

AD-A260 008

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## REPORT DOCUMENT



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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 Materiel Command, DCS/Science 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.

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**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-A253946 REPORT DATE: 31 MAY 92 ANNUAL REPORT

Scanning Tunneling Microscopy Studies of Low-Dimensional Materials: Probing the Effects of Chemical Substitution at the Atomic Level.  
AD-A252829 REPORT DATE: 91 FINAL REPORT

A Search for Low-Luminosity Objects.  
AD-A253301 REPORT DATE: 31 OCT 91 FINAL REPORT

Self-Consistent Modeling of the Ionosphere-Thermosphere-Magnetosphere System.  
AD-A253232 REPORT DATE: 31 MAY 92 FINAL REPORT

Semiclassical Demonstration of Mode Specificity in the Tunneling Splitting in a Model of the Malonaldehyde Molecule.  
AD-A253178 REPORT DATE: 05 JUN 92 ANNUAL REPORT

Semiempirical Calculation of the Hyperpolarizabilities of Polyenes.  
AD-A253439 REPORT DATE: 90 FINAL REPORT

SETAC/AFOSR New Investigator Program.  
AD-A253252 REPORT DATE: JUN 91 ANNUAL REPORT

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Shock Enhancement and Control of Hypersonic Combustion.  
AD-A254295 REPORT DATE: 18 JUN 92 ANNUAL REPORT

Silamidide Salts: Synthesis, Structure, and Reactions.  
AD-A253795 REPORT DATE: 91 FINAL REPORT

Simulation in the Ultrasonic Submersion Test for Layered Anisotropic Plates.  
AD-A253899 REPORT DATE: 30 NOV 91 FINAL REPORT

Singular Perturbation Methods for Nonlinear Dynamical Systems and Waves.  
AD-A254116 REPORT DATE: JUL 92 FINAL REPORT

Soft X-Ray Projection Lithography Topical Meeting Held in Monterey, California on April 6 - 8, 1992. Technical Digest, Volume 8.  
AD-A254756 REPORT DATE: 06 APR 92

Solid State Sciences Committee Forum.  
AD-A253556 REPORT DATE: MAY 92 FINAL REPORT

Solution and Solid-State Oxidation Chemistry of Tetrakis (2,4,6-Trisopropylphenyl)Disilene.  
AD-A254875 REPORT DATE: 92 ANNUAL REPORT

Somatosensory Responsiveness in Behaving Monkeys and Human Subjects.  
AD-A254784 REPORT DATE: 31 JUL 92 ANNUAL REPORT

Some Recent Developments in Polysilane Chemistry.  
AD-A254881 REPORT DATE: 92

Sources of Anisotropy in Amorphous Magnetic Thin Film.  
AD-A252296 REPORT DATE: APR 92 FINAL REPORT

Spatial Light Modulators with Arbitrary Quantum Well Profiles.  
AD-A253637 REPORT DATE: 03 FEB 92 ANNUAL REPORT

State-Resolved Collisional Energy Transfer in Highly Vibrationally Excited Polyatomic Molecules.  
AD-A253299 REPORT DATE: 11 JUN 92 FINAL REPORT

State-Resolved Reaction Dynamics.  
AD-A254291 REPORT DATE: 27 JUL 92 FINAL REPORT

Stochastic Control and Nonlinear Estimation.  
AD-A253543 REPORT DATE: 07 JUL 92 FINAL REPORT

Structural and Dynamical Properties of the Sol-Gel Transition.  
AD-A253062 REPORT DATE: 90 FINAL REPORT

Structures and Adsorption Energetics for Chemisorbed Fluorine Atoms on Si(100)-2 x 1.  
AD-A253426 REPORT DATE: 92 FINAL REPORT

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Structures of Two Hydrated Cage Diketones.  
AD-A253424 REPORT DATE: 90 FINAL REPORT

Structures of Two Novel Heptacyclic Compounds: A Cage Ketone and a Cage Enone.  
AD-A253780 REPORT DATE: 90 FINAL REPORT

Structures of Two Tricyclo(5.2.1.0(2,6))decane Derivatives.  
AD-A253478 REPORT DATE: 90 FINAL REPORT

Studies of Collisional and Nonlinear Radiative Processes for Development of Coherent UV and XUV Sources.  
AD-A253402 REPORT DATE: 04 JUN 91 FINAL REPORT

Study of a Viscous Sublayer Model in the Analysis of 3-D Shock/Boundary Layer Interaction Flow Fields.  
AD-A253731 REPORT DATE: 20 JUN 92 FINAL REPORT

A Study of the Effect of hydrocarbon Structure on the Induction of Male Rat Nephropathy and Metabolite Structure.  
AD-A252192 REPORT DATE: 31 MAY 92 ANNUAL REPORT

Subpicosecond Interconversion of Buckled and Symmetric Dimers on Si(100).  
AD-A253427 REPORT DATE: 90 FINAL REPORT

Super Auditory Localization for Improved Human-Machine Interfaces.  
AD-A254438 REPORT DATE: JUN 92 ANNUAL REPORT

Super Auditory Localization for Improved Human-Machine Interfaces.  
AD-A254699 REPORT DATE: 07 JAN 92 ANNUAL REPORT

Surface Dynamics of Order Cu3Au(001) Studied by Elastic and Inelastic Helium Atom Scattering.  
AD-A253053 REPORT DATE: 92 FINAL REPORT

Surface Production of Ions.  
AD-A253434 REPORT DATE: 26 MAY 92 FINAL REPORT

Synaptic Plasticity and Memory Formation.  
AD-A253904 REPORT DATE: 14 MAY 92 FINAL REPORT

Synthesis and Photolysis of a 1,2-Disilathietane.  
AD-A253193 REPORT DATE: 91 ANNUAL REPORT

Synthesis and Reactions of Fluoroalkyl Polynitrogen Compounds.  
AD-A253422 REPORT DATE: 92 FINAL REPORT

Synthesis and Reactivity of Siloxide and Silamide Complexes Pertaining to Bond Breaking and Aggregation Phenomena.  
AD-A254703 REPORT DATE: JUL 92 FINAL REPORT

Synthesis of a 2-Oxabrendane Derivative via Reaction of endo-5-Acetyl-7,7-dimethoxynorborn-2-ene With N-Bromosuccinimide.  
AD-A253212 REPORT DATE: 91 ANNUAL REPORT

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US Air Force 1989 Research Initiation Program. Volume 4.  
AD-A254458 REPORT DATE: 25 JUN 92 ANNUAL REPORT

USAF 1990 Research Initiation Program. Volume 1.  
AD-A254856 REPORT DATE: 25 JUN 92 ANNUAL REPORT

USAF 1990 Research Initiation Program. Volume 2.  
AD-A254854 REPORT DATE: 25 JUN 92 ANNUAL REPORT

USAF 1990 Research Initiation Program. Volume 3.  
AD-A254715 REPORT DATE: 25 JUN 92 ANNUAL REPORT

USAF 1990 Research Initiation Program. Volume 4.  
AD-A254855 REPORT DATE: 25 JUN 92 ANNUAL REPORT

USU Center of Excellence in Theory and Analysis of the Geo-Plasma Environment.  
AD-A252186 REPORT DATE: 25 MAY 92 ANNUAL REPORT

UV/XUV FEL Storage Ring and LINC.  
AD-A253307 REPORT DATE: 31 DEC 91 FINAL REPORT

Variable Temperature Scanning Tunneling Microscopy Studies of the Charge Density Wave Phases in Tantalum Disulfide.  
AD-A253075 REPORT DATE: APR 91 FINAL REPORT

Visual Motion Perception and Visual Information Processing.  
AD-A254815 REPORT DATE: 01 FEB 91 ANNUAL REPORT

Visual Perception of Structure from Motion.  
AD-A253235 REPORT DATE: 30 APR 92 FINAL REPORT

VLSI Design, Parallel Computation and Distributed Computing.  
AD-A252349 REPORT DATE: 30 SEP 91 FINAL REPORT

Vortices in Long Josephson Junctions.  
AD-A253230 REPORT DATE: 16 JUN 92 FINAL REPORT

Weak Pinning and Hexatic Order in a Doped Two-Dimensional Charge-Density-Wave System.  
AD-A253077 REPORT DATE: 17 JUN 91 FINAL REPORT

Wild Mammalian Biomonitoring for Assessing Impacts of Environmental Contamination on Population and Community Ecology.  
AD-A252991 REPORT DATE: 31 MAY 92 ANNUAL REPORT

The 157 nm Photodissociation of OCS.  
AD-A252988 REPORT DATE: 15 MAY 89 ANNUAL REPORT

A 32-Membered Fluorinated Multifunctional Heterocycle.  
AD-A253175 REPORT DATE: 91 ANNUAL REPORT

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## **ABSTRACTS**

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CALIFORNIA UNIV SAN DIEGO LA JOLLA COMPUTER SYSTEMS LAB

(U) Automatic Cloud Classification from Multi-Spectral Satellite Data. IDENTIFIERS: (U) PEG1102F, WUAFOSR2310A1.

