTPUT, PARAMETERS, PARAMETRIC ANALYSIS, POLYNOMIALS, REQUIREMENTS, RESONANT FREQUENCY, TRANSFER FUNCTIONS, VELOCITY.

IDENTIFIERS: (U) *Flexible structures, *Dynamic response, *Numerical analysis, Computer applications, WUAFOSR2302B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 809 20/9 21/3

OHIO STATE UNIV COLUMBUS DEPT OF MECHANICAL ENGINEERING

(U) Fundamental Research on Erosion in Magnetoplasmadynamic Thrusters.

DESCRIPTIVE NOTE: Annual technical rept. Oct 90-Oct 91,

JUL 91 42P

PERSONAL AUTHORS: Subramaniam, V. V.

CONTRACT NO. AFOSR-87-0360

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0891, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant developments have been made toward a comprehensive theory of Onset and erosion in steady-state self-field MPD thrusters. The Back-EMF Onset theory predicts that the middle region of the cathode (i. e. away from the inlet and exit) and the near inlet and exit regions of the anode are susceptible to severe erosion. This erosion occurs due to excessive electron bombardment at a critical value of the local sheath voltage drop (or current density). Furthermore, this theory predicts that the regions of potential and magnetic field oscillations observed at Onset occur predominantly in the high current density regions of the cathode (i.e. near the inlet and exit regions) and in the low current density regions at the anode. Past experimental observations at Princeton, and recent observations from Stuttgart support the predictions of this theory. The research described here provides a summary of the accomplishments and progress made during the final year under grant AFOSR-87-0360.

DESCRIPTORS: (U) , COMPREHENSION, CURRENT DENSITY, ELECTRON IRRADIATION, EROSION, EXITS, HIGH DENSITY, HIGH POWER, INLETS, LOW DENSITY, MAGNETIC FIELDS, OSCILLATION, REGIONS, STEADY STATE, THEORY, THRUSTERS, VULNERABILITY.

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F, *Electrode plasma interactions, *Magnetoplasmadynamic thrusters, Erosion, Current densities.

AD-A241 809 CONTINUED

AD-A241 809

AD-A241 807 5/8

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF COMPUTER SCIENCE

(U) A Complexity Theory of Neural Networks.

DESCRIPTIVE NOTE: Final technical rept. 15 Sep-14 Apr 91,

AUG 91 14P

PERSONAL AUTHORS: Berman, Piotr; Schnitger, Georg; Parberry, Ian

CONTRACT NO. AFOSR-87-0400

MONITOR: AFOSR, XF
TR-91-0881, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant progress has been made in laying the foundations of a complexity theory of neural networks. The fundamental complexity classes have been identified and studied. The class of problems solvable by small, shallow neural networks has been found to be the same class even if (1) probabilistic behaviour (2)Multi-valued logic, and (3)analog behaviour, are allowed (subject to certain resonable technical assumptions). Neural networks can be made provably fault-tolerant by physically separating the summation units from the thresholding units. New results have also been obtained on the complexity of approximation, communication complexity, the complexity of learning from examples and counterexamples, learning with multi-valued neurons, exponential lower bounds for restricted neural networks, and fault tolerance in distributed computation.

DESCRIPTORS: (U) , ANALOG SYSTEMS, BEHAVIOR, COMMUNICATION AND RADIO SYSTEMS, COMPUTATIONS, DISTRIBUTION, FAULT TOLERANCE, LEARNING, LIMITATIONS, NERVE CELLS, NEURAL NETS, SHALLOW DEPTH, THEORY.

IDENTIFIERS: (U) *Neural networks, Complexity theory, Fault tolerance, Learning.

AD-A241 807

AD-A241 806 20/10 20/6 20/3

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Quantum and Nonlinear Optics Research on Solid-State X-Ray Source and X-Ray Laser Using Low Energy Electron Beams, Relativistic Nonlinear Optics, Self-Bending Effect, Bistable and Robust Solitons, Hysteretic Resonances in Semiconductors, Nonlinear Sagnac Effect and Isolas, and Related Fields.

DESCRIPTIVE NOTE: Final rept. 1 mar 88-28 Feb 90,

JUN 90 23P

PERSONAL AUTHORS: Kaplan, Alexander E.

CONTRACT NO. AFOSR-87-0152

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0882, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In the field of nonlinear optics and quantum electronics, the research progressed basically in these directions: Multiphoton optical resonances of a single cyclotron electron and electrons in semiconductors; CW self-bending of a laser beam in sodium vapor; Atomic shell x-ray radiation by electron beams in solid-state superlattice; Dispersion related multimode instabilities and oscillations in nonlinear counter-propagating waves; Bistable optical solitons; and Nonlinear magneto optics of vacuum.

DESCRIPTORS: (U) , BISTABLE DEVICES, CRYSTAL LATTICES, CYCLOTRONS, ELECTRON BEAMS, ELECTRON ENERGY, ELECTRONS, HYSTERESIS, LASER BEAMS, LOW ENERGY, MAGNETOS, NONLINEAR OPTICS, NUCLEAR RADIATION, OPTICAL PROPERTIES, OSCILLATION, PHOTONS, QUANTUM ELECTRONICS, RESONANCE, SEMICONDUCTORS, SHELLS(STRUCTURAL FORMS), SODIUM, SOLID STATE ELECTRONICS, SOLITONS, SOURCES, VACUUM, VAPORS, X RAY LASERS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, *Nonlinear

AD-A241 806

AD-A241 806 CONTINUED

optics, *Quantum electronics.

AD-A241 805 12/2

MINNESOTA UNIV MINNEAPOLIS SCHOOL OF MATHEMATICS

(U) Inertial Manifolds for Navier-Stokes Equations and Related Dynamical Systems.

DESCRIPTIVE NOTE: Annual rept. (Final) 1 Aug 87-31 May 91,

MAY 91 22P

PERSONAL AUTHORS: Luskin, Mitchell; Sell, George R.

CONTRACT NO. F49620-87-C-0095

PROJECT NO. 6103

TASK NO. 99

MONITOR: AFOSR, XF
TR-91-0889, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *NAVIER STOKES EQUATIONS, DYNAMICS, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR610399, Manifolds(Mathematics), Euler galerkin method, Kolmogorov flow.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 793 6/5

MISSISSIPPI UNIV MEDICAL CENTER JACKSON

(U) Mechanism of Lethal Interaction of Hazardous Chemicals at Subtoxic Doses.

DESCRIPTIVE NOTE: Final rept. 1 Nov 87-31 Aug 91,

SEP 91 11P

PERSONAL AUTHORS: Mehendale, Harihara M.

CONTRACT NO. AFOSR-88-0009

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0872, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The possibility of unusual toxicity due to interaction of toxic chemicals upon environmental or occupational exposures to two or more chemicals, particularly when exposures involve levels ordinarily considered harmless individually is an important toxicological concern. Progress in this area of environmental toxicology has suffered for want of a model where the two interactants are individually nontoxic. Models, where toxic doses of chemicals are employed are not very representative of low level, environmental exposure. Prior exposure to nontoxic levels of the pesticide Kepone (chlordecone, CD) results in a 67-fold amplification of CCI4 lethality in experimental animals. This propensity for chlordecone to potentiate hepatotoxicity of halomethanes such as CCI4, CHCI3 and BrCCI3 has been the subject of this intense inquiry to unravel the underlying mechanism. The biological effects of this interaction include extensive hepatotoxicity characterized by histological alterations, hepatic dysfunction, and perturbation of related biochemical parameters.

DESCRIPTORS: (U) , BIOCHEMISTRY, CHEMICALS, DOSAGE, DYSFUNCTION, ENVIRONMENTS, EXPOSURE(GENERAL), HAZARDOUS MATERIALS, INTERACTIONS, LABORATORY ANIMALS, LETHALITY, LIVER, LOW LEVEL, PARAMETERS, RESPONSE(BIOLOGY), TOXIC

AD-A241 793 CONTINUED

AGENTS, TOXICITY, TOXICOLOGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 791 20/4

NEW YORK UNIV NY

(U) Nonlinear Partial Differential Equations for Gas and Elasticity.

DESCRIPTIVE NOTE: Final rept. 1 Jan 89-31 Dec 90,

DEC 90 3P

PERSONAL AUTHORS: Liu, Tai-Ping

CONTRACT NO. AFOSR-89-0203

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-91-0884, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We obtain a striking new phenomenon that a perturbation of such a wave produces another wave with same given end states without other time-asymptoti state. This is markedly distinct from the vicous shock waves in gas flow. The author subsequently studied the overcompressive shocks in a MHD and elasticity model. Such a wave is called intermediate shock wave, whose admissibility has been controversial since the 1950's. One of the main research interests of the author in recent years has been the qualitative understanding of viscous conservation laws such as the compressible Navier-Stokes equations. Usual approach uses typical parabolic techniques such as spectral and energy methods, or maximum principle. These methods are of limited effectiveness because they fail to detect the hyperbolic mature of underlying inviscid models. A new approach is introduced to incorporate the nonlinear coupling of waves pertaining to different characteristics families, such as nonlinear acoustic wave and entropy waves in gas flow.

DESCRIPTORS: (U) , ACOUSTIC WAVES, COMPRESSIBLE FLOW, CONSERVATION, COUPLING(INTERACTION), ELASTIC PROPERTIES, ENERGY, ENTROPY, GAS FLOW, INVISCID FLOW, MODELS, NAVIER STOKES EQUATIONS, NONLINEAR DIFFERENTIAL EQUATIONS, NONLINEAR SYSTEMS, PARABOLAS, PARTIAL DIFFERENTIAL EQUATIONS, SHOCK WAVES, VISCOSITY, WAVES.

AD-A241 791

AD-A241 791 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 790 12/4

MARYLAND UNIV COLLEGE PARK INST FOR PHYSICAL SCIENCE AND TECHNOLOGY

(U) Theoretical Investigations of Chaotic Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-30 Nov 90,

AUG 91 11P

PERSONAL AUTHORS: Yorke, James

CONTRACT NO. AFOSR-89-0401

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0879, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the outstanding problems of chaotic dynamics has been to show that chaos develops monotonically as the parameter is varied, for some systems. Results along this line have been very few. An overview of these results has been given in the proposal for this funding period. Kan and Yorke have discovered results in two dimensions which clearly indicate the situation is far worse than previously believed. Their results require some mild nondegeneracy conditions which shall not be spelled out in detail here. Their results are for diffeomorphisms that depend on a parameter. They show that monotonicity never occurs in two dimensions as the parameter varies, except in the most trivial situations. In (KY) these results have been written for a specical prototype example which seems quite typical. This example has nice simple choices of coordinates, and analysis is facilitated. Establishment of the full result was much more difficult and the analysis has been carried out in (KKY).

DESCRIPTORS: (U) , DYNAMICS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4, *Operations research, *Chaos, *Dynamics.

AD-A241 790

AD-A241 789 12/1

ALASKA UNIV FAIRBANKS

(U) Quo Vadis, Graph Theory? An Alaskan Conference on the Future Directions of Graph Theory.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 90,

DEC 90 8P

PERSONAL AUTHORS: Gimbel, John

CONTRACT NO. AFOSR-90-0078

PROJECT NO. 2304

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0880, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The conference Quo Vadis, Graph Theory was held on the University of Alaska Fairbanks campus August 13-16, 1990. The conference had 77 participants. Forty three were American citizens. Four came from industry. Two from the US-government. One from the Office of Naval Research as well as one from the Naval Postgraduate School. Other countries with representatives at the conference are Canada, Italy, Israel, Denmark, Rumania, South Africa, France, Germany, Poland, England and Hungary. One of the principal goals of the conference was to encourage active participation by women. In this, we were very successful; 20 women attended. Also, we wished to emphasize the importance of graph theory in education. In this we were very successful. Some interesting lectures were given and a very good discussion ensued which included some insightful remarks from some of our foreign participants on the educational techniques used in their countries. Also, we had many non-graph theorists participate, including many professors from the University of Alaska and a graduate student in math education from New York City.