DESCRIPTIVE NOTE: Final rept. 1 May 80-30 Sep 81.

SEP 81 170P

PERSONAL AUTHORS: Gautier, Catherine; Lavallee, D.; Peterson, P.; Schweizer, D.

CONTRACT NO. AFOSR-80-0208

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XC  
TR-82-0727, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project was aimed at developing an operational 'expert' system to perform the classification of satellite images into cloud types. The approach we have used is based on a number of assumptions. The first one is that such a classification is possible with satellite images of 1 km (or more) resolution. A second assumption, which lays the foundations for all classifications, is that there exists a parameter space wherein some clustering of the data occurs, so the task is to identify this parameter space from the data. An additional assumption necessary for the classification the results, but not necessary for the classification itself, is that the clusters found in this parameter space can be related to cloud types or physical features. We chose a Bayesian classifier for our classification. We believe that this type of classifier is best suited for the task because clouds are fuzzy objects which have overlapping characteristics. Also, with a Bayesian classifier, each point in the parameter space has a probability to belong to each class, although this probability may be anywhere between zero and one.

DESCRIPTORS: (U) \*ARTIFICIAL SATELLITES, \*EXPERT SYSTEMS, APPROACH, CLASSIFICATION, CLOUDS, CLUSTERING, IMAGES, NUMBERS, PARAMETERS, PROBABILITY, RESOLUTION.

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AD-A255 081 5/8 20/1

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

CONNECTICUT UNIV STORRS DEPT OF COMMUNICATION SCIENCES

(U) AFOSR Technical Report Summaries, for April-June 1991.

(U) Auditory Perception.

DESCRIPTIVE NOTE: Quarterly rept. no. 2,

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 90,

JUN 91 912P

AUG 92 8P

PERSONAL AUTHORS: Tyrrell, Debra L.

PERSONAL AUTHORS: Cohen, Marion F.

MONITOR: AFOSR, XC  
TR-92-0844, AFOSR

CONTRACT NO. AFOSR-89-0008

PROJECT NO. 2313

UNCLASSIFIED REPORT

TASK NO. A8

ABSTRACT: (U) The AFOSR Technical Report Summaries are published quarterly of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center for that quarter.

MONITOR: AFOSR, XC  
TR-92-0850, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) \*TECHNICAL INFORMATION CENTERS, \*AIR FORCE RESEARCH, DIVISION, INFORMATION CENTERS.

ABSTRACT: (U) During the past year we have continued our experiments designed to study the role of cross-spectrum coherent frequency change on signal detection. We have studied the effects of frequency glides and frequency jitter on cross-spectrum fusion, specifically addressing the issues of maximum spectral distance and harmonic relationship between signal and masker, and have found that the improved detection which we reported last year cannot be solely attributed to either. We have spent considerable time developing two experimental paradigms to be used in our future studies of signal separation as it relates to separation of a direct sound from its echo. The results of initial experiments using these paradigms indicate that a signal following an identical waveform is considerably more difficult to detect than when it is leading that waveform. These results cannot be accounted for by traditional temporal masking. We have also continued our experiments using 'noise-problem people' as subjects in an effort to determine if their ability to perform these tasks is related to their difficulty listening in background noise.

DESCRIPTORS: (U) \*FREQUENCY, \*AUDITORY PERCEPTION, ADDRESSING, BACKGROUND, BACKGROUND NOISE, DETECTION, ECHOES, HARMONICS, MASKING, NOISE, SEPARATION, SIGNALS, SOUND, WAVEFORMS.

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IDENTIFIERS: (U) WUAFOSR2313A8, PE81102F, Signal  
detection.

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Evaluation of Absolute Saturation Coverages of Carbon  
Monoxide on Ordered Low-Index Platinum and Rhodium  
Electrodes,

92 18P

PERSONAL AUTHORS: Weaver, M. J.; Chang, S. C.; Leung, L.  
W.; Jiang, X.; Reubel, M.

CONTRACT NO. AFOSR-89-0368

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0827, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Electroanal. Chem., v327  
p247-260 1992. Available only to DTIC users. No copies  
furnished by NTIS.

ABSTRACT: (U) The limitations on evaluating surface  
concentrations, and hence fractional coverages for  
saturated irreversibly adsorbed CO adlayers on low-index  
platinum and rhodium electrodes by anodic voltammetry are  
discussed with particular reference to Pt(111). In  
agreement with Feliu et al., substantially higher  
estimates (about 0.9) are obtained by this means in  
aqueous sulfuric acid than in perchloric acid (0.6-0.7).  
Additional evidence from nonelectrochemical methods,  
however, indicates that the latter estimate approximates  
the true values. In particular, thin-layer IR  
spectrophotometry enables values to be extracted from the  
absorbance of the O-C-O stretch for the X02 product. As  
for surfaces in ultrahigh vacuum (UHV), the reliable  
determination of adsorbate coverage at solid  
electrochemical interfaces is of fundamental interest and  
importance. The recent emergence of reliable non-UHV  
means by which ordered monocrystalline surfaces of  
platinum and rhodium can be prepared and examined in  
ambient environments offers new opportunities for the  
quantitative characterization of the adlayer structure at  
structurally well-defined electrochemical interfaces

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MASSACHUSETTS INST OF TECH CAMBRIDGE

involving these catalytically important metals. quantitative evaluation of the adsorbate coverages clearly constitutes a significant step towards fulfilling this goal. Of the various adsorbates examined, CO is of particular importance for several reasons, including its ubiquitous presence and influence upon the electro-oxidation of organic fuels at transition metal-aqueous interfaces. From a fundamental structural viewpoint, CO is of central interest given the uniquely detailed characterization afforded to this adsorbate at metal-UHV interfaces.

DESCRIPTORS: (U) , ELECTRODES, CARBON MONOXIDE, PLATINUM, RHODIUM, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303A1, PEG1102F, Electrochemical interfaces, Platinum electrodes, Carbon monoxide electrodes.

(U) Interpretation of in Situ Testing of Cohesive Soils Using Rational Methods.

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

JUL 92 435P

PERSONAL AUTHORS: Whittle, Andrew J.; Aubeny, Charles P.; Ladd, Charles C.

CONTRACT NO. AFOSR-89-0060

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR, XC  
TR-92-0780, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research uses theoretical analyses to investigate the fundamental mechanisms controlling the performance of common in-situ penetration tests which are used to estimate the engineering properties of cohesive soils. The mechanics of penetration processes are modelled using the Strain Path Method together with generalized effective stress soil models. The analytical predictions provide a rational basis for establishing how soil properties are related to in-situ measurements. The predictions are evaluated by comparison with field data from well documented test sites. Results of this research show the following: (1) The cone resistance and excess pore pressures measured on the face of the cone during piezocone penetration are the most reliable measurements for estimating changes in undrained shear strength within a given clay deposit. (2) There is no rational basis for correlations between dilatometer contact pressures and in situ K sub 0 stresses, undrained shear strength or preconsolidation pressure. (3) Model predictions provide a reliable basis for estimating the horizontal coefficient of permeability for normally and lightly overconsolidated clays (OCR<4) using measurements of pore pressure dissipation on the shaft of the piezocone. (4) Installation disturbance affects significantly the interpretation of undrained shear strength in

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pressuremeter expansion tests. The analyses show that undrained shear strength can be estimated more reliably from measurements during the contraction phase of the pressuremeter test. In situ testing, Cohesive soils, Piezocene, Dilatometer, Pressuremeter, Strain Path Method, Soil models.