DESCRIPTORS: (U) , ALASKA, CANADA, DENMARK, EDUCATION, FRANCE, GERMANY(EAST AND WEST), GRAPHS, GREAT BRITAIN, HUNGARY, INDUSTRIES, ISRAEL, ITALY, MATHEMATICS, NEW YORK(NEW YORK), ORIENTATION(DIRECTION), PERSONNEL, POLAND,

AD-A241 789

AD-A241 789 CONTINUED

RUMANIA, SOUTH AFRICA, STUDENTS, THEORY, UNITED STATES, UNIVERSITIES.

IDENTIFIERS: (U) WUAFOSR2304B1, PE61102F, *Graphs, *Symposia, Alaska.

AD-A241 706 6/5

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PSYCHIATRY

(U) Extrathalmic Modulation of Cortical Function.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 90-30 Jun 91,

SEP 91 9P

PERSONAL AUTHORS: Foote, Stephen L.; Pineda, Jaime A.

CONTRACT NO. AFOSR-90-0323

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0870, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The studies we have completed to data suggest that monkey auditory and visual P300s in passive and in active operant conditions exhibit morphological and functional characteristics similar to those observed in human subjects. The role of NA-LC in the genesis of P300 was examined in the present study by recording ERPs in squirrel monkey (Saimiri sciureus) before and after systemic administrations of the alpha-2 adrenergic agonist, clonidine, in doses that are known to suppress the electrophysiological activity of LC neurons. Clonidine significantly decreased the area and increased the latency of P300-like potentials without affecting other ERP components. It also increased EEG power in the alpha range (8-12Hz) and decreased power in the upper beta range (20-40 Hz) which leaving performance unaffected. Administration of clonidine, however, had no effect on the amplitude, area, or latency of the visual P300 component.

DESCRIPTORS: (U) , DOSAGE, ELECTROENCEPHALOGRAPHY, ELECTROPHYSIOLOGY, MORPHOLOGY, NERVE CELLS, POWER, RECORDING SYSTEMS, SQUIRREL MONKEYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 705 14/2 12/4

ILLINOIS UNIV AT CHICAGO CIRCLE

(U) Design of Experiments and Reliability Models.

DESCRIPTIVE NOTE: Final technical rept. 15 Dec 88-14 Dec 90.

MAY 91 3P

PERSONAL AUTHORS: Hedayat, A. S.; El-Neweihi, E.

CONTRACT NO. AFOSR-89-0221

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0885, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary goal in most scientific studies is to design an experiment which yields the maximum possible information about the phenomenon under study within the budgetary restraints. Our research addresses precisely this fundamental issue. Our recent discoveries not only add to the store of knowledge about the multiple facts of data collection and analysis, but have immediate applications to several fields of scientific investigation. In the equipment testing and aerospace medicine.

DESCRIPTORS: (U) , AEROSPACE MEDICINE, DATA ACQUISITION, MODELS, RELIABILITY, TEST AND EVALUATION.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F, *Experimental design, Communication engineering, Aerospace medicine, Reliability, *Mathematical models, Multistate coherent systems.

AD-A241 653 9/3 20/5 20/6

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Far East Optoelectronics Conferences.

DESCRIPTIVE NOTE: Final rept. 1 Mar-31 Dec 88,

SEP 88 20P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. AFOSR-88-0151

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0802, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The proceedings contain the majority of the papers presented at the Topical Meeting on Laser Materials and Laser Spectroscopy which was held at the Tien-ma Hotel in Shanghai, China on July 25-27, 1988. This topical meeting is a post conference meeting for the 16th International Quantum Electronics Conference in Tokyo, Japan and it focused on the relatively narrow subject of laser materials and laser spectroscopy. The purpose of this topical is to review the state-of-the-art research achievements in the fields of laser materials and laser spectroscopy and to create an academic and harmonic environment of understanding and interaction between the international scientists in China.

DESCRIPTORS: (U) , CHINA, ELECTROOPTICS, FAR EAST, HARMONICS, INTERNATIONAL, JAPAN, LASER MATERIALS, LASERS, SCHOOLS, SCIENTISTS, SPECTROSCOPY, SYMPOSIA.

IDENTIFIERS: (U) WUAFOSR2301A1, Symposia, *Laser materials, Optical equipment, *Laser spectroscopy, Yag lasers, Photoluminescence.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 647 20/5

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Termolecular Association and Laser-Assisted Electron-(Excited) Atom Collisions.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 90-30 Jun 91,

AUG 91 134P

PERSONAL AUTHORS: Flannery, M. R.

CONTRACT NO. AFOSR-89-0426

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0818, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the present research is to formulate, develop and implement new theoretical descriptions of the following atomic and molecular processes: Laser-Assisted Collisions: A new theory of laser-assisted electron-(excited) atom collisions, in which the dressed states of the atom A in the laser field are closely coupled and the Volkov states of the projectile electron in the laser field are included; Termolecular Recombination: The transport-collisional set of Master equations for Termolecular Recombination, A + B + M yields AB + M as a function of gas density has been developed by M. R. Flannery. Angular Momentum Changes in Collisions with excited atoms: Work is progressing on the cross sections for angular momentum changes, in heavy-particle and electron-atom (e-B) collisions where the target atom is initially in an excited state.

DESCRIPTORS: (U) , ANGULAR MOMENTUM, ATOMIC PROPERTIES, ATOMS, CROSS SECTIONS, DENSITY, ELECTRONS, EQUATIONS, GASES, LASERS, MOLECULES, PROJECTILES, TARGETS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4, *Electron collisions, Laser field, *Dressed atoms, Lasers, Termolecular association, Excitation.

AD-A241 647

AD-A241 645 12/9

TEXAS A AND M UNIV COLLEGE STATION DEPT OF ELECTRICAL ENGINEERING

(U) Nonlocal Methods for Signal Detection and Estimation in the Dependent Nonstationary Environment.

DESCRIPTIVE NOTE: Final rept. 1 Jan 87-30 Jun 91,

JUN 91 12P

PERSONAL AUTHORS: Halverson, Don R.

CONTRACT NO. AFOSR-87-0087

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF
TR-91-0799, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have obtained a number of results pertaining to image compression, robust estimation, and robust signal detection. All of this work has admitted the presence of data whose statistics are imperfectly known. Our results have featured adaptivity, flexibility, and nontraditional approaches. In order to employ more realistic statistical models, we have directed our research to admit nonstationarity and dependency. Much of our work in robust estimation and detection has employed a geometric approach which we have originated in past research. Our geometric techniques provide a quantitive way to measure the degree of robustness, thus offering the designer more flexibility in meeting the performance/robustness needs of the user. Our results include generalized robustness criteria involving curvature as well as manifold slope, as well as generalized nonlocal robustness criteria which supersede prior nonlocal criteria based on the worst case perspective. In addition, we have applied the geometric perspective to show how linear estimation algorithms can be modified to optimize a weighted combination of performance and robustness, thus offering the user the option of selecting various performance/robustness combinations as deemed appropriate for a specific application.

AD-A241 645

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 645 CONTINUED

DESCRIPTORS: (U) , ALGORITHMS, COMPRESSION, DETECTION, ESTIMATES, GEOMETRY, IMAGES, MANIFOLDS(ENGINES), MATHEMATICAL MODELS, SIGNALS, SLOPE, STATISTICAL ANALYSIS, WEIGHTING FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6, *Image processing, Robust signal detection, BTC(Block Truncation Coding), Algorithms, Electrical engineering, Compression, Robustness.

IAC NO. GC-920367

IAC DOCUMENT TYPE: GACIAC - MICROFICHE --

IAC SUBJECT TERMS: G--(U)IMAGE PROCESSING, DATA COMPRESSION, ESTIMATION, STATISTICAL ANALYSIS, ROBUSTNESS, ALGORITHMS.;

AD-A241 644 7/3

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) Dynamic Constraints on Stochastic Behavior in the Chemistry of Highly Excited Molecules.

DESCRIPTIVE NOTE: Final rept. 15 Apr 87-14 Apr 90,

APR 90 5P

PERSONAL AUTHORS: Carpenter, Barry K.; Wiesenfeld, John R.

CONTRACT NO. AFOSR-87-0165

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0796, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The intention of this project was to synthesize a number of organic molecules whose decomposition would lead to highly vibrationally excited intermediates, and then to study the energy disposition in these intermediates and compare it with the predictions of stochastic models which are believed to be deficient in this domain. At the termination of the project the synthesis of all target molecules had been accomplished and the study of their behavior had just begun. Significant evidence for dynamic control of branching ratios was obtained even from the limited experimental work that could be carried out before termination of the project.

DESCRIPTORS: (U) , CHEMISTRY, CONTROL, DECOMPOSITION, DYNAMICS, MATHEMATICAL MODELS, MOLECULES, ORGANIC COMPOUNDS, PREDICTIONS, STOCHASTIC PROCESSES, SYNTHESIS, TARGETS.

IDENTIFIERS: (U) Molecular energy levels, Decomposition, *Organic compounds, Synthesis(Chemistry), Optically active compounds, Reaction kinetics, PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 640 9/3

PURDUE UNIV LAFAYETTE IN DEPT OF CHEMISTRY

(U) Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.

DESCRIPTIVE NOTE: Annual rept. 15 Dec 89-14 Dec 90,

JUN 91 15P

PERSONAL AUTHORS: King, Galen B.; Laurendeau, Normand M.; Lytle, Fred E.

CONTRACT NO. AFOSR-89-0051

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0765, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the progress on the development of a new laser based combustion diagnostic for the quantitative measurement of both major and minor species in high pressure flames. The technique, asynchronous Optical Sampling (ASOPS), is a state of the art improvement in picosecond pump probe spectroscopy. A method is presented for vastly improving the output of the synchronously mode-locked dye laser systems. A pump probe absorption model is used to estimate the detection limit. A new differential detector is described. A modification is made to the basic instrument to achieve shot noise limited detection.

DESCRIPTORS: (U) , ABSORPTION, ASYNCHRONOUS SYSTEMS, COMBUSTION, DETECTION, DETECTORS, DIAGNOSIS(GENERAL), DYE LASERS, FLAMES, HIGH PRESSURE, INSTRUMENTATION, LASER APPLICATIONS, LASERS, LIMITATIONS, MEASUREMENT, MODE LOCKED LASERS, MODELS, OPTICAL PROPERTIES, PROBES, PUMPS, SAMPLING, SHOT NOISE, SPECTROSCOPY, STATE OF THE ART.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, Spectroscopy, High pressure, *Dye lasers, Diagnostic equipment, Shot noise, *Pump probe spectroscopy, ASOPS(Asynchrous Optical Sampling), High pressure flames.

AD-A241 640

AD-A241 639 6/4 5/8 14/4

NEW YORK UNIV NY DEPT OF PSYCHOLOGY

(U) Perception and Memory of Pictures.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-30 Jun 91,

AUG 91 26P

PERSONAL AUTHORS: Snodgrass, Joan G.

CONTRACT NO. AFOSR-89-0442

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0798, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research is concerned with perception and memory of pictures. The theoretical motivations behind the experiments vary from area to area: in some cases, we want to test predictions of a connectionist model for picture recognition; in other we want to compare pictures with words to determine whether the two surface forms are understood at the same rate; in still other, the pictures are used as a vehicle to study questions about implicit memory. In the area of perception, interference in identification of a degraded image occurs when even more degraded images of the same object precede it. We tested, and rejected, the explanation proposed by Bruner and Potter that erroneous hypotheses about the object's identity interfere with subsequent recognition in favor of the explanation generated by our connectionist model. This explanation holds that transient activation of perceptual features common to the target and its distractors reduces the signal-to-noise ratio and causes interference. We were able to eliminate interference by having subjects solve math problems between presentations of the more degraded images. In the area of implicit memory, we found that the best priming stimulus for subsequent identification was a moderately fragmented stimulus, as compared to a very fragmented or almost complete stimulus. We developed the perceptual closure hypothesis to account for this effect--it says that the more difficult perceptual closure or

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 639 CONTINUED

completion of the fragmented figure is to achieve, the more priming occurs, as along as closure is finally achieved.

DESCRIPTORS: (U) , ACTIVATION, CLOSURES, FRAGMENTATION, HYPOTHESES, MATHEMATICS, MEMORY DEVICES, PERCEPTION, PICTURES, PREDICTIONS, PRIMERS, RECOGNITION, SIGNAL TO NOISE RATIO, STIMULI, TEST AND EVALUATION, TRANSIENTS, VEHICLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, *Visual perception, *Memory(Psychology), Implicit memory, Explicit memory, Recognition memory, Connectionist models, Psychology, Fragmented pictures, Pictures.

AD-A241 639

AD-A241 625 7/3

WASHINGTON UNIV SEATTLE

(U) Transition-Metal Fluoro Compounds Containing Carbonyl, Phosphine, Arsine and Stibine Ligands,

91 22P

PERSONAL AUTHORS: Doherty, Nancy M.; Hoffman, Norris W.

CONTRACT NO. AFOSR-87-0362

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0768, AFOSR

UNCLASSIFIED REPORT

Availability: PUb. in Chemical Reviews, v91 n4 p553-573 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) This review describes the considerable variety of transition-metal fluoro compounds containing carbonyl, phosphine, arsine, and stibine ligands reported in the literature. Included are a number of stable low-valent organometallic fluorides, a class of compounds frequently assumed to be inaccessible on the basis of hard/soft acid/base predictions. A wide range of metal ligand environments can support fluoro ligands. In fact, fluoro complexes are more stable in many instances than the corresponding heavier halogen analogues. Tables II-IX provide a comprehensive survey of the methods used to prepare metal fluoro complexes. From the compounds and chemistry described in this review, several features emerge concerning the reactivity of the transition-metal fluoro compounds containing carbonyl, phosphine, arsine and stibine ligands. The combination of soft low-valent transition-metal centers and hard fluoride ions can produce unusual compounds with new reactivity patterns (e. g., RhF(PCy3)2). Fluoride appears to promote ligand-substitution lability at metal centers; this effect, combined with the stability of metal fluoride bonds, suggests promised for the use of organometallic fluoro compounds as catalysts and reagents in aprotic media. Fluoro ligands can also be useful sites for reaction

AD-A241 625

AD-A241 625 CONTINUED

chemistry; the propensity of F to form hydrogen bonds to hydroxylic compounds and the extremely strong Si-F bond can be used in synthetic schemes to prepare transition-metal compounds not accessible from chloro, bromo, or iodo starting materials.

DESCRIPTORS: (U) , ARSINES, BONDING, CATALYSTS, CHEMICAL REACTIONS, CHEMISTRY, ENVIRONMENTS, FLUORIDES, FLUORINE COMPOUNDS, HYDROGEN BONDS, IONS, LIGANDS, MEDIA, METAL COMPLEXES, METALS, ORGANOMETALLIC COMPOUNDS, PHOSPHINE, RANGE(EXTREMES), REACTIVITIES, SURVEYS, TRANSITION METAL COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Transition metal, *Fluoro, *Carbonyl, Phosphine, Arsine, Stibine, Ligands.

AD-A241 625

AD-A241 624 7/4

COLUMBIA UNIV NEW YORK

(U) Diffusion and Percolation of Radical Pairs in Zeolite Media. A Product Analysis Study.

DESCRIPTIVE NOTE: Rept. for 1989-1990,

91 8P

PERSONAL AUTHORS: Garcia-Garibay, Miguel; Zhang, Zhenyu; Turro, Nicholas J.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0767, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the American Chemical Society, v113 n16 p6212-6218 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The photochemistry of dibenzyl-d5 ketone (DBK d5) adsorbed in the zeolite NaX was investigated as a function of substrate loading. The cage effect and the relative yields of 1,2,-diphenylethane (DPE), o-methyl-Beta phenylacetophenone (o-MAP), and p-methyl Beta-phenylacetophenone (p-MAP) were found to depend dramatically on the loading of the starting material present. These results and the variations observed in the percent cage effect are described in terms of local and global effects that determine the influence of the zeolite media. Changes in reactivity as a function of reactant loading are explained in terms of percolation theory by using the model ants in a labyrinth propose by de Gennes. The diffusing radicals play the role of the ants and the disposition of the reactant in the regular zeolite topology determines the nature of the labyrinth. This model implies that the diffusion coefficient of the radicals is larger than the diffusion coefficient of the starting ketone. The model is supported by trapping experiments with an oxygen scavenger and by experiments carried out at -20 deg C where the diffusion of the

AD-A241 624

AD-A241 624 CONTINUED

radicals is largely diminished.

DESCRIPTORS: (U) , CHEMICAL RADICALS, DIFFUSION, DIFFUSION COEFFICIENT, FORMICIDAE, GLOBAL, KETONES, MATERIALS, MODELS, PERCOLATION, REACTANTS(CHEMISTRY), REACTIVITIES, STARTING, SUBSTRATES, THEORY.

IDENTIFIERS: (U) *Zeolites, Cage effect, Bimolecular reactions, Photochemical reactions.

AD-A241 624

AD-A241 623 7/4

KANSAS STATE UNIV MANHATTAN DEPT OF CHEMISTRY

(U) Reactions of NF(a(1)Delta) with Nitrogen, Oxygen, and Carbon Atoms,

91 9P

PERSONAL AUTHORS: Setser, Donald W.

CONTRACT NO. AFOSR-88-0279

MONITOR: AFOSR, XF
TR-91-0766, AFOSR

UNCLASSIFIED REPORT

Pub. in Jnl. of Physical Chemistry, v95 n12 p4728-4735 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Utilization of the chemical energy stored in the NF system is likely to involve a highly reactive environment. Therefore, an understanding of the chemistry of NF(a) with reactive atoms will be essential. The rate constant with F atoms, was reported earlier by the authors. The reaction with H atoms has a similar rate constant. In this work, we have studied the reactions of ground state N, O, and C atoms using a flow reactor; total quenching rate constants and product states were investigated. Only the C atom reaction gives chemiluminescence. In previous work from this laboratory, quenching rate constants for NF(a) from a variety of stable molecules were reported, including a separate study with halogen molecules, which tend to have large rate constants. The NF(a) state has a wide range of reactivity with small rate constants for molecules that quench by E-V energy transfer, but larger rate constants for molecules that can act as strong Lewis bases and for unsaturated molecules. All of the previous work, as well as the present study, utilized the 2F + HN3 reaction system as the source of NF(a) in a flow reactor.

DESCRIPTORS: (U) , ATOMS, CARBON, CHEMICAL REACTIONS, CHEMILUMINESCENCE, CONSTANTS, ENERGY, ENVIRONMENTS, GROUND STATE, HALOGENS, MOLECULES, NITROGEN, OXYGEN, QUENCHING, RANGE(EXTREMES), RATES, REACTIVITIES, RESPONSE, STABILITY.

AD-A241 623

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 623 CONTINUED

IDENTIFIERS: (U) *Singlet NF, Oxygen, Nitrogen, Carbon, Chemical reactions, Atoms, CN Chemiluminescence, Reprints.

AD-A241 622 7/6

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Ring Opening Metathesis Polymerization of 1,1-Diphenyl-1-Sila-Cyclopent-3-Ene,

JUL 91 4P

PERSONAL AUTHORS: Stonich, Derek A.; Weber, William P.

CONTRACT NO. AFOSR-89-0007

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0763, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Polymer Bulletin, v25 p629-631 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) 1,1-Diphenyl-1-silacyclopent-3-ene (I) has been polymerized by ring opening metathesis using tungsten hexachloride and either cyclopentene or cyclohexene as an initiator, with or without tetraphenyltin as a cocatalyst. The product polymer poly(1,1-diphenyl-1-sila-cia-pent-3-ene) (II) has been characterized by 1H, 13C, and 29Si NMR and IR spectroscopy.

DESCRIPTORS: (U) CHEMICAL REACTIONS, CHLORIDES, CYCLOHEXENES, CYCLOPENTENES, HEXANES, OPENING(PROCESS), POLYMERIZATION, RINGS, SPECTROSCOPY, TUNGSTEN.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Metathesis polymerization, Reprints, POMP, Pentenes, Polymers, Organic reactions.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 617 6/5

TEXAS A AND M UNIV COLLEGE STATION DEPT OF BIOLOGY

(U) Melatonin, the Pineal Gland and Circadian Rhythms.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 90-30 Apr 91,

AUG 91 6P

PERSONAL AUTHORS: Cassone, Vincent M.

CONTRACT NO. AFOSR-90-0244

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0760, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project had two interrelated thrusts, both of which are currently in progress. The first, Cellular mechanisms of melatonin's action using an in vitro hypothalamic slice preparation , has been set up. Our initial data indicate a modest but significant decrease in the relative LGU by 10 nM and 1 uM melatonin but not 10 pM melatonin at CT9-10. The second major thrust of this project. The pineal gland's role in mammalian circadian organization , is progressing very well This study indicates that, although pinealectomy has no effect on rat circadian rhythms is LD or constant darkness (DD), the surgery completely disrupts circadian rhythms is constant light.

DESCRIPTORS: (U) , CIRCADIAN RHYTHMS, CYTOLOGY, DARKNESS, IN VITRO ANALYSIS, INTERACTIONS, LIGHT, MAMMALS, ORGANIZATIONS, PINEAL GLAND, RATS, SURGERY, THRUST.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A3, *Pineal gland, Melatonin, *Hypothalamus, Constant darkness, Constant light.

AD-A241 611 9/3

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Organization of the Topical Meeting on Free-Electron Laser Applications in the Ultraviolet.

DESCRIPTIVE NOTE: Final rept. 1 Feb 88-3 Feb 89,

FEB 89 10P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. AFOSR-88-0118

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0801, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this conference were to discuss, evaluate, and promote unique and new applications that are awaiting Free Electron Laser devices that will operate at wavelengths below 300 nm. The subjects included: atomic and molecular spectroscopy, materials and surface physics, surface photochemistry, chemical dynamics, industrial photochemical processes, photoelectron spectroscopy, photolithography, materials processing, biological structures and radiation effects, plasma physics, and laser radar.

DESCRIPTORS: (U) , ATOMIC SPECTROSCOPY, BIOLOGY, CHEMICAL REACTIONS, DYNAMICS, ELECTRONIC EQUIPMENT, FREE ELECTRON LASERS, INDUSTRIAL PRODUCTION, LASER APPLICATIONS, MATERIALS, MOLECULAR SPECTROSCOPY, OPTICAL RADAR, PHOTOCHEMICAL REACTIONS, PHOTOELECTRON SPECTRA, PHOTOLITHOGRAPHY, PHYSICS, PLASMAS(PHYSICS), PROCESSING, RADIATION EFFECTS, STRUCTURES, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, *Free electron lasers, *Laser applications.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 610 5/2 7/3 7/2 4/1

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL
WASHINGTON DC

(U) Evaluation of Chemical and Atmospheric Sciences Research.

DESCRIPTIVE NOTE: Final rept. Sep 87-Oct 90,

OCT 90 13P

PERSONAL AUTHORS: Raber, Douglas J.

CONTRACT NO. F49620-87-C-0120

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-91-0815, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The National Research Council (NRC), through its Board on Chemical Sciences and Technology (BCST) provided the AFOSR Directorate of Chemical and Atmospheric Sciences with external scientific review of research proposals, program assessments, and advice. The work was carried out (with assistance by BCST staff) by volunteer panels that were appointed according to NRC procedures. The scope of these panels included the chemical and atmospheric sciences research programs administered jointly by the Air Force Office of Scientific Research (AFOSR) and the Air Force Astronautics Laboratory. Standing panels were established for three reviewing areas: Atmospheric Sciences, Chemical Sciences, and High Energy Density Materials (HEDM). The purposes of this project were to: assist the AFOSR in evaluating research proposals for scientific merit via peer review, conduct overall evaluations of research programs of the Directorate; and, to undertake special studies upon request by the Directorate, upon approval by the NRC governance. The three panels conducted convened-group review of 449 research proposals, based on 1,671 reviews received from 814 reviewers.