DESCRIPTORS: (U) \*COHESIVE SOILS, \*SOIL TESTS, \*SOIL MECHANICS, CLAY, COEFFICIENTS, COMPARISON, CORRELATION, DEPOSITS, DILATOMETERS, DISSIPATION, ESTIMATES, EXPANSION, INSTALLATION, MEASUREMENT, MODELS, PATHS, PENETRATION, PERMEABILITY, PORE PRESSURE, PREDICTIONS, PRESSURE, RESISTANCE, SHEAR STRENGTH, SOIL MODELS, SOILS, STRESSES, TEST AND EVALUATION, FIELD TESTS, STRAIN(MECHANICS), DEFORMATION, STRESS STRAIN RELATIONS, POISSON EQUATION.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2302C1, Overconsolidation, \*Penetration resistance(Soils), Site investigation, Undrained tests, Penetration tests, Geotechnical engineering.

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ENGINEERING FOUNDATION NEW YORK

(U) Air Force Engineering Research Initiation Grants (1990-1991).

DESCRIPTIVE NOTE: Final rept. 1 Aug 89-31 Aug 91.

JUL 92 130P

PERSONAL AUTHORS: Freiman, Charles V.

CONTRACT NO. ASOFR-89-0484

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR, AFOSR, XC  
TR-92-0764, NA-89-0484, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This work unit covers the Air Force Research Initiation Grant (AFERIG) Program for the Academic Year 1990-1991. It was announced in the Fall of 1990 for up to 25 AFERIGS carrying a stipend of \$20,000. The Engineering Foundation's five Founder Societies received a total of 282 proposals. Fifty-six of these were selected for referral to AFOSR. AFOSR selected 25 with 10 alternates. This report contains abstracts and papers for each of the 25 grants. Engineering research. Young investigators.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, ABSTRACTS, AIR FORCE, ENGINEERING, GRANTS, SOCIETIES, WORK.

IDENTIFIERS: (U) PEB1010F.

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## OPTICAL SOCIETY OF AMERICA WASHINGTON DC

- (U) Compact Blue-Green Lasers: Summaries of Papers Presented at the Topical Meeting Held in Santa Fe, New Mexico on 20-21 February 1992. Volume 8. Technical Digest Series.

DESCRIPTIVE NOTE: Quarterly rept. 18 Feb-21 Feb 92,

FEB 92

173P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. F49620-92-J-0284

PROJECT NO. 2301

TASK NO. AS

MONITOR: AFOSR, XC  
TR-92-0736, AFOSR

## UNCLASSIFIED REPORT

DESCRIPTORS: (U) \*DYE LASERS, \*SEMICONDUCTOR LASERS, \*VISIBLE SPECTRA, BLUE(COLOR), GREEN(COLOR), LASER PUMPING.

IDENTIFIERS: (U) PE81102F, WJAFOSR2301AS, Rare earth.

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## WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

- (U) Some Recent Developments in Polysilane Chemistry.

92

18P

PERSONAL AUTHORS: West, Robert; Menescal, Rogerio; Asuke, Tetsuya; Eveland, Jeffrey

CONTRACT NO. AFOSR-89-0004

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC  
TR-92-0817, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Inorganic and Organometallic Polymers, v2 n1 p29-45, 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) (1) Ordered and disordered polysilane copolymers: Condensation of C1SiMe2Si (n-Hex)2SiMe2C1 with Na/K in toluene at 80 deg C produced a polymer with a strongly bimodal molecular weight distribution. The high Mw and low-Mw portions were separated by fractional precipitation with 2-propanol, and the properties of the two fractions were investigated 29Si-NMR spectra show that the low-Mw fraction is fully ordered but the high-Mw fraction is randomized. (2) Liquid crystalline polysilanes: Condensation of n-Bu(n-Hex)SiC12 with Na in toluene led to a homopolymer which is a rubbery solid at 25 deg C. The polymer undergoes a second-order transition at -45 deg C and a first-order (melt) transition at -20 deg C. X-ray diffraction shows that the polymer has the same structure, a columnar hexagonal lattice, in all three phases: from -20 to > 200 deg C, it exists in a columnar liquid crystalline mesophase. Similar hexagonal mesophases were observed at 25 deg C for the family of copolymers, (n-Hex2Si)n(Alk2Si)m, Alk = n-Pentyl, n-Bu, n-Pr, Et, Me.

DESCRIPTORS: (U) \*CHEMISTRY, \*CONDENSATION, \*COPOLYMERS, \*POLYSILANES, AVAILABILITY, DIFFRACTION, DISTRIBUTION, LIQUIDS, MELTS, MOLECULAR WEIGHT, PHASE, POLYMERS.

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WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Novel Silicon Ring Compounds from Disilenes,  
92 18P

PERSONAL AUTHORS: West, Robert

CONTRACT NO. AFOSR-89-0004

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC  
TR-92-0818, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemistry of Inorganic Ring Systems, v14 p35-50, 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) L Reactions of disilenes, R2Si=SiR2, leading to new inorganic ring systems are described. These include reactions with (1) chalcogens and dinitrogen oxide, to give three-membered rings; (2) dioxygen; (3) nitrobenzene and nitrosobenzene; (4) organic azides and azo compounds; (5) white phosphorus, to give bicyclobutane products, and (6) bis(phosphine)-platinum, to give disilene-platinum complexes. The structures of several of these new ring compounds are described and questions of chemical bonding are considered.

DESCRIPTORS: (U) \*RINGS, \*SILICON COMPOUNDS, \*CHEMICAL BONDS, AVAILABILITY, AZIDES, BONDING, CHALCOGENS, CHEMICALS, CHEMISTRY, NITROBENZENES, OXIDES, PHOSPHINE, PHOSPHORUS, PLATINUM, REPRINTS, SILICON, STRUCTURES, WHITE PHOSPHORUS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, \*Disilenes, Dinitrogen oxide, Dioxygen, Nitrosobenzene, Azo Compounds, Bicyclobutane, Inorganic ring systems, Carbon containing rings.

PRECIPITATION, PROPANOLS, REPRINTS, SOLIDS, SPECTRA, STRUCTURES, TOLUENES, TRANSITIONS, WEIGHT, X RAY DIFFRACTION, X RAYS, LIQUID CRYSTALS, ORDER DISORDER TRANSFORMATIONS, CHLORINE, SILICON, METHYL RADICALS, SODIUM, POTASSIUM, BIREFRINGENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, Columnar hexagonal lattice, Mesophases, Homopolymers, Polysilenes.

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF EARTH  
ATMOSPHERIC AND PLANETARY SCIENCES

(U) GPS Measurements at Vandenberg AFB.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 91-14 Jan 92.

JAN 92 5P

PERSONAL AUTHORS: King, Robert W.

CONTRACT NO. AFOSR-90-0338

PROJECT NO. 2308

TASK NO. AS

MONITOR: AFOSR, XC  
TR-92-0822, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) The objective was to measure directly the tectonic deformation in the Santa Maria Fold and Thrust Belt (SMFTB), northwest of Santa Barbara California. The principal measurement technique was space geodesy; using microwave signals transmitted by Block II satellites of the Global Positioning System (GPS), from March to August 1990. Geodetic observations were analyzed to resolve tectonic deformation across the SMFTB. The geodetic network forms a braced quadrilateral with 40 km sides whose southwest corner is the Vandenberg very long baseline interferometry (VLBI) station. Three different types of data were combined to estimate two-dimensional station position and strain rate parameters simultaneously. Significant strain rates were discovered using a model which constrains the relative velocity field to be linear in space and constant in time. The maximum compressive strain is oriented N17e+/-5E, and the compressive strain rate in that direction is 0.13 + or - 0.03 strain/yr. Under the assumption that the unresolved rotational component of the velocity field is zero, the integrated rate of deformation across the basin was estimated at 7 + or - 1 mm/yr oriented at N3E+ or - 13. This vector can be decomposed into 8 + or - 2 mm/yr of crustal shortening on the general structural trend of N30E and 3+ or -1 mm/yr of right-lateral shear across the axis.