DESCRIPTORS: (U) , AERONOMY, AIR FORCE FACILITIES, ASTRONAUTICS, ATMOSPHERES, CHEMISTRY, EXTERNAL, HIGH

AD-A241 610 CONTINUED

DENSITY, HIGH ENERGY, LABORATORIES, MATERIALS, PANELS, RESEARCH MANAGEMENT, TEST AND EVALUATION, VOLUNTEERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, *Research management, *Chemistry, *Atmospherics, Panels.

AD-A241 610

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 609 20/5

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MATERIALS SCIENCE AND ENGINEE RING

(U) Detailed Modeling of Soot Particle Nucleation and Growth.

DESCRIPTIVE NOTE: Rept. for 1 Jan 88-31 Dec 90,

90 9P

PERSONAL AUTHORS: Frenklach, Michael; Wang, Hai

CONTRACT NO. AFOSR-88-0072

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0771, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium on Combustion, p1559-1566 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Detailed modeling of soot particle nucleation and growth in laminar premixed hydrocarbon flames is presented. The model begins with fuel pyrolysis, followed by the formation of polycyclic aromatic hydrocarbons, their planar growth and coagulation into spherical particles and finally, surface growth and oxidation of the particles. The computational results are in quantitative agreement with experimental results from several laminar premixed hydrocarbon flames. A detailed analysis of soot particle inception and surface growth processes is presented. Surface growth was described in terms of elementary chemical reactions of surface active sites. The density of these sites was found to depend on the chemical environment. The model predicts the classical picture of soot particle inception and the classical description of soot particle structure.

DESCRIPTORS: (U) , AROMATIC HYDROCARBONS, CHEMICAL REACTIONS, CHEMISTRY, COAGULATION, COMPUTATIONS, FLAMES, FUELS, GROWTH(GENERAL), HYDROCARBONS, LAMINAR FLOW, MIXING, NUCLEATION, OXIDATION, PARTICLES, PICTURES,

AD-A241 609

AD-A241 609 CONTINUED

PLANAR STRUCTURES, POLYCYCLIC COMPOUNDS, PYROLYSIS, SITES, SOOT, SPHERES, SURFACE ACTIVE SUBSTANCES, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, *Soot formation, *Computer modeling, Reprints.

AD-A241 609

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 607 24/7

TENNESSEE UNIV KNOXVILLE

(U) Environmental Biotechnology: Moving from the Flask to the Field.

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-30 Sep 91,

SEP 91 59P

PERSONAL AUTHORS: Blackburn, James W.

CONTRACT NO. AFOSR-91-0046

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0823, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Environmental biotechnology for hazardous wastes is operationally defined as the use of living organisms or their processes for socio-economic benefit in environmental protection and restoration. Often, biotechnology for control of wastes and toxic materials is viewed as the extremes of either conventional biological waste treatment technology or genetically engineered 'super bugs' of consequent risk to the environment. Between these extremes, environmental biotechnology has evolved from the integration of Engineering, Environmental and Biological sciences as an important new research field contributing to the development, application and optimization of biological processes in hazardous waste control. An analysis of applications of biological process in hazardous waste control leads to the identification of major areas in which environmental biotechnology can contribute new problem solutions and directions for the development or more reliable technology.

DESCRIPTORS: (U) , BIOLOGY, BIOTECHNOLOGY, CONTROL, ECONOMICS, ENGINEERING, ENVIRONMENTAL PROTECTION, ENVIRONMENTS, FLASKS, HAZARDOUS MATERIALS, INTEGRATION, LIFE(BIOLOGY), MATERIALS, OPTIMIZATION, PROBLEM SOLVING, RELIABILITY, RISK, SOCIOLOGY, TOXICITY, WASTES.

AD-A241 607 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 578 20/4 21/2

YALE UNIV NEW HAVEN CT

(U) Acquisition and Representation of 2D and 3D Data from Turbulent Flows and Flames.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Jan 91,

AUG 89 8P

PERSONAL AUTHORS: Long, Marshall B.; Lyons, Kevin; Lam, Joseph K.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0804, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

Reprint: Acquisition and Representation of 2D and 3D Data from Turbulent Flows and Flames.

DESCRIPTORS: (U) *TURBULENT FLOW, *FLAMES, FLOW VISUALIZATION, EXPERIMENTAL DESIGN, TURBULENCE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3, Laser diagnostics.

AD-A241 578

AD-A241 577 7/4

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The First Bicyclic System with σ(Si-Si)-Pi Conjugation. Synthesis of Bicylo(6.6.0)-1, 8-Diisopropyl-4,4,5,5,11, 11,12,12-Octamethyl-1,4,5,8,11,12-Hexasila-2,6,9,13-Tetrayne,

91 6P

PERSONAL AUTHORS: Iwahara, Takahisa; West, Robert

CONTRACT NO. AFOSR-89-0004

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-91-0814

UNCLASSIFIED REPORT

Availability: Pub. in Chemistry Letters, p545-548 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Bicyclic systems consisting of Delta (Si-Si) Pi conjugations are of some interest, since such a fused system may lead to unusual electronic and physical properties through unique (Si-Si) Pi conjugation Quite interesting properties are observed for the bicyclic 2.2.0 hexasilane compound reported by Nagai et al. Recently we have reported a new route to a good yield of strained cyclic disilanylene acetylenes using di Grignard reagents of 1,2-diethynyldisilane in dilute THE solutions. The bicyclic compound can be obtained by the reaction of 1,2-diisopropyltetrachlorodisilane with 2 equiv. of di Grignard reagent of 1,2-diethynyltetramethyldisilane in dilute THF solution. A shorter reaction time or on-and-off reaction decreased the yield. In these cases, a pale yellow viscous liquid and small amounts of white solid were obtained as crude products.

DESCRIPTORS: (U) , ACETYLENES, ELECTROMAGNETIC PROPERTIES, LIQUIDS, PHYSICAL PROPERTIES, REACTION TIME, VISCOSITY, YELLOW(COLOR).

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A241 577

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 576 7/4

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The Crystal Structure of a 1,2-Disilanediol, (t-Bu2SiOH)2.

91 8P

PERSONAL AUTHORS: West, Robert; Pham, Eric K.

CONTRACT NO. AFOSR-89-0004

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0813, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Organometallic Chemistry, v403 p43-48 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Disilenes, the silicon congener of alkenes, are now well established in the chemical literature. In a few cases they can be prepared thermally by reduction of 1,2-dihalodisilanes. We have explored the reductive chemistry of tetra-t-butyl-1,2-diiododisilane, the course of these studies, we have isolated a 1,2-disilanediol, whose novel structre is discussed here. All reactions were performed under an atmosphere of nitrogen or argon. Air-sensitive materials were handled using standard Schlenk techniques. Tetra-1-butyl-1,2-diiododisilane (1) was prepared according to the literature procedure. Several attempts were made to dehalogenate in the presence of trapping agents. The following experiment is illustrative: to a Schlenk flask containing a THF solution and two molar equivalents of LiC10H8 at -78C, an excess of methanol (2mL) was added by syringe. The mixture was then allowed to warm to ambient temperature.

DESCRIPTORS: (U) , ARGON, ATMOSPHERES, CHEMICALS, CRYSTAL STRUCTURE, DOCUMENTS, METHANOLS, NITROGEN.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A241 575 21/2

YALE UNIV NEW HAVEN CT

(U) Two-Dimensional Measurements of the Time Development of a Turbulent Premixed Flame.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Jan 91,

89 9P

PERSONAL AUTHORS: Winter, Michael; Long, Marshall B.

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0803, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Combust. Sci. and Tech., v66 p181-188 1989. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Two-Dimensional Measurements of the Time Development of a Turbulent Premixed Flame.

DESCRIPTORS: (U) *COMBUSTION, *FLAMES, TURBULENCE, PHOTOGRAPHIC ANALYSIS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3, Turbulent flames, *Turbulent combustion, Flame fronts, Laser diagnostics.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 574 7/6

COLUMBIA UNIV NEW YORK

(U) Stereochemistry of Photocycloaddition of (E)-1,2-Dicyano- and (Z)-1,2-Diethoxyethylene to 5-Substituted Adamantanones.

DESCRIPTIVE NOTE: Rept. 1989-1990,

91 7P

PERSONAL AUTHORS: Chung, Wen S.; Turro, Nicholas J.; Srivastava, Sushil; Le Noble, William J.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0770, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Organic Chemistry, v56 n17 p5020-5025 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The photocycloaddition of olefins to 5-substituted adamantanones produces two geometrically isomeric oxetanes in which the oxygen atom and the 5-substituent are in anti syn positions. The substituent was varied from fluoro-, chloro-, bromo-, hydroxyl, arphenyl to tert-butyl. Although the mechanisms of the reaction with electron-rich and electron poor olefins are quite differnt, the product ratios are similar (60:40) in all instances. The preference of product formation from the attack on the zu face is discussed in terms of transition-state hyperconjugation.

DESCRIPTORS: (U) , ATOMS, GEOMETRIC FORMS, ISOMERS, OXETANES, OXYGEN, RATIOS, RESPONSE.

IDENTIFIERS: (U) Adamantanones, *Photocycloaddition, *Ketone, *Stereochemistry, PE61102F, WUAFOSR2303B2.

AD-A241 574

AD-A241 573 7/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Soot Formation and Inert Addition in Diffusion Flames,

90 8P

PERSONAL AUTHORS: Axelbaum, R. L.; Law, C. K.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0778, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion/The Combustion Institute (23rd) p1517-1523 1990. Available only to DTIC users No copies furnished by NTIS.

ABSTRACT: (U) An experimental study has been conducted in coflow diffusion flames in order to identify the relative importance of fuel concentration dilution and flame temperature reduction on soot formation when inert is added to fuel. Two different methodologies were used to isolate dilution and temperature effects, both involving substitution of inerts with different specific heats. To quantify the extent of soot reduction, laser-light extinction as well as smoke point measurements were made. The results are in agreement with previous studies in counterflow flames and show that soot formation rates in the coflow flame behave nearly linearly with fuel concentration. Furthermore, while temperature exerts a strong influence on soot formation, dilution can also affect formation rates and smoke points when inerts are added to fuels. It is found that the relative importance of dilution and temperature depends on the extent of addition. When moderate amounts of inert are added, the temperature reduction is typically very small so that the effect of dilution can be considerably greater than that of temperature. When large amounts of inert are added, temperature effects may dominate those of dilution although, in an absolute sense, dilution effects could

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AD-A241 573 CONTINUED

still be important because fuel concentrations are low.

DESCRIPTORS: (U) , ADDITION, CONCENTRATION(COMPOSITION), DIFFUSION, DILUTION, FLAMES, FLOW, FUELS, INERT MATERIALS, MEASUREMENT, RATES, REDUCTION, SMOKE, SOOT, TEMPERATURE.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F, *Soot formation, Diffusion flames, Temperature effects, Inert addition, Reprints.

AD-A241 573

AD-A241 572 7/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Experimental and Numerical Determination of Laminar Flame Speeds: Mixtures of C2-Hydrocarbons with Oxygen and Nitrogen,

90 9P

PERSONAL AUTHORS: Egolfopoulos, F. N.; Zhu, D. L.; Law, C. K.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0777, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion/The Combustion Institute (23rd) p471-478 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Using the counterflow flame technique, laminar flame speeds of mixtures of ethane, ethylene, acetylene and propane with oxygen and nitrogen have been accurately determined over extensive lean-to-rich fuel concentration ranges and over the pressure range of 0.25 to 3 atm. These data are then compared with the numerically calculated values obtained by using the various kinetic schemes in the literature as well as one compiled in the present study. The present scheme yields close agreement with all of the experimental flame speeds except for diluted, rich acetylene flames, for which the calculated values are higher. The relative importance and influence of the individual reactions on the flame speed and reaction mechanism are assessed and discussed with the aid of sensitivity analysis. The study also demonstrates that C2 schemes validated through comparisons based on methane flame speeds may not be accurate enough for flame speed predictions of the C2 fuels, and that the C2 schemes developed through comparisons with the flame speeds of the C2 fuels are rather insensitive to the details of the C3 sub-mechanism.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 572 CONTINUED

The importance of having accurate values of the thermophysical properties of radicals for flame simulation is also emphasized.

DESCRIPTORS: (U) , ACCURACY, ACETYLENE, CHEMICAL RADICALS, ETHANES, ETHYLENE, FLAMES, FLOW, KINETICS, LAMINAR FLOW, METHANE, NITROGEN, NUMERICAL ANALYSIS, OVERPRESSURE, OXYGEN, PREDICTIONS, PROPANE, RESPONSE, SIMULATION, THERMOPHYSICAL PROPERTIES, VALUE, VELOCITY, YIELD.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F, *Flame propagation speeds, Methane, Ethane, Ethylene, Acetylene, Propane, Chemical kinetics, Reprints.

AD-A241 572

AD-A241 571 9/3

YALE UNIV NEW HAVEN CT

(U) Technique for Three-Dimensional Measurements of the Time Development of Turbulent Flames,

JUN 91 4P

PERSONAL AUTHORS: Frank, Jonathan H.; Lyons, Kevin M.; Long, Marshall B.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XF
TR-91-0782, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v16 n12 p958-960, 15 Jun 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A three-dimensional imaging technique has been developed that permits the investigation of the time development of a scalar in turbulent reacting flows. An aerosol-seeded premixed flame was illuminated by four closely spaced parallel laser sheets of different wavelength. Lorenz Mie scattering from the four illumination sheets was imaged onto an intensified two dimensional charge coupled device array. Bandpass filters and a multi-image optical component in the collection optical allowed individual sheets to be imaged onto different areas of the charge-coupled-device array. A double-pulsed Nd: YAG laser was used in conjunction with a rotating mirror in the collection optics to enable instantaneous three-dimensional images to be obtained at two times separated by 100 micro seconds.

DESCRIPTORS: (U) , ARRAYS, BANDPASS FILTERS, CHARGE COUPLED DEVICES, COLLECTION, FLAMES, ILLUMINATION, IMAGES, LASERS, MEASUREMENT, MIE SCATTERING, MIRRORS, OPTICS, PARALLEL ORIENTATION, ROTATION, SHEETS, THREE DIMENSIONAL, TIME, TURBULENCE, YAG LASERS.

IDENTIFIERS: (U) *Three-dimensional, Lorenz Mie

AD-A241 571

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 571 CONTINUED

scattering, *Turbulence, Laser diagnostics, Time evolution, WUAFOSR2308CS, PE61102F.

AD-A241 570 6/5

YALE UNIV NEW HAVEN CT

(U) Measurement of Three-Dimensional Concentrations in Turbulent Jets and Flames,

88 10P

PERSONAL AUTHORS: Long, Marshall B.; Yip, Bandon

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0806, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion/The Combustion Institute (22nd) p701-709 1988. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Laser-based techniques for obtaining measurements of a three-dimensional scalar field in turbulent jets and flames are described. In one experiment, three dimensional scalar gradients are determined by detecting the scattered light intensity from two parallel illumination sheets intersecting the flow. Another experimental approach gives more complete three dimensional data by scanning a single laser sheet through the flow, and recording the scattering corresponding to different sheet locations. Data from nonreacting and reacting flows are presented and important factors in the measurement techniques are discussed. Laser diagnostic techniques are now widely used for making nonintrusive, in situ measurements in reacting and nonreacting flows. Quantitive measurements of temperature; species concentration, density, and velocity have been demonstrated using a number of different light scattering mechanisms. New laser diagnostic techniques have first been demonstrated for measurements at a single point. Subsequently, some techniques have been extended to allow simultaneous measurements in one or two dimensions.

DESCRIPTORS: (U) , APPROACH, DIAGNOSIS(GENERAL),

AD-A241 571

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 570 CONTINUED

EXPERIMENTAL DATA, FLAMES, GRADIENTS, ILLUMINATION, INTENSITY, JET FLOW, LASER APPLICATIONS, LASERS, LIGHT SCATTERING, MEASUREMENT, METHODOLOGY, PARALLEL ORIENTATION, POSITION(LOCATION), SCALAR FUNCTIONS, SCATTERING, SHEETS, SYNCHRONISM, TEMPERATURE, THREE DIMENSIONAL, TURBULENT FLOW.

IDENTIFIERS: (U) WUAFOSR2308A3, PE61102F, *Turbulence, *Laser diagnosis, Three dimensional, Fluorescence, Reprints.

AD-A241 570

AD-A241 569 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Three-Dimensional Visualization of Temporal Flow Sequences,

MAR 91 6P

PERSONAL AUTHORS: Van Cruyningen, I.; Lozano, A.; Mungal, M. G.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0067

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0779, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in AIAA Jnl., v29 n3 p479-482 Mar 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) FLOW visualization remains one of the most powerful methods of gaining insight into turbulent flow physics. Recently there have been several excellent reviews that describe some of the latest developments in the field. It is also well known among the research community that movie or video sequences of flow visualization images, because of their dynamic nature, are frequently used to study flow development. Presentation of these data as a series of successive frame-by-frame images allows some correlation of temporal information, but is generally unsatisfactory as the human eye is much more adept at determining spatial correlations within a single image. This note describes the application of a method to generate single three-dimensional views that emphasize temporal correlations of time-evolving two-dimensional data sets (i.e. movies), thereby improve interpretation of such data.

DESCRIPTORS: (U) , CORRELATION, EYE, FLOW, FLOW VISUALIZATION, HUMANS, IMAGES, PHYSICS, SEQUENCES, SPATIAL DISTRIBUTION, THREE DIMENSIONAL, TURBULENT FLOW, VIDEO SIGNALS.

IDENTIFIERS: (U) Reprints, WUAFOSR2308A3, PE61102F.

AD-A241 569

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 565 11/2

CALIFORNIA INST OF TECH PASADENA DIV OF CHEMISTRY AND CHEMICAL ENGINEERING

(U) Microscopic Theoretical Modeling of the Chemical and Tribological Properties of Ceramic Surfaces and Interfaces.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 87-31 Oct 90,

SEP 91 58P

PERSONAL AUTHORS: Goddard, William A., III

CONTRACT NO. AFOSR-88-0051

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-91-0816, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The major goal to this research was to develop a strategy for establishing a microscopic atomic level understanding of the fundamental surface processes ultimately responsible for friction, adhesion at surfaces, and abrasion. The approach was; (1) to use quantum chemical studies to establish the dominant surface species for clusters of atoms modeling various ceramics and to elucidate the thermochemistry and detailed mechanistic steps involved in surface reactions of such systems; (2) to develop theoretical force fields based on the energy surfaces from clusters in i that allow predictions of the energies and geometries for infinite surfaces and interfaces; (3) to use the force fields from ii to predict the barriers and kinetics for various diffusion and reaction processes relevant for catalysis, corrosion, and materials synthesis processes; (4) to develop procedures for molecular dynamics and Monte Carlo simulations of various chemical processes in these systems, and , (5) to interface the results of these simulations onto appropriate graphics systems, allowing the designer to interactively follow a three dimensional image of the evolving system.

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DESCRIPTORS: (U) , ABRASION, ADHESION, ATOMIC ENERGY LEVELS, ATOMS, CATALYSIS, CERAMIC MATERIALS, CHEMICAL PROPERTIES, CHEMICAL REACTIONS, CHEMISTRY, CLUSTERING, CORROSION, DYNAMICS, ENERGY, FRICTION, GRAPHICS, IMAGES, MATERIALS, MICROSCOPY, MODELS, MOLECULAR PROPERTIES, MONTE CARLO METHOD, PREDICTIONS, QUANTUM CHEMISTRY, RESPONSE, SIMULATION, SURFACE REACTIONS, SURFACES, SYNTHESIS, THEORY, THERMOCHEMISTRY, THREE DIMENSIONAL, TRIBOLOGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, CAMS(Computer Aided Materials Simulations), Skin friction, *Ceramic materials, Surface analysis, Quantum chemistry, Microstructure, *Tribology.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 564 20/4

MICHIGAN UNIV ANN ARBOR

(U) Drop/Gas Interactions in Dense Sprays.

DESCRIPTIVE NOTE: Annual technical rept. Aug 90-Aug 91,

AUG 91 7P

PERSONAL AUTHORS: Faeth, G. M.

CONTRACT NO. AFOSR-89-0516

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0764, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Two processes of dense sprays are being studied: (1) turbulence modulation, which involves the turbulent field generated by drop motion; and (2) secondary drop breakup which can be the rate controlling process in dense sprays. Since past work on turbulence modulation highlighted the need for information on drop wake properties for low drop Reynolds numbers (10-1000), measurements of these flows are in progress using spheres traversing in stagnant glycerol baths. Three wake regions have been identified: a fast-decaying wake (caused by eddy shedding at drop Reynolds numbers greater than 200), a turbulent wake (extending to wake Reynolds numbers of 5-8), and a final laminar wake. Turbulence is not highly developed in the turbulent wakes, yet mean velocities satisfy similarity theory quite well. Current work is concentrating on results at higher Reynolds numbers, to approach results in the literature; studying wakes in turbulent environments; and introducing these results into a stochastic theory of turbulence modulation. Secondary drop breakup is being studied in a shock tube using water, glycerol and n-heptane drops. A breakup regime map has been developed, defining no-deformation, oscillatory deformation, non-oscillatory deformation, bag breakup, multimode breakup and shear breakup regimes as a function of Weber and Ohnesorge numbers. Results at Ohnesorge numbers greater than 4 show that these conditions are dominated by the no-deformation regime.

AD-A241 564

AD-A241 564 CONTINUED

Current work involves measurements of the dynamics and outcomes of bag and multimode breakup.

DESCRIPTORS: (U) , BAGS, BATHS, DEFORMATION, DYNAMICS, EDDIES(FLUID MECHANICS), EDDY CURRENTS, ENVIRONMENTS, GLYCEROLS, HIGH DENSITY, LAMINAR FLOW, MAPS, MEAN, MODULATION, MULTIMODE, OSCILLATION, REYNOLDS NUMBER, SHEAR PROPERTIES, SHOCK TUBES, SPHERES, SPRAYS, STAGNATION, STOCHASTIC PROCESSES, THEORY, TURBULENCE, VELOCITY, WAKE, WATER.

IDENTIFIERS: (U) *Multiphase flow, *Sprays, *Drops, Breakup(Drops), Atomization, Vortex shedding, Rate control, Turbulence modulation, Dense sprays, Weber number, Ohnesorge number, Reynold number, Homogeneous turbulence, PE61102F, WUAFOSR2308A2.

AD-A241 564

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 561 7/2

JOHNS HOPKINS UNIV BALTIMORE MD

(U) Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.

DESCRIPTIVE NOTE: Final rept.,

SEP 91 22P

PERSONAL AUTHORS: Dagdigian, Paul J.; Alexander, Millard H.

CONTRACT NO. F49620-88-C-0056

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0789, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A joint experimental and theoretical study of the dynamics of phototypical reactions of the azide radical (N3) with light atoms, as well as the decomposition of the azide radical and its precursor, hydrazoic acid (HN3), has been carried out. Reactions of atoms with free radicals are an interesting class of chemical reactions whose dynamics has not been extensively studied, in part because of the difficulties in preparing two labile reagents. Because of the open shell nature of atoms and radicals, these reactions necessarily involve multiple potential energy surfaces, only one of which will usually lead to a strongly bound intermediate, namely the stable molecule formed by the chemical bonding of two reagents.

DESCRIPTORS: (U) , ATOMS, AZIDES, CHEMICAL AGENTS, CHEMICAL BONDS, CHEMICAL REACTIONS, DECOMPOSITION, DYNAMICS, FREE RADICALS, HYDRAZOIC ACID, LIGHT, MOLECULES, PHOTODISSOCIATION, POTENTIAL ENERGY, SHELLS(STRUCTURAL FORMS), STABILITY, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Azides, *Hydrazoic acid, Photodissociation, Chemluminescence, Electronic quenching, Atom radical reactions, N3(Azide

AD-A241 561

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Radical), NH3(Hydrazoic Acid).

AD-A241 561

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 560 5/8

CALIFORNIA UNIV IRVINE DEPT OF PHARMACOLOGY

(U) Cellular Analogs of Operant Behavior.