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DESCRIPTORS: (U) \*GEODESY, \*GLOBAL POSITIONING SYSTEM, \*TECTONICS, ARTIFICIAL SATELLITES, BELTS, CALIFORNIA, CONSTANTS, DEFORMATION, EARTHQUAKES, ESTIMATES, GLOBAL, INTERFEROMETRY, MEASUREMENT, MICROWAVES, MODELS, NETWORKS, OBSERVATION, RATES, SIGNALS, STATIONS, STRAIN RATE, THRUST, TIME, TWO DIMENSIONAL, VALUE, VELOCITY.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2308AS.

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WASHINGTON UNIV SEATTLE DEPT OF GEOPHYSICS

(U) Large-Scale Waves in the Upper-Mesosphere at Antarctic High-Latitudes.

92 5P

PERSONAL AUTHORS: Hernandez, G.; Smith, R. W.; Fraser, G.  
J.; Jones, W. C.

CONTRACT NO. AFOSR-89-0318

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XC  
TR-92-0820, AFOSR

UNCLASSIFIED REPORT

Availability: Pub in Geophysical Research Letters, v19  
n13 p1347-1350, 6 Jul 92. Available to DTIC users only.  
No copies furnished by NTIS.

ABSTRACT: (U) Upper-mesosphere combined optical  
measurements of wind and temperature fields at Amundsen-  
Scott Station (South Pole) and wind radar measurements at  
Scott Base (78 deg S, 167 deg E) show the presence of  
large-scale waves in this region of the atmosphere. At  
Amundsen-Scott the largest amplitude wave observed with  
sub-diurnal periodicity appears with a frequency near 2.4/  
day ( $\sim 10.1$  hour period), with a westward phase  
progression of wavenumber one. The presence of a wave  
with this periodicity is confirmed by the observations at  
Scott Base. The combination of the experimentally found  
period, phase progression, associated small-temperature  
oscillations, and theoretical considerations lead to the  
interpretation of this wave as a Lamb wave. The present  
combination of spatially-resolved optical measurements  
and radar measurements illustrates the value of multiple-  
station and multiple-technique observations in  
elucidating the upper-mesosphere dynamical state, as well  
as the properties of the waves propagating through the  
medium where the observations are being made. Atmosphere  
Waves, Passive Diagnostics, High-Resolution Spectra.

DESCRIPTORS: (U) \*ATMOSPHERIC PHYSICS, AMPLITUDE.

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T4J19F

ATMOSPHERES, FREQUENCY, HIGH RESOLUTION, MEASUREMENT,  
MESOSPHERE, OBSERVATION, OSCILLATION, PERIODIC VARIATIONS,  
PHASE, RADAR, REGIONS, RESOLUTION, SCALE, SPECTRA,  
STATIONS, TEMPERATURE, TILES, VALUE, WIND, OPTICAL  
PROPERTIES, ATMOSPHERIC TEMPERATURE, WAVE PROPAGATION.

IDENTIFIERS: (U) WUAFOSR2310A2, PEB1102F.

## UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A254 978 CONTINUED

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Models for Polysilane High Polymers. 1. Singlets  
Photophysics of Linear Permethylhexadecasilane (Si18  
Me34).

92 12P

PERSONAL AUTHORS: Sun, Ya-Ping; Hamada, Yoshitaka; Huang,  
Li-Ming; Marka, Jim; Hsiao, Jium-Shyong

CONTRACT NO. AFOSR-89-0004

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC  
TR-82-0818, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub in Jnl. American Chemical Society, v114  
n16 p6301-6310 1992. Available to DTIC users only. No  
copies furnished by NTIS.

ABSTRACT: (U) An investigation of the UV absorption and emission properties of n-Si18Me34 in room and low temperature solutions revealed a striking similarity to the photophysical behavior of high molecular weight peralkylated polysilanes. The absorption is that expected for a statistical collection of chromophoric segments. Room-temperature emission is that expected from the lowest excitation energy conformations of approximately 18-silicon chains, presumable all-trans. Their excited states are believed to be generated by energy transfer in the polymer and by adiabatic conformational transformations in the hexadecasilane. The latter process is suppressed in 3-methylpentane glass, where many spectrally distinct conformers are observed to behave independently. Three of them dominate and have been characterized spectrally. At concentrations of  $5 \times 10^{-6}$ M and higher, 3-methylpentane solutions of Si18Me34 formed dimeric or oligomeric species upon fast cooling and precipitated a microcrystalline solid upon slow cooling. These, too, have been spectrally characterized.

DESCRIPTORS: (U) \*ABSORPTION, \*POLYMERS, \*POLYSILANES,

AD-A254 978

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T4J19F

\*LINEAR SYSTEMS, BEHAVIOR, CHAINS, COLLECTION, COOLING,  
EMISSION, ENERGY, ENERGY TRANSFER, EXCITATION, GLASS,  
MOLECULAR WEIGHT, ROOM TEMPERATURE, SILICON, SOLIDS,  
TEMPERATURE, TRANSFER, TRANSFORMATIONS, WEIGHT, REPRINTS,  
ULTRAVIOLET DETECTION, CHROMOPHORES, ADIABATIC CONDITIONS,  
DIMERS, OLIGOMERS, SPECTRA.

IDENTIFIERS: (U) WUAF0SR230382, PE81102F, \*Singlet  
photophysics, \*permethylhexadecasilanes, Conformations, 3-  
Methylpentane, Microcrystalline solid.

## UNCLASSIFIED

## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A254 975 7/3 7/4 20/2

AD-A254 972 14/2

## WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

## ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Solution and Solid-State Oxidation Chemistry of  
Tetrakis (2,4,6-Trisopropylphenyl)Disilene,

(U) Radioactive Labeling Study of Bisulfate Adsorption on  
Copper Adatoms Deposited on the Gold Electrode in  
Neutral Media.

92

7P

PERSONAL AUTHORS: Millevolte, Anthony J.; Powell, Douglas  
R.; Johnson, Sigmund G.; West, Robert

DESCRIPTIVE NOTE: Final rept. Apr 89-Apr 90,

91 12P

CONTRACT NO. AFOSR-89-0004

PERSONAL AUTHORS: Zelenay, Piotr; Rice-Jackson, Lesa M.;  
Wieckowski, Andrzej

PROJECT NO. 2303

CONTRACT NO. AFOSR-89-0388

TASK NO. 82

PROJECT NO. 2303

MONITOR: AFOSR, XC

TASK NO. A1

MONITOR: AFOSR, XC

TR-92-0618, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub in Jnl. of Organometallics, v11 n3  
p1091-1095 1992. Available to DTIC users only. No copies  
furnished by NTIS.

ABSTRACT: (U) The air oxidation of several disilenes was  
one of the first reactions to be studied following the  
discovery of these compounds 10 years ago. This reaction  
has been particularly well studied for  
tetramesityldisilene (1a) and 1,2-di-tert-butyl-1,2-  
dimesityldisilene (1b). For these compounds, air  
oxidation in solution produces initially the 1,2-  
disiladioxetane 2a or 2b as the major product along with  
some of the 1,2-disilaoxirane 5a or 5b. In a slower  
reaction, the 1,2-disilaoxitanes rearrange to the 1,3-  
cyclodisiloxanes 3a or 3b; if excess oxygen is present  
the latter compounds are also formed by further oxidation  
of 5a,b. Oxygen of the solid disilenes 1a and 1b also  
lead to eventual formation of 3a or 3b.

DESCRIPTORS: (U) \*SILICON COMPOUNDS, \*OXIDATION, \*AIR,  
\*SOLUTIONS(MIXTURES), \*SOLID STATE CHEMISTRY, REPRINTS,  
ORGANOMETALLIC COMPOUNDS, BENZENE, CRYSTAL STRUCTURE, X  
RAY DIFFRACTION, PHENYL RADICALS, SYNTHESIS.

IDENTIFIERS: (U) \*Tetrakis(2-4-6-trisopropylphenyl)  
disilene, Isopropyl Groups, Disilaoxitanes, WUAFOSR2303B2,  
PE81102F.

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AD-A254 972

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T4J19F

Availability: Pub in Jnl. of Surface Science, v256 p253-  
263 1991. Available to DTIC users only. No copies  
furnished by NTIS.

Reprint: Radioactive Labeling Study of Bisulfate  
Adsorption on Copper Adatoms Deposited on the Gold  
Electrode in Neutral Media.

DESCRIPTORS: (U) \*LABELED SUBSTANCES, \*ELECTRODEPOSITION,  
COPPER, GOLD, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303A1, PE81102F, Radioactive  
Labeling.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

AD-A254 947 12/4

MARYLAND UNIV BALTIMORE

(U) Optimal Design and Control of Distributed Parameter Systems.

DESCRIPTIVE NOTE: Final rept. 1 Oct 80-3 Sep 91.

SEP 91 8P

PERSONAL AUTHORS: Seidman, Thomas I.

CONTRACT NO. AFOSR-91-0008

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XC  
TR-92-0823, AFOSR

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Research has been conducted on nonlinear optimization in the areas of (1) dual based methods and decomposition; (2) regularization and approximation techniques; (3) nonsmooth optimization and (4) algorithms developed for large-scale optimization. The methods developed are applicable to a wide range of important applications including: optimal shape design, structural optimization, and image reconstruction.

DESCRIPTORS: (U) \*OPTIMIZATION, \*PARAMETERS, ALGORITHMS, CONTROL, DECOMPOSITION, IMAGES, SCALE, SHAPE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, \*Distributed systems.

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AD-A254 943 6/15 6/13

ARMED FORCES INST OF PATHOLOGY WASHINGTON DC

(U) Augmented Oxygen-Dependent Killing of Leishmania.

DESCRIPTIVE NOTE: Final technical rept. Jul 90-Jul 92.

JUN 92 53P

PERSONAL AUTHORS: Muhvich, K. H.; Criswell, D. W.;  
Anderson, L. H.; Wilson, B.; Howard, R. T.

CONTRACT NO. AFOSR-90-0317

PROJECT NO. 2312

TASK NO. A8

MONITOR: AFOSR, XC  
TR-92-0713, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This study examined the role of oxygen in amphotericin B-induced killing of Leishmania braziliensis panamensis promastigotes and Candida albicans. In the first phase of the study, we explored the effects of high oxygen tensions on the lethal effects of three reduction-oxidation cycling drugs: amphotericin B, menadione, and phenazine methosulfate. Promastigotes were exposed to the above drugs under normoxic, hyperoxic (100% O<sub>2</sub> at 101.3 kPa), or hyperbaric hyperoxic (100% O<sub>2</sub> at 253.3 kPa) conditions. After 24 h incubation at 27 deg C, viable promastigotes stained with fluorescein diacetate and were counted using epifluorescence microscopy. Hyperbaric hyperoxia alone (P02 = 229 kPa) was as effective as AmB alone (0.2 uM); both killed 80% of the original inoculum. AmB killed more promastigotes in a hyperbaric hyperoxic environment than in normoxic (P02 = 21.1 kPa) or hyperoxic conditions (P02 = 91.7 kPa). High oxygen tensions did not alter the lethal effects of either menadione or phenazine methosulfate. In the second phase of the study, the effects of hypoxia on AmB killing in Leishmania and yeast cells were investigated. Leishmania promastigotes were exposed to AmB (0.1 and 1.0 uM) in media with dissolved P02s of 22 mmHg (hypoxia) and 150 mmHg (normoxia) for two h at 27 deg C. Following incubation, promastigotes were stained as above and viable organisms counted. Promustigote, hyperoxia,

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hyperbaric hyperoxia, amphotericin B, Leishmania.

CORNELL UNIV ITHACA NY DEPT OF THEORETICAL AND APPLIED MECHANICS

DESCRIPTORS: (U) \*AMPHOTERICIN, \*LEISHMANIA, \*OXYGEN, CANDIDA, CELLS, DRUGS, ENVIRONMENTS, HYPEROXIA, HYPOXIA, INCUBATION, MEDIA, MICROSCOPY, OXIDATION, PHASE, REDUCTION, TENSION, YEASTS, IN VITRO ANALYSIS, MACROPHAGES, ENVIRONMENTAL TESTS, STRESS(PHYSIOLOGY), LETHALITY.

(U) Experiments, Theory, and Simulation on the Evolution of Fabric in Granular Materials.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Dec 91,

JUL 92 119P

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A6, Promastigote, Normoxic drugs, Leishmania Braziliensis panamensis.

PERSONAL AUTHORS: Jenkins, J. T.; Cundall, P. A.; Ishibashi, I.

CONTRACT NO. F49620-88-C-0080

PROJECT NO. 2302

MONITOR: AFOSR, XF  
TR-92-0811, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this research, we have attempted to characterize the anisotropy in particle arrangement and particle interactions that develop when a granular material is deformed and to determine the influence of this anisotropy on the subsequent behavior of the material. The research has dealt with the behavior of an idealized granular material consisting of loss spheres and has involved the close interaction between physical experiments, numerical simulations, and the development of theory. We have focused on: (1) Understanding the relationship between the developing anisotropy of the material and the changes in volume observed in deformations in which the mean stress is held constant. In particular, we have considered the volume change of a hollow cylindrical sample in triaxial compression and extension; (2) Using elastic waves to probe the evolution of the internal structure of the granular material as it is being deformed; and (3) Developing constitutive relations for general stress paths in the triaxial/torsional device through the combined efforts of theoretical modeling and numerical simulation.

DESCRIPTORS: (U) \*DEFORMATION, \*FABRICS, \*PLASTIC PROPERTIES, ANISOTROPY, BEHAVIOR, BOUNDARIES, COMPRESSION, CONSTANTS, ELASTIC WAVES, INTERACTIONS, MATERIALS, PARTICLES, POLYCRYSTALLINE, PROBES, SIMULATION, SPHERES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A254 800 12/5 12/1

STRUCTURES, VOLUME, WAVE PROPAGATION.

FLORIDA AGRICULTURAL AND MECHANICAL UNIV TALLAHASSEE  
DEPT OF PHYSICS

IDENTIFIERS: (U) Granular material, Fabric, Volume  
change, Boundary effects, Wave propagation, Anisotropic  
elasticity, Numerical simulation triaxial compression,  
Polycrystal line plasticity, PE61102F.

(U) Lowdin Alpha-function, Overlap Integral, and Computer  
Algebra,

92 7P

PERSONAL AUTHORS: Jones, Herbert W.

CONTRACT NO. F49620-82-J-0063, F49620-89-C-0007

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XF  
TR-92-0622, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in International Jnl. of Quantum  
Chemistry, v41 p749-754, 1992. Available to DTIC users  
only. No copies furnished by NTIS.

ABSTRACT: (U) A commercial computer algebra program,  
Mathematica, is used to generate the C matrix that  
characterizes our implementation of the Lowdin-function  
method as applied to Slater-type orbitals. An example of  
a two-center overlap integral is done to show how the  
arbitrary precision capability of Mathematica can  
overcome severe cancellation errors encountered with  
programming in FORTRAN. This strategy is capable of being  
generalized to other multicenter molecular integrals.  
Mathematica programs are included.

DESCRIPTORS: (U) \*ALGEBRA, \*COMPUTER PROGRAMS, \*APPLIED  
MATHEMATICS, CANCELLATION, COMPUTER PROGRAMMING,  
COMPUTERS, ERRORS, FORTRAN, FUNCTIONS, INTEGRALS, OVERLAP,  
PRECISION, STRATEGY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303FS..

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FLORIDA AGRICULTURAL AND MECHANICAL UNIV TALLAHASSEE  
DEPT OF PHYSICS

Hybrid.

(U) Analytic Loeidin Alpha-Function Method for Two-Center  
Electron-Repulsion Integrals over Slater-Type Orbitals.

91 8P

PERSONAL AUTHORS: Jones, Herbert W.