DESCRIPTIVE NOTE: Annual rept.,

DEC 90 5P

PERSONAL AUTHORS: Stein, Larry

CONTRACT NO. AFOSR-89-0213

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0781, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our previous work indicates that hippocampal CA1 bursting may be reinforced by dopaminergic agents such as dopamine itself, cocaine, and certain dopamine receptor agonists. A major concern is that these agents may facilitate bursting merely by direct or indirect pharmacological stimulation of neuronal activity rather than by a cellular reinforcement process. We have always required as critical evidence of cellular reinforcement that noncontingent or random presentations of the positive agents will be relatively ineffective; and indeed random applications of dopamine, cocaine, and dynorphin A are ineffective and even tend to suppress the bursting of hippocampal pyramidal cells. One approach is to attempt to reinforce hippocampal bursting with a nonspecific depolarizing agent such as glutamate. Unlike dopamine and cocaine, burst-contingent applications of glutamate did not produce selective facilitation of cellular bursting when compared to ramdom presentations; indeed, both contingent and random glutamate applications reduced the likelihood of bursts, while at the same time increasing the frequency of individual spikes.

DESCRIPTORS: (U) , ANALOGS, CELLS, CELLS(BIOLOGY), COCAINE, DOPAMINE, GLUTAMIC ACID, HIPPOCAMPUS, PHARMACOLOGY, PYRAMIDS, SALTS, SENSE ORGANS, SPIKES, STIMULATION(GENERAL).

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IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1.

AD-A241 560

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 536 20/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF AEROSPACE ENGINEERING

(U) A New Technique for Temperature and Specie Concentration Measurements in Unseeded Supersonic and Hypersonic Gas Flows.

DESCRIPTIVE NOTE: Final rept. 2 Feb 88-1 Feb 91,

AUG 91 16P

PERSONAL AUTHORS: Erwin, Daniel A.; Kunc, Joseph A.; Muntz, E. P.

CONTRACT NO. AFOSR-88-0119

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0808, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal to develop an experimental diagnostic technique suitable for gas flows of densities intermediate between atmospheric and rarefied. A laser assisted Electron Beam Fluorescense technique which we call electron photon fluorescense was developed. Theoretical work was done to predict the time dependence of the excitation/deexcitation processes. As described in the original proposal, our goal in this work was the attainment of an experimental diagnostic technique suitable for gas flows of densities intermediate between atmospheric and rarefied. Measurements in such intermediate density flows, typical of hypersonic flight at altitudes above about 50 km, present difficulties in that traditional wind-tunnel techniques (shadow and schlieren, as well as laser based scattering techniques) provide insufficient signal. Moreover, the resonant scattering techniques may require an absorptive species as a tracer to be seeded into the flow, a requirement inconsistent with the realities of existing large facilities. On the other hand, the densities are not enough for continuous electron-beam fluorescence (EBF) to be used due to beam spreading and collisional quenching.

AD-A241 536 CONTINUED

DESCRIPTORS: (U) , ABSORBERS(MATERIALS), ALTITUDE, COLLISIONS, DENSITY, DIAGNOSIS(GENERAL), ELECTRON BEAMS, ELECTRONS, FACILITIES, FLOW, FLUORESCENCE, GAS FLOW, HYPERSONIC FLIGHT, HYPERSONIC FLOW, LABORATORY PROCEDURES, LASER BEAMS, LASERS, PHOTONS, QUENCHING, RESONANCE, SCATTERING, SUPERSONIC FLOW, THEORY, TIME DEPENDENCE, WIND TUNNELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1, Electron beam flourescense, Hypersonic flow, Rarefied gas.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 514 16/2 16/2.1 17/7.3 15/3.1

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Hypervelocity Aerodynamics and Control.

DESCRIPTIVE NOTE: Final rept. 15 Sep 86-14 Oct 87,

DEC 87 61P

PERSONAL AUTHORS: Adamson, T. C., Jr.; Howe, R. M.

CONTRACT NO. F49620-86-C-0138

PROJECT NO. 2587

TASK NO. 00

MONITOR: AFOSR
TR-91-0787

UNCLASSIFIED REPORT

ABSTRACT: (U) The research objective of this study of optimal aerodynamics and propulsive control at supercircular speeds is to develop methods for determining optimal guidance and control of earth launch kinetic energy weapons designed to intercept intercontinental ballistic missiles early in their ascent trajectory. Optimal control techniques are used to obtain multistage trajectories based on minimizing the mass ratio. Study parameters include time of flight, down range intercept distance and intercept altitude. Re-entry/ skip trajectories are considered. Innovative means of attitude control of the final stage which intercepts the target are being studied. An investigation of the control of aerodynamic forces on hypersonic vehicles by boundary layer injection has also been started. Its goal is to determine optimal patterns of injection of a gas into a boundary layer on a hypersonic vehicle, to generate desired aerodynamic forces. Two directions of approach are being studied. In the first, analytical means are being used to study the effects of blowing on simple flow problems in the various flow regimes; a combination of asymptotic and numerical methods are used. In the second, numerical methods are being used, with particular emphasis on obtaining efficient codes which result in the computation of crisp shock waves and which can handle blowing in the boundary layer. Both distributed and strip blowing are under consideration. Preliminary results are

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AD-A241 514 CONTINUED

presented.

DESCRIPTORS: (U) , AERODYNAMIC FORCES, AERODYNAMICS, ALTITUDE, ASCENT TRAJECTORIES, ATTITUDE CONTROL SYSTEMS, BOUNDARY LAYER, CODING, CONTROL, DISTRIBUTION, EFFICIENCY, FLIGHT, FLOW, GUIDANCE, GUIDED MISSILES, HYPERSONIC VEHICLES, HYPERSONIC VELOCITY, INJECTION, INTERCEPTION, LONG RANGE(DISTANCE), MASS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARAMETERS, PATTERNS, RANGE(DISTANCE), RATIOS, REENTRY VEHICLES, SHOCK WAVES, STAGING, TIME, TRAJECTORIES.

IDENTIFIERS: (U) Interceptors, *Intercept trajectories, *Boundary layer control, Kinetic energy weapons, Surface launched, Staging, Hypersonic flight, *Guided missile trajectories, Superorbital velocity, Boundary layer injection, Reentry trajectories, Skip trajectories, Blowing, Gas injection, Ballistic missile intercept systems, Optimal control, *Hypervelocity weapons, WUAFOSR258700.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 513 21/3

CALIFORNIA INST OF TECH PASADENA GUGGENHEIM JET PROPULSION CENTER

(U) Electron-Cyclotron-Resonance Plasma Thruster Research.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-30 Jun 91,

AUG 91 18P

PERSONAL AUTHORS: Culick, F. E.; Sercel, Joel C.

CONTRACT NO. AFOSR-87-0205

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0809, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results of a three year program devoted to theoretical and experimental research on plasma acceleration by Electron-Cyclotron-Resonance (ECR). Theoretical work in the first year of this effort centered on simple analytical treatment of many of the phenomena which have a role in ECR plasma acceleration. These analytical studies pointed out which phenomena are sufficiently important to be incorporated in the more rigorous theoretical studies of years two and three and also provided vital guidance to the process of designing the experimental apparatus. An experimental facility was developed in the first year of this program so that an ECR research device could be tested. The JPL facility has the unique capability of providing up to 20 kW of S-band microwave power and 18,000 liters/second of high quality vacuum system pumping for the study of advanced microwave propulsion concepts.

DESCRIPTORS: (U) , MICROWAVES, PLASMA ACCELERATORS, PROPULSION SYSTEMS, RADIOFREQUENCY POWER, RESEARCH FACILITIES, S BAND, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, *Cyclotron resonance, *Plasma engines.

AD-A241 513

AD-A241 512 5/2

SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS PHILADELPHIA PA

(U) SIAM Workshop on Automatic Differentiation of Algorithms: Theory, Implementation and Application.

DESCRIPTIVE NOTE: Final rept.,

JAN 91 10P

PERSONAL AUTHORS: Block, I. E.

CONTRACT NO. AFOSR-91-0004

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-91-0811, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The workshop was attended by sixty-five researchers, of whom thirty gave half hour lecturers, and nineteen presented posters. This was the first scientific meeting devoted to the topic of automatic differentiation of algorithms. There were many excellent talks on large scale applications - in particular weather modeling, oceanography, petroleum reservoir modeling, beam tracing in optics, satellite orbit analysis, and mechanical systems simulation. Some of the speakers delineated very clearly the remaining deficiencies of currently available automatic differentiation techniques in comparison to handcoded derivative evaluation programs. From the lively discussion that followed, it can be expected that the software developers present will accept the challenge of closing this gap in efficiency without sacrificing user convenience. In many formal and informal discussions, the participants raised the question of how potential users and the scientific community at large can be made aware of the extremely promising computational techniques presented at the workshop. Some felt that the name Automatic Differentiation sounds too mechanical and fails to indicate the wealth of intrinsic problems and ramifications.

DESCRIPTORS: (U) , ALGORITHMS, ARTIFICIAL SATELLITES,

AD-A241 512

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 512 CONTINUED

COMPUTATIONS, COMPUTER PROGRAMS, LECTURES, MECHANICAL COMPONENTS, MODELS, OCEANOGRAPHY, OPTICS, ORBITS, PETROLEUM GEOLOGY, RESERVOIRS, SCIENTIFIC ORGANIZATIONS, SIMULATION, TEST AND EVALUATION, WEATHER.

IDENTIFIERS: (U) PE61102F, WUAFISR2304A4.

AD-A241 512

AD-A241 511 5/8

EEG SYSTEMS LAB SAN FRANCISCO CA

(U) Neuro-Triggered Training.

DESCRIPTIVE NOTE: Interim rept. 1 Apr 90-30 Mar 91,

APR 91 15P

PERSONAL AUTHORS: Gevins, Alan S.; Cutillo, Brian A.

CONTRACT NO. F49620-90-C-0026

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XF
TR-91-0784, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) Cortical neuroelectric patterns during a working memory task differed from a control task during two of four split-second intervals when access to the contents of working memory is assumed to take place. Prefrontal cortical areas were prominent among those differentially activated by working memory in these two intervals, which included a prestimulus preparatory interval and a late poststimulus response-inhibition interval. By contrast, patterns were similar between conditions during an early poststimulus interval and during a response interval, when the predominant activity was related to stimulus encoding or response execution. These results suggest that working memory is a dynamic process embodied in neuroelectric activity patterns distributed across the neural areas involved in performing a particular task. The active aspect of short-term memory, termed 'working memory' by A. Baddeley and co-workers, provides the basis for consciously directed perception, cognition and action, attentional programs, and extended logical and linguistic operations.

DESCRIPTORS: (U) , ACTIVATION, COGNITION, CONTROL, DYNAMICS, INTERVALS, LINGUISTICS, MEMORY DEVICES, MEMORY(PSYCHOLOGY), NERVOUS SYSTEM, RESPONSE, SHORT

AD-A241 511

AD-A241 511 CONTINUED

RANGE(TIME).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313BS, *Working memory, *Cognition, Feedback, Learning.

AD-A241 478 21/2

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) An Experimental and Computational Study of the Burning Rates of Ultra-Lean to Moderately-Rich H2/O2/N2 Laminar Flames with Pressure Variations,

90 9P

PERSONAL AUTHORS: Egolfopoulos, F. N.; Law, C. K.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2408

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0773, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion/The Combustion Institute (23rd), p333-340, 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) By using the counterflow flame technique, laminar flame speeds of H2/O2/N2 mixtures have been experimentally determined in the fuel stoichiometric range of ultra-lean to moderately-rich, oxygen concentration range of 7.4 to 30 molar percent of the oxidizer, and pressure range of 0.2 to 2.25 atm. These results are then compared with the numerically-determined values obtained by using several existing H2/O2 kinetic schemes. Results show that, while these kinetic schemes accurately predict the propagation speeds of high-temperature flames, they substantially underpredict those of low temperature flames. Furthermore, while the experimental pressure exponents of the mass burning rates exhibit a minimum-point, parabola-like behavior with increasing pressure, indicating the initial, negative influence of the H-O2 termination reaction and the subsequent availability of a positive channel which facilitates radical production, the calculated results fail to show the increasing trend in the pressure range investigated.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 478 CONTINUED

DESCRIPTORS: (U) , BURNING RATE, CHANNELS, COMPUTATIONS, CONCENTRATION(CHEMISTRY), FLAMES, FLOW, FUELS, HIGH TEMPERATURE, KINETICS, LAMINAR FLOW, LOW TEMPERATURE, MASS, OXIDIZERS, OXYGEN, PRESSURE, PRODUCTION, PROPAGATION, STOICHIOMETRY, VARIABLE PRESSURE, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, *Hydrogen combustion, Intermediate-temperature kinetics, Flame propagation speeds, Reprints.