CONTRACT NO. F49620-92-J-0083

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XF  
TR-92-0621, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Computational Chemistry, v12  
n10 p1217-1222, 1991. Available to DTIC users only. No  
copies furnished by NTIS.

ABSTRACT: (U) Using the Loeidin alpha-function method in  
which displaced orbitals are expanded in spherical  
harmonics, two-center, two-electron repulsion integrals  
of the Coulomb, hybrid, and exchange type are done  
analytically using Slater-type orbitals. Computer algebra  
and integer arithmetic are used to obtain analytic  
results and avoid cancellation errors by the generation  
of rational matrix elements for C, E, and F matrices that  
are used to express the function. The formula for the  
exchange integral is kept simple by reversing the order  
of integration over each part of a split quadrant. Only  
two basic integrals are used that are first efficiently  
evaluated by using look-up tables and then used  
repeatedly. Computer algebra, Slater exchange integrals,  
Coulomb, Hybrid, Exchange integrals.

DESCRIPTORS: (U) \*INTEGRATION, \*SPHERICAL HARMONICS,  
ALGEBRA, ARITHMETIC, CANCELLATION, COMPUTERS, ELECTRONS,  
ERRORS, EXCHANGE, FUNCTIONS, HARMONICS, INTEGRALS,  
QUADRANTS, REPRINTS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303FS, (STO)Slater  
Type Orbitals, Loeidin alpha function method, Coulomb,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A254 784 CONTINUED

TENNESSEE UNIV MEMPHIS DEPT OF ANATOMY AND NEUROBIOLOGY

(U) Somatosensory Responsiveness in Behaving Monkeys and Human Subjects.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 91-30 Jun 92.

JUL 92 22P

PERSONAL AUTHORS: Nelson, Randall J.

CONTRACT NO. AFOSR-91-0333

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0789, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During this first year of USAF grant AFOSR 91-0333, it was determined that: (1) The responsiveness of primary somatosensory (SI) cortical neurons that respond to vibratory go-cues for wrist movement with the greatest fidelity have their activity modulated prior to movement onset. This observation fits with the hypothesis that prior to active movement, sensory inputs that are no longer behaviorally relevant are gated so as not to interfere with monitoring movement parameters by the primate CNS. (2) Previous findings that human subjects acquire a predictable positional target by wrist movements more quickly if vibratory go-cues are presented in addition to visual targets was extending to include unpredictable target locations and movement directions. Equations describing the acquisition of and final performance level during wrist movement tasks were developed. These allow for the prediction of final performance and the time necessary to achieve it from a few days of recorded behavioral performance. The neurophysiological experiments suggest that SI neuronal responsiveness is profoundly influenced by behavioral conditions. The human psychophysical experiments suggest that the adding vibratory go-cues to visual targets may have performance benefits even in more complex control systems. Changes in sensory responsiveness; Response

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gating; Reaction times; Cortical neuronal responses; visual and vibratory cues; Monkeys; Humans.  
DESCRIPTORS: (U) \*NERVE CELLS, \*RESPONSE(BIOLOGY), \*CUES(STIMULI), \*CEREBRAL CORTEX, ACQUISITION, ADDITION, BENEFITS, CONTROL, EQUATIONS, HUMANS, INPUT, MONITORING, MONKEYS, OBSERVATION, PARAMETERS, PREDICTIONS, PRIMATES, REACTION TIME, TARGETS, TIME, VISUAL TARGETS, WRIST.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, \*Somatosensory response, Response gating.

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AD-A254 758 20/8 13/8 20/4 9/1

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Diffractive Optics: Design, Fabrication, and Applications, Technical Digest Series, Volume 9, 1992.

(U) Soft X-Ray Projection Lithography Topical Meeting Held in Monterey, California on April 8 - 8, 1992. Technical Digest, Volume 8.

DESCRIPTIVE NOTE: Quarterly rept. 13-15 Apr 92.

DESCRIPTIVE NOTE: Quarterly rept. 8-8 Apr 92.

92 198P

PERSONAL AUTHORS: Quinn,

APR 92 182P

CONTRACT NO. F49820-92-J-0284

PERSONAL AUTHORS: Quinn,

PROJECT NO. 2301

CONTRACT NO. F49820-92-J-0284

TASK NO. AS

PROJECT NO. 2301

MONITOR: AFOSR, XF  
TR-92-0735, AFOSR

MONITOR: AFOSR, XF  
TR-92-0738, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Summaries of papers presented at the Diffractive Optics: Design, Fabrication, and Applications Topical Meeting, New Orleans, Louisiana, April 13-15, 1992.

ABSTRACT: (U) Since the first suggestion of doing projection lithography with soft x-rays was made by Hawryluk and Seppala, and Silivast and Wood nearly 4 years ago, there has been a flood of activity on many of the basic principles and technologies. Foremost among these has been the development of high reflectivity coatings for mirrors that operate near 130 angstroms, the demonstration of diffraction-limited reduction imaging over a small field, and the design of high efficiency laser plasmas for compact illumination sources. Current work includes construction and repair of reflection masks, designs for large field cameras, and illuminators to couple them to the source, and development of advanced methods to measure and ultimately fabricate precision spherical and aspherical mirrors for large field cameras. Yet a great deal of work has to be done before soft x-ray projection lithography can become even a prototype lithography system, much less a commercial competitor.

DESCRIPTORS: (U) \*DIFFRACTION, \*OPTICAL LENSES, FABRICATION, OPTICS, VOLUME, SYMPOSIA, CIRCUIT INTERCONNECTIONS.

IDENTIFIERS: (U) WJAFOSR2301AS, Diffractive optics.

DESCRIPTORS: (U) \*PHOTOLITHOGRAPHY, \*SOFT X RAYS, \*IMAGE PROJECTORS, \*X RAY APPARATUS, \*MASKING, \*MIRRORS, \*PLASMA GENERATORS, \*WAFERS, CHIPS(ELECTRONICS), IMAGE REGISTRATION, X RAY DIFFRACTION, PULSED LASERS, PHOTORESIST COATINGS, PULSE GENERATORS, REFLECTIVITY, PHOTOSENSITIVITY, LAYERS, CAMERAS, ALIGNMENT, SUBSTRATES.

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SPHERES, IMAGES, SYMPOSIA, CALIFORNIA.

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

IDENTIFIERS: (U) WUAFOSR2301AS, PES110ZF.

(U) USAF 1980 Research Initiation Program. Volume 3.

DESCRIPTIVE NOTE: Annual rept. 1 Jan 81-31 Dec 81,

JUN 82 1318P

PERSONAL AUTHORS: Darrah, Rod

CONTRACT NO. F49620-88C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR, XF  
TR-92-0709, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program is for follow-on research efforts for the participants in the Summer Faculty Research Program. Funding is provided to establish RIP awards to about half the number of participants in the SFRP. Participants, in the 1990 SFRP competed for funding under the 1990 RIP. Evaluation of the proposals were made by the contractor. Evaluation criteria consisted of: (1). Technical excellence of the proposal. (2). Continuation of the SFRP effort. (3). Cost sharing by the university. The list of proposals selected for award was forwarded to AFOSR for approval of funding and for research efforts to be completed by 31 December 1991. The following summarizes the events for the evaluation of proposals and award of funding under the REP. A RIP proposals were submitted to the contractor by 1 November 1991. The proposals were limited to \$20,000 plus cost sharing by the universities. The universities were encouraged to cost share, since this is an effort to establish a long term effort between the Air Force and the university. (8). Proposals were evaluated on the criteria listed above and the final award approval was given by AFOSR after consultation with the Air Force Laboratories. (C). Subcontracts were negotiated with the Universities. There were a total of 92 REP awards made under the 1990 program.

DESCRIPTORS: (U) \*CONTRACTORS, \*AIR FORCE RESEARCH, AIR FORCE, AWARDS, LABORATORIES, NUMBERS, RODS, SUMMER,

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UNIVERSITIES, VOLUME.

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KANSAS UNIV LAWRENCE DEPT OF GEOLOGY

IDENTIFIERS: (U) WUAFOSR2305D5, PE61102F, Summer faculty  
research program, Proposals, Cost sharing.

(U) Characterization of Heterogeneities Controlling  
Transport and Fate of Pollutants in Unconsolidated  
Sand and Gravel Aquifers. First Year Report.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 31-31 May  
92.

JUN 92 212P

PERSONAL AUTHORS: McElwee, Carl D.; Butler, James J., Jr

CONTRACT NO. AFOSR-91-0298

PROJECT NO. 3484

TASK NO. RS

MONITOR: AFOSR, XF  
TR-92-0754, AROSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this project is to evaluate promising methodologies for characterization of heterogeneities in hydraulic conductivity. A major thrust of the first year of this project was an assessment of slug tests in heterogeneous formations. The theoretical components of this effort included the development of a time-continuous numerical model, a study of slug tests in layered aquifers, an examination of effective properties obtained from slug tests in the presence of well skins, and an examination of slug tests with observation wells. The field component emphasized multilevel slug tests. A prototype multilevel slug-test system was tested. Test results indicated that the tests are being affected by mechanisms not accounted for in the conventional theory. A series of experiments were carried out in order to clarify the mechanisms producing the observed behavior. These experiments served as the basis for the development of a new nonlinear model for the analysis of slug-test data. Additional field work included further hydraulic testing; a detailed aqueous geochemistry study; drilling and sampling activities; modification of the bladder sampler; laboratory analyses of cores; and a detailed seismic survey.

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SEARCH CONTROL NO. T4J19F

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DESCRIPTORS: (U) \*AQUIFERS, \*GEOCHEMISTRY, \*POLLUTANTS, \*SAMPLING, BEHAVIOR, CONDUCTIVITY, CORES, DRILLING, GRAVEL, HYDRAULICS, LABORATORIES, MODELS, PROTOTYPES, SAMPLERS, SAND, SITES, SURVEYS, TEST AND EVALUATION, THEORY, TRANSPORT, WATER POLLUTION.

WASHINGTON UNIV SEATTLE DEPT OF GEOPHYSICS

(U) Investigations of the Dynamics and Thermodynamics of the Mesosphere Lower Thermosphere and Upper Thermosphere at the Polar Regions with Optical Ground-Based Remote Sensing.

IDENTIFIERS: (U) Heterogeneities, Alluvial aquifers, Slug tests, Site characterization, Pollutant transport, PE01103D, WUAFOSR3484RS, Contaminant transport.

DESCRIPTIVE NOTE: Final rept. 15 Apr 89-14 Jul 92,

AUG 92 11P

PERSONAL AUTHORS: Hernandez, G.; Clark, K. G.

CONTRACT NO. AFOSR-89-0318

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0824, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The advances in diagnostic techniques and basic studies concerning the Earth's atmosphere made under the auspices of AFOSR are described in this report. Highlights of the investigations are the following: (a) the development and exploitation of a new field of atmospheric investigations using molecular species as passive tracers of the motion and temperature of the mesosphere. This new development is the first method devised to measure simultaneously the winds and temperatures of this poorly understood region of the atmosphere. (b) The attainment of a working, stable, rugged, monolithic electrooptic solid-state cavity whose spacing can be arbitrarily and precisely manipulated by applied electric field. This breakthrough in interference optics provides the opportunity to use small high-luminosity, high-resolution Fabry-Perot spectrometers which require no adjustments for their operation. Such instruments will make it possible to make unmanned observations of unique geophysical events at isolated stations. (c) Because of the proven robustness of our AFOSR-supported developments in teleautonomous operation of instrumentation, we have installed and are conducting two high-resolution diagnostic ground-based atmospheric experiments in the Southern Hemisphere at South Pole

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AD-A254 746

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DTIC REPORT BIBLIOGRAPHY

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AD-A254 748 CONTINUED

(Antarctica) and New Zealand. Neither of these experiments is accessible to the investigators more than twice yearly; they have been successfully operated for six instrument-years. The data obtained from the field experiments have increased the basic understanding of upper atmosphere dynamics and circulation in the two polar regions. The results of these investigations are published in the open literature, and have contributed to current global semi-empirical models of these regions of the atmosphere.

DESCRIPTORS: (U) \*ELECTROOPTICS, \*MESOSPHERE, \*POLAR REGIONS, \*THERMODYNAMICS, ATMOSPHERES, ATMOSPHERICS, CAVITIES, CIRCULATION, DYNAMICS, ELECTRIC FIELDS, GLOBAL, GROUND BASED, HEMISPHERES, HIGH RESOLUTION, INSTRUMENTATION, INTERFERENCE, NEW ZEALAND, OBSERVATION, OPTICS, RESOLUTION, SOLIDS, SOUTHERN HEMISPHERE, SPECTRA, SPECTROMETERS, TEMPERATURE, THERMOSPHERE, UNMANNED, UPPER ATMOSPHERE, WIND, REMOTE DETECTION, ATMOSPHERIC MOTION, ATMOSPHERIC TEMPERATURE, OPTICAL ANALYSIS.

IDENTIFIERS: (U) Passive Diagnostics, Atmosphere, High-Resolution Spectra, PE61102F, WUAFOSR2310A2.

AD-A254 717 7/6 7/4 7/3 11/9

DEXTER-HYSOL AEROSPACE INC PITTSBURG CA

(U) Phase Transfer Catalytic Nucleophilic Addition Reactions: Synthesis of Polymers and Acetylenic Terminated Resins.

DESCRIPTIVE NOTE: Final technical rept. Jun 91-15 Aug 92,

AUG 92 30P

PERSONAL AUTHORS: Klapprott, David K.; Kellman, Ray

CONTRACT NO. F49820-91-C-0052

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF  
TR-92-0825, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Solid-liquid phase transfer catalysis (SLPTC) was studied to facilitate the preparation of acetylene-terminated (AT) resins. 3-Ethylphenol, as a model system, was found to react with p,p'-difluorobenzophenone and p,p'-difluorodiphenylsulfone in refluxing pyridine using SLPTC to give high yields of the corresponding substitution products. However, the p,p'-dichloro derivatives afforded a mixture consisting predominantly of monosubstituted product. 3-Ethynylphenol was reacted under similar conditions to afford AT resins which were compared with AT resins made by conventional synthesis methods. High molecular weight, soluble polyetherether ketones and polysulfones were made by reacting bisphenols and appropriate difluoroaromatic compounds in refluxing pyridine using SLPTC.

DESCRIPTORS: (U) \*ACETYLENES, \*ADDITION REACTIONS, \*CATALYSIS, \*PHASE, \*PLASTICS, \*POLYMERS, \*SYNTHESIS, \*TRANSFER, \*NUCLEOPHILIC REACTIONS, ADDITION, KETONES, LIQUID PHASES, LIQUIDS, MIXTURES, MODELS, MOLECULAR WEIGHT, POLYSULFONES, PREPARATION, PYRIDINES, SOLIDS, WEIGHT, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, PEEK(PolyetherEther Ketone), Bisphenols, Difluoroaromatic

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AD-A254 703 7/3 7/4 20/2

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) Synthesis and Reactivity of Siloxide and Silamide Complexes Pertaining to Bond Breaking and Aggregation Phenomena.

DESCRIPTIVE NOTE: Final rept. 1 Feb 87-31 Oct 91.

JUL 92 29P

PERSONAL AUTHORS: Wolczanski, Peter T.

CONTRACT NO. AFOSR-87-0103

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF  
TR-92-0788, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The synthesis of siloxide and silamide complexes of tantalum has been carried out and their reactivity with respect to bond breaking and aggregation phenomena has been studied. Types of reactions include carbon monoxide cleavage to dicarbides and ketyllidene, carbon monoxide reduction, ketyl formation, ether cleavage, ligation of pyridine and related adducts, hydrocarbon activations, routes to early metal nitrides, and formation of cubic tantalum nitride.

DESCRIPTORS: (U) \*REACTIVITIES, \*SYNTHESIS, \*TANTALUM, ACTIVATION, CARBON, CARBON MONOXIDE, CLEAVAGE, ETHERS, HYDROCARBONS, METALS, MONOXIDES, NITRIDES, PYRIDINES, REDUCTION, CARBIDES, NITROGEN, SOLID STATE CHEMISTRY, CHEMICAL BONDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, \*Siloxide complex, \*Silamide complex, \*Bond breaking, \*Aggregation, Ketyllidene, Ketyl formation, Ligation, Adducts, Molecular precursors, Cubic tantalum nitrides.