AD-A241 478

AD-A241 477 7/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) A Kinetic Criterion of Flammability Limits: The C-H-O-Inert System,

90 10P

PERSONAL AUTHORS: Law, C. K.; Egolfopoulos, F. N.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0775. AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion/The Combustion Institute (23rd), p413-421, 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) An experimental and theoretical investigation has been conducted on the determination of the flammability limits of the C-H-O-inert system and on the understanding of limit phenomena in general. Experimentally, flammability limits have been determined by first measuring the extinction limits of stretched, counterflow flames and extrapolating the results to zero stretch. Consequently, lean and rich flammability limits have been determined for mixtures of methane, ethane, ethylene, acetylene, and propane with air, for mixtures of H2, H2/CH4, and H2/CO with O2/N2, and for the effects of dilution, inert substitution, chemical additives such as CH3Br and H2, and radiative heat loss due to flame broadening. By further hypothesizing that the limit phenomena are primarily controlled by the kinetic processes of chain branching versus termination, a predictive theory has been advanced for the a priori determination of flammability limits. Calculated results largely agree with the experimental data for both the lean and rich limits, except for excessively thick flames for which the limits could be quilitatively affected by radiative heat loss, the study further shows that H + O2

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yield O + OH is the dominant branching reaction for all lean and rich limits, that H + O2 = M yields HO2 + M is the dominant termination reaction for all lean limits.

DESCRIPTORS: (U) , ACETYLENE, ADDITIVES, CHAINS, CHEMICALS, DETERMINATION, ETHANES, ETHYLENE, EXPERIMENTAL DATA, EXTINCTION, FLAMES, FLAMMABILITY, FLOW, HEAT LOSS, INERT MATERIALS, KINETICS, LIMITATIONS, METHANE, MIXTURES, PROPANE, RADIATIVE TRANSFER, RESPONSE, SUBSTITUTES, THEORY, THICKNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, *Flammability limit, Flame extinction, Hydrocarbon combustion, Chemical kinetics, Reprint.

AD-A241 477

AD-A241 465 6/5

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 90-31 Mar 91,

MAR 91 11P

PERSONAL AUTHORS: Trosko, James E.

CONTRACT NO. AFOSR-89-0325

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XF
TR-91-0822, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period under report, we have made significant progress in the studies proposed under various specific aims. More importantly, antibodies to three major gap junction (GJ) proteins were generated and used to characterize the GJ proteins of various tissue culture systems. Progress has also been made in understanding the biochemical and molecular basis of the action of certain tumor promoting chemicals, such as TPA, mezerein and bryostatin, which indicated that protein kinase C (PKC), an import component of cellular second messenger system, was activated. Since gap junction protein is considered to be affected by PKC, the observations we made suggest that PKC activating toxicants can exert their action as tumor promoters through abolishing GJ protein function. Another study suggested that certain oncogenes, ras, neu and src, induce cellular transformation and the resulting transformed cells have very poor GJIC. Studies are underway to identify the mechanisms of gap junction protein regulation.

DESCRIPTORS: (U) , ACTIVATION, ANTIBODIES, CELLS, CHEMICAL REACTIONS, CHEMICALS, FUNCTIONS, INHIBITION, NEOPLASMS, PROTEINS, TISSUE CULTURE, TOXIC AGENTS,

AD-A241 465

AD-A241 465 CONTINUED

TRANSFORMATIONS.

IDENTIFIERS: (U) Gap junctions, *Cell communication, Tumor promoters, Teratogens, *Neurotoxins, Protein kinase C, Chemical toxicity, WUAFOSR2312AS, PE61102F.

AD-A241 464 1/3 1/1

CALIFORNIA UNIV LOS ANGELES DEPT OF MECHANICAL AEROSPACE AND NUCLEAR ENGINEER ING

(U) Control Augmented Structural Optimization of Aeroelasticity Tailored Fiber Composite Wings.

DESCRIPTIVE NOTE: Final rept. 11 Nov 86-30 Sep 90,

AUG 91 71P

PERSONAL AUTHORS: Friedmann, Peretz P.; Schmit, Lucien A., Jr

CONTRACT NO. F49620-87-K-0003

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0786, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of control augmented structural optimization of aeroelastically tailored fiber composite wings was addressed in a series of comprehensive studies. This research culminated in the first truly integrated, practical computer program capable of treating this multidisciplinary synthesis problem by simultaneously changing structural, aerodynamic and control type design variables for practical aircraft configurations. The effectiveness and efficiency of this integrated aeroscervoelastic optimization capability was displayed by applying it to an RPV type vehicle as well as the more complex F-16 and X-29 type airplane models. In addition, within the framework of this research a digital adaptive controller capable of suppressing flutter in composite wings under time varying flight conditions in subsonic and transonic flow was developed. This efficient analysis can be used as the basis for structural optimization studies of actively controlled composite wings in transonic flow.

DESCRIPTORS: (U) , ADAPTIVE CONTROL SYSTEMS, AEROELASTICITY, AIRCRAFT, AUGMENTATION, COMPOSITE WINGS, COMPUTER PROGRAMS, CONFIGURATIONS, CONTROL, CONTROL SYSTEMS, DIGITAL SYSTEMS, EFFICIENCY, FIBER REINFORCED

AD-A241 464 CONTINUED

COMPOSITES, FLIGHT, FLUTTER, OPTIMIZATION, STRUCTURAL PROPERTIES, SUBSONIC FLOW, SYNTHESIS, TIME, TRANSONIC FLOW, VARIABLES, VEHICLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1, *Composite wings, *Aeroelasticity, *Aeroservoelasticity, Computerized simulation, Aerodynamics, Structural analysis, F-16 Aircraft, *Fiber reinforced composites, X-29 Aircraft, Aircraft models, Subsonic flow, Transonic flow, *Flutter simulators, Gust loads, Aerodynamic drag, *Adaptive control systems.

AD-A241 463 9/3

ARMY BALLISTIC RESEARCH LAB ABERDEEN PROVING GROUND MD

(U) Fundamental Studies of Laser Ignition and Kinetics in Reactive Gases.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 89-30 Sep 90,

JUN 91 7P

PERSONAL AUTHORS: Miziolek, A. W.; Forch, B. E.

CONTRACT NO. MIPR-90-0025

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XF
TR-91-0790, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser ignition experiments involving the hydrogen atom 2-photon resonance at 243, nm have been conducted and show an interesting isotope wavelength dependence. Figure shows the ILE dependence for the ignition of H2/O2 (curve a) and D2/O2 (curve b) using a tunable laser near 243 nm. The plots clearly show a wavelength shift which corresponds to 22 cm-1 at the two-photon level. This is exactly the energy difference in the n=2 excited state for the two different isotopes. Previously, we observed a similar wavelength dependence for the formation of microplasmas in flows of pure H2 and D2 gases. Figure 2 shows the ignition ILE dependence on equivalence ratio for H2/O2 and D2/O2 with the laser set at the corresponding minimum wavelength points which are the wavelengths for maximum two-photon excitation. As can be seen, the two curves are basically alike as would be expected for these two fuel gases whose flame chemistry is quite similar.

DESCRIPTORS: (U) , CHEMISTRY, EXCITATION, FLAMES, FREQUENCY, FUELS, GASES, IGNITION, ISOTOPES, LASERS, PHOTONS, RATIOS, REACTIVE GASES, SHIFTING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308BS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 462 23/2 5/8

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Conference on Visual Information Assimilation in Man and Machine.

DESCRIPTIVE NOTE: Final rept. 1 Jun-30 Nov 90,

NOV 90 7P

PERSONAL AUTHORS: Jain, Ramesh

CONTRACT NO. AFOSR-90-0280

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-91-0791, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In June 27-29, the Artificial Intelligence Laboratory of the University of Michigan, in cooperation with the Cognitive Science and Machine Intelligence Laboratory, organized a conference on visual information assimilation. The primary funding agency for the conference was the Air Force Office of Scientific Research. The conference was successful in bringing together a diverse group of participants. About 100 people attended the conference, with cross-disciplinary attendees from both within the University of Michigan and outside.

DESCRIPTORS: (U) , ARTIFICIAL INTELLIGENCE, ASSIMILATION, COGNITION, LABORATORIES, MICHIGAN, VISION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7, *Man machine systems, *Visual inspection, *Computer vision, *Cognition.

AD-A241 462

AD-A241 461 9/1

LEHIGH UNIV BETHLEHEM PA

(U) Large Signal Characterization and Modeling of Heterojunction Bipolar Transistors.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 90-31 May 91,

JUN 91 27P

PERSONAL AUTHORS: Whitefield, D. S.; Wei, C. J.; Hwang, J. C.

PROJECT NO. 2305, 2306

TASK NO. R1, B1

MONITOR: AFOSR, XF
TR-91-0759, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Heterojunction bipolar transistors have been characterized up to 40GHz. In addition to direct current-voltage and high frequency small signal measurements, power and harmonic characterization has been performed. The measurement results were fitted to a ten-element equivalent circuit model in which only three elements were allowed to vary with bias. This bias dependent model is accurate to within 2% over the entire bias range and is the first step toward a true large-signal model. The power and harmonic characteristics of the heterojunction bipolar transistor can also be accurately modeled with increasing number of both bias-dependent and fixed elements. Pulsed DC and thermal measurements have also been accomplished to determine the junction temperature and understand its effects on device characteristics. (Author)

DESCRIPTORS: (U) , BIAS, BIPOLAR TRANSISTORS, DIRECT CURRENT, ELECTRIC CURRENT, HARMONICS, HETEROJUNCTIONS, JUNCTIONS, MEASUREMENT, PULSES, SIGNALS, TEMPERATURE, THERMAL PROPERTIES, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305R1, WUAFOSR2306B1, *Bipolar transistors, *Heterojunction transistors, Large signals, Bias, Reprints.

AD-A241 461

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 460 4/1

COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

(U) Numerical Modeling of Middle and High Level Clouds with the Colorado State University Regional Atmospheric Modeling System-RAMS.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 89-1 Jun 91,

AUG 91 152P

PERSONAL AUTHORS: Cotton, William R.; Flatau, Piotr J.; Stephens, Graeme L.

CONTRACT NO. AFOSR-88-0143

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0793, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research supported on this grant has focused on cirrus clouds. The includes the analysis of data collected during tne FIRE cirrus experiment, refinement of the microphysics of RAMS for cirrus cloud simulations, development of cirrus radiation theory and parameterizations, and performing mesoscale simulations of cirrus clouds. The simulations demonstrated that RAMS has the ability to simulate many observed features of cirrus clouds including multiple layering, cirrus generation zones, and the growth and dissipation of cirrus for specific cases. The results suggest that RAMS may be suitable for numerical forecasting of cirrus clouds.

DESCRIPTORS: (U) , CIRRUS CLOUDS, CLOUDS, FIRES, FORECASTING, LAYERS, MATHEMATICAL MODELS, PHYSICS, RADIATION, SIMULATION, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1, Cirrus clouds; Numerical weather prediction; Electromagnetic scattering; Non-spherical particles, Stable layer turbulence, FIRE Project.

AD-A241 460

AD-A241 423 19/1.1

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) The Influence of Carbon Dioxide and Oxygen as Additives on Soot Formation in Diffusion Flames,

90 6P

PERSONAL AUTHORS: Du, D. X.; Axelbaum, R. L.; Law, C. K.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0772, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion/The Combustion Institute (23rd), p1501-1507, 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) A study of carbon dioxide and oxygen addition on soot formation has been performed such that the effects of dilution, temperature and direct chemical participation have been isolated for the additives on both the fuel and oxidizer sides. By measuring soot inception limits in the counterflow flame and integrated soot volume fractions in the coflow flame, the influence of the additives on soot inception, growth and burnout has also been ascertained. Results demonstrate that carbon dioxide, whether added to the fuel or oxidizer side, can suppress soot formation chemically. The effect of oxygen addition is more complex. When added to the fuel side of an ethylene flame, the addition leads to an abrupt increase in the inception limit, indicating that the inception chemistry has been accelerated. The addition to propane, however, is initially suppressive and results in a significant reduction in the soot inception limit which is more than can be accounted for by dilution. The addition becomes promoting as the oxygen mole fraction approaches 40%. Finally, the effect of oxygen concentration on the oxidizer side, for both ethylene and propane flames, is almost totally thermal.

AD-A241 423

AD-A241 423 CONTINUED

DESCRIPTORS: (U) , ADDITION, ADDITIVES, BURNOUT, CARBON DIOXIDE, CHEMISTRY, CONCENTRATION(CHEMISTRY), DIFFUSION, ETHYLENE, FLAMES, FLOW, FUELS, INTEGRATED SYSTEMS, MEASUREMENT, OXIDIZERS, OXYGEN, PROPANE, SIDES, SOOT, SUPPRESSION, VOLUME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, *Soot formation, Diffusion flames, Carbon dioxide addition, Oxygen addition, Reprints.

AD-A241 422 21/2

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) An Experimental and Theoretical Investigation of the Dilution, Pressure and Flow-Field Effects on the Extinction Condition of Methane-Air-Nitrogen Diffusion Flames,

90 8P

PERSONAL AUTHORS: Chelliah, H. K.; Law, C. K.; Ueda, T.; Smooke, M. D.; Williams, F. A.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0774, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion/The Combustion Institute (23rd), p503-511 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Laminar opposed flow diffusion flames, established in the forward stagnation region of a porous cylinder or between two opposed jets from circular tubes, have been used extensively to study diffusion-flame structure and extinction, in order to quantify the effect of flame stretch on the interaction of transport and chemical processes. The results provide valuable physical insight and quantitive data for application of laminar flamelet concepts in modeling turbulent diffusion flames. At fixed nozzle separation distance, increasing the opposed-jet exit velocities increases the axial velocity gradient (strain rate) and the fuel and oxidizer concentration gradients in the mixing layer, thereby decreasing the local diffusion time in the vicinity of the flame. The second Damkohler number, defined as the ratio of the diffusion time to chemical reaction time, also decreases, subjecting the flame increasingly to nonequilibrium effects and eventually resulting in stretch-induced extinction. The critical strain rates beyond which the flame cannot be stabilized have been

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 422 CONTINUED

studied experimentally and theoretically.

DESCRIPTORS: (U) , BOUNDARIES, BURNERS, EXTINCTION, FLOW, FLOW FIELDS, FUELS, GRADIENTS, HIGH PRESSURE, LIMITATIONS, OXIDIZERS, PLUGS, POTENTIAL FLOW, SIDES, STRAIN RATE, THEORY, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, Methane air diffusion, Flames, Extinction, Pressure effects, Dilution effects, Flow field effects, Reprints.

AD-A241 419 14/2 21/2

YALE UNIV NEW HAVEN CT CENTER FOR LASER DIAGNOSTICS

(U) Instantaneous Three-Dimensional Concentration Measurements in Turbulent Jets and Flames.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Jan 91,

FEB 88 4P

PERSONAL AUTHORS: Yip, Brando; Schmitt, Randal L.; Long, Marshall B.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0805, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v13 n2 p96-98, Feb 88. Available to DTIC users only. No copies furnished by NTIS.

Reprint: Instantaneous Three-Dimensional Concentration Measurements in Turbulent Jets and Flames.

DESCRIPTORS: (U) *LASER APPLICATIONS, *FLAMES, JET FLOW, TURBULENT FLOW, LIGHT SCATTERING, RAYLEIGH SCATTERING, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3, Laser diagnostics.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 412 12/2

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Multivariate Analysis and Its Applications.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 Jan 91,

JAN 91 3P

PERSONAL AUTHORS: Rao, C. R.

CONTRACT NO. AFOSR-89-02079

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-91-0792, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main lines of research undertaken during the period are: Probability Theory: Major advances were made in obtaining Edgeworth expansions in a variety of situations, e.g., involving discrete variables, and errors in variables models. New limit theorems were established and their applications were discussed. Several contributions have been made to characterization theory. Linear Models and Time Series: New methods of forecasting were developed using dynamic linear models and multiple bilinear time series models. Multivariate Analysis: Topics of research in this area included inference on interclass and intraclass correlations and principal component analysis. M-estimation: A unified theory of robust inference (estimation and tests of hypotheses) was developed using a convex discrepancy function for minimization.

DESCRIPTORS: (U) , DYNAMICS, FORECASTING, HYPOTHESES, LIMITATIONS, LINEARITY, MATHEMATICAL MODELS, MODELS, MULTIVARIATE ANALYSIS, PROBABILITY, THEOREMS, THEORY, TIME SERIES ANALYSIS, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *Probability theory, Linear models and time series, Multivariate analysis, M-Estimation.

AD-A241 412

AD-A241 371 21/2

YALE UNIV NEW HAVEN CT

(U) Two-Wavelength Single Laser CH and CH4 Imaging in a Lifted turbulent Diffusion Flame,

SEP 88 5P

PERSONAL AUTHORS: Namazian, M.; Schmitt, R. L.; Long, M. B.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-91-0807, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Applied Optics, v27 n17 p3597-3600, 1 Sep 88. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A new technique has been developed which allows simultaneous 2-D mapping of CH and CH4 in a turbulent methane flame. A flashlamp-pumped dye laser using two back mirrors produces output at 431.5 and 444 nm simultaneously. The 431.5-nm line is used to excite the (0,0) band system of CH, and the fluorescence of the (0,1) transition is observed at 489 nm. Coincidentally, the spontaneous Raman scattering from CH4 also occurs near 489 nm for a 431.5-nm excitation. To separate the CH4 that is spectrally separated from the CH fluorescence. Subtraction of the signals generated by the 431.5- and 444-nm wavelength beams yields separate measurements of CH4 and CH. Raman-scattered light records the instantaneous distribution of the fuel, and simultaneously the CH fluorescence indicates the location of the flame zone. The resulting composite images provide important insight on the interrelationship between fuel-air mixing and subsequent combustion.

DESCRIPTORS: (U) , COMBUSTION, COMPOSITE IMAGES, DIFFUSION, DISTRIBUTION, DYE LASERS, FLAMES, FLASH LAMPS, FLUORESCENCE, FREQUENCY, FUEL AIR RATIO, FUELS, LASERS, LIGHT SCATTERING, METHANE, MIRRORS, PUMPING(ELECTRONICS),

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 371 CONTINUED

RAMAN SPECTRA, TURBULENCE.

IDENTIFIERS: (U) WUAFOSR2308A3, PE61102F, *Raman scattering, Fluorescence, *Turbulent flames, Laser diagnostics.

AD-A241 370 21/2

SIBLEY SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING ITHACA NY

(U) Computations of Turbulent Combustion: Process and Challenges,

90 23P

PERSONAL AUTHORS: Hope, S. B.

CONTRACT NO. AFOSR-88-0052

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0781, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on Combustion (23th), p591-612 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We review the significant progress that has been made in the development and use of turbulent combustion models applicable to practical combustion devices. Recent work has focused on the development of methods that can treat finite-rate kinetics in a realistic yet tractable way, so that local extinction and related phenomena can be studied. Direct numerical simulation cannot be used for this purpose, because it is computationally intractable; and the potential of large-eddy simulation is far from clear because combustion reactions give rise to a severe closure problem. PDF methods, on the other hand, overcome the major closure problems, and they have been shown to be tractable for complex flows and with realistic finite-rate kinetics. A simple explanation of pdf methods is presented. It is shown that the single modelled equation for the joint pdf of velocity, dissipation and composition provides a closure for turbulent combustion. Reaction and convection are treated exactly, while the modelling is performed in a Lagrangian setting, by constructing deterministic or stochastic models for the evolution of fluid-particle properties. Examples of recent pdf calculations are described, including those based on four-step mechanisms

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for methane. Extension of pdf methods to include composition gradients is discussed, with a view to improving the modelling of molecular diffusion.

DESCRIPTORS: (U) , CLOSURES, COMBUSTION, COMPUTATIONS, CONVECTION, EQUATIONS, EXTINCTION, FLOW, LAGRANGIAN FUNCTIONS, MATHEMATICAL MODELS, METHANE, MODELS, NUMERICAL ANALYSIS, SETTING(ADJUSTING), STOCHASTIC PROCESSES, TRACTABLE, TURBULENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A241 369 17/5 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) A Planar Mie Scattering Technique for Visualizing Supersonic Mixing Flows,

91 12P

PERSONAL AUTHORS: Clemens, N. T.; Mungal, M. G.

CONTRACT NO. AFOSR-90-0151

PROJECT NO. 3484

TASK NO. A1

MONITOR: AFOSR, XF
TR-91-0780, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in *Experiments in Fluids*, v11 p175-185 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: A Planar Mie Scattering Technique for Visualizing Supersonic Mixing Flows.

DESCRIPTORS: (U) *FLOW VISUALIZATION, *MIE SCATTERING, JET MIXING FLOW, SUPERSONIC FLOW, CONDENSATION, REPRINTS.

IDENTIFIERS: (U) WUAFOSR3484A1, PE61103D, Droplets.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 368 7/4

KANSAS STATE UNIV MANHATTAN DEPT OF CHEMISTRY

(U) Identification of the SiCl2 (a (3)B1-X (1)A1) Emission System and a Flow Reactor Source of SiCl2(a (3)B1).

JUN 91 8P

PERSONAL AUTHORS: Du, Kangyan; Chen, Xiaoshan; Setser, D. W.

REPORT NO. 5-30173

CONTRACT NO. AFOSR-88-0279

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-91-0783, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v181 n4 p344-350, 28 Jun 91. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Identification of the SiCl2 (a (3)B1-X (1)A1) Emission System and a Flow Reactor Source of SiCl2(a (3) B1).

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, *CHEMICAL REACTIONS, ARGON, PHOSPHORUS, SILICON, CHLORINE, QUENCHING, ATOMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, Argon potassium, Reaction rator, Triplet state, Radiative lifetimes.

AD-A241 205 9/1

UNIVERSITY COLL OF WALES ABERYSTWYTH DEPT OF PHYSICS

(U) Total Electron Content and Scintillation in the Vicinity of the Main Ionospheric through Over Northern Europe.

DESCRIPTIVE NOTE: Final rept., 1 Jul 90-30 Jun 91,

JUN 91 28P

PERSONAL AUTHORS: Kersley, L.; Walker, I. K.

CONTRACT NO. AFOSR-87-0378

MONITOR: AFOSR, XF
TR-91-08, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) A receiving system for NNSS satellites located at Lerwick (60.1N, 1.2W) has been used to make differential carrier phase measurements in the vicinity of the main ionospheric trough. The observations have been calibrated to obtain absolute total electron content using measurements from a co-located GPS receiver for two months near solar maximum. Mapping techniques, developed to study the changes in night-time total electron content as a function of both latitude and time, are described. Examples are given of characteristic trough behaviour for different levels of geomagnetic activity. A new feature of the work is the limited extent of the poleward wall of the trough for moderate geomagnetic conditions. The mapping techniques can also be applied to measurements of radio-wave scintillation allowing comparison between small-scale irregularity behaviour and the larger-scale changes in total electron content.

DESCRIPTORS: (U) , BEHAVIOR, ELECTRONS, GEOMAGNETISM, IONOSPHERE, LATITUDE, MAPPING, MEASUREMENT, NORTHERN EUROPE, RADIO WAVES, SCINTILLATION, TROUGHS, WALLS.

IDENTIFIERS: (U) *Electron content, Ionospheric trough, Ionospheric irregularities, Scintillation boundary.