AD-A254 717 CONTINUED  
Compounds, Reflux.

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AD-A254 717

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AD-A254 700 20/3 20/14

AD-A254 898 23/2

MASSACHUSETTS UNIV AMHERST DEPT OF ELECTRICAL AND  
COMPUTER ENGINEERING

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF  
ELECTRONICS

(U) Optical Generation, Control and Sensing of Millimeter  
Waves.

(U) Super Auditory Localization for Improved Human-Machine  
Interfaces.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 88-31 Aug  
91.

DESCRIPTIVE NOTE: Annual technical rept. 1 Mar 91-29 Feb  
92.

JUL 92 8P

JAN 92 9P

PERSONAL AUTHORS: DeFonzo, Alfred P.

PERSONAL AUTHORS: Durlach, Nathaniel

CONTRACT NO. AFOSR-88-0108

CONTRACT NO. AFOSR-90-0200

PROJECT NO. 2301

PROJECT NO. 2313

TASK NO. A1

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0781, AFOSR

MONITOR: AFOSR, XF  
TR-92-0782, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A novel optically excited, frequency  
invariant, coplanar stripline antenna that we developed  
is presented. A comprehensive full wave analysis of  
optically excited coplanar striplines developed by us is  
also briefly reviewed. The work confirms the earlier  
hypothesis regarding the existence of new mechanisms. The  
reported findings imply the existence of a deeper and  
more fundamental physics underlying the optical  
generation, sensing and control of electromagnetic  
radiation. An extensive bibliography is provided. As of  
August 1991 the following characteristics have been  
achieved: Center frequency - N/A; Bandwidth > 1THz (3 dB  
received power); Beam quality > 99% TeBou Gaussian; SNR >  
105. Energy output 25 femtojoules per pulse; Energy  
efficiency 0.003% (optical to electromagnetic).

DESCRIPTORS: (U) \*ELECTROMAGNETIC RADIATION, \*FREQUENCY,  
\*PHYSICS, ANTENNAS, BANDWIDTH, BIBLIOGRAPHIES, CONTROL,  
EFFICIENCY, ENERGY, FREQUENCY RESPONSE, OUTPUT, POWER,  
PULSES, QUALITY, RADIATION, RESPONSE, WORK.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, Full wave  
analysis, Coplanar striplines.

AD-A254 700

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ABSTRACT: (U) Work during the period 3/1/91 - 2/29/92  
has continued on the development of a hybrid stimulation  
system in which a virtual auditory environment is  
combined with a real visual environment. This system has  
been developed to help explore the effects of various  
transformations of auditory-localization cues on both  
resolution and response bias. Initial research has  
focussed on the effects of altering the cues available to  
the listener for determining sound source direction in  
the horizontal plane. Of particular interest are  
alterations that magnify these cues and thus lead to  
supernormal performance. Although these experiments have  
not yet been completed, results to date indicate that  
current models of auditory behavior are adequate for  
predicting the observed changes in resolution but  
inadequate for predicting the observed change in response  
bias.

DESCRIPTORS: (U) \*MAN COMPUTER INTERFACE, \*AUDITORY  
SIGNALS, BEHAVIOR, BIAS, ENVIRONMENTS, MODELS, RESOLUTION,  
RESPONSE, SOUND, TRANSFORMATIONS, VISUAL SIGNALS, HYBRID  
SIMULATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313CS, Auditory

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AD-A254 694 15/1 15/8

localization, Hybrid stimulation.

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC  
(U) Air Force Office of Scientific Research: Research  
Proposal Quarterly Status Report, April-June 1992.

JUL 92 63P

PERSONAL AUTHORS: Tyrrell, Debra L.

MONITOR: AFOSR, XF  
TR-92-0814, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) \*MILITARY RESEARCH, AIR FORCE.

IDENTIFIERS: (U) Office of scientific research, Research  
proposals.

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AD-A254 689

12/9

MARYLAND UNIV COLLEGE PARK LAB FOR PLASMA RESEARCH

(U) Adaptive Neural Network Models for Intelligent Computations.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Dec 91,

DEC 91 9P

PERSONAL AUTHORS: Chen, H. H.; Lee, Y. C.; Sun, G. Z.

CONTRACT NO. AFOSR-89-0492

PROJECT NO. 7013

TASK NO. 00

MONITOR: AFOSR, XF  
TR-92-0828, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) By looking closely at the dynamics of learning, it was discovered that for different input the states of network tended to cluster around three values plus the initial state. These four states can be considered as possible states of an actual finite state machine and the movement between these states as a function of input can be interpreted as the state transition of a state machine. This four state machine constructed is a perfect state machine that recognize the dual parity grammar. It recognizes dual parity strings with arbitrary length. This rule extraction generalization power is qualitatively different from that of the 'data interpolation' paradigm which is usually true for a feedforward neural net.

DESCRIPTORS: (U) \*NETWORKS, \*ADAPTIVE CONTROL SYSTEMS, DYNAMICS, EXTRACTION, FUNCTIONS, GRAMMARS, INPUT, LEARNING, LENGTH, MACHINES, NETS, NEURAL NETS, PARITY, POWER, TRANSITIONS, VALUE, COMPUTATIONS, ARTIFICIAL INTELLIGENCE.

IDENTIFIERS: (U) PE81102F, WUAFOSR701300.

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20/6.1

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Organization of the Optical Society of America Photonic Science Topical Meeting Series, Volume 8. Integrated Photonics Research: Workshop on Active and Passive Fiber Components Held in Monterey, California on 9-11 April 1991.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91.

MAY 92 233P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. AFOSR-91-0176

PROJECT NO. 2305

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0513, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Attach list of reports supported by Optical Society of America Photorefractive Materials, Effects, and Devices Integrated Photonics Research Nonlinear Guided Wave Phenomena Optical Amplifiers and Their Applications Optical computing Picosecond Electronics and Optoelectronics Quantum Optoelectronics Photonic Switching Microphysics of Surfaces: Beam Induced Processes Soft X-ray Projection Lithography Short Wavelength Coherent Radiation, Generation and Applications Persistent Spectral Hole-Burning: Science and Applications.

DESCRIPTORS: (U) \*PHOTONICS, \*FIBER OPTICS, \*INTEGRATED SYSTEMS, \*PASSIVE SYSTEMS, AMPLIFIERS, COHERENT RADIATION, ELECTRONICS, LITHOGRAPHY, MATERIALS, RADIATION, SHORT WAVELENGTHS, SOCIETIES, SOFT X RAYS, SURFACES, SWITCHING, X RAYS, NONLINEAR SYSTEMS, WORKSHOPS.

IDENTIFIERS: (U) WUAFOSR2301, PE81102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A254 885 4/1 20/8

LOCKHEED MISSILES AND SPACE CO INC PALO ALTO CA PALO  
ALTO RESEARCH LAB

belt of trapped electrons, and that it occurs more often  
at midnight local time than at noontime.

(U) Comprehensive Mappings of Electron Precipitation and  
its Effects on the Comprehensive Mappings of Electron  
Precipitation and its Effects on the Atmosphere.

DESCRIPTORS: (U) ARTIFICIAL SATELLITES, ATMOSPHERICS,  
BOUNDARIES, CHEMISTRY, DEPOSITS, DYNAMICS, ELECTRONS,  
GLOBAL, HIGH ENERGY, HIGH LATITUDES, LATITUDE, MAPS,  
NIGHT, PATTERNS, POLAR CAP, PRECIPITATION, RADIATION,  
RELATIVISTIC ELECTRONS, REPRODUCTION, UPPER ATMOSPHERE, X  
RAYS.

DESCRIPTIVE NOTE: Final rept. Jul 88-Jun 92,

JUN 92 54P

PERSONAL AUTHORS: Voss, H. D.; Mobilia, J.; Vondrak, R. R.  
; Gaines, E. E.; Datlowe, D. W.

IDENTIFIERS: (U) X-ray mappings, Relativistic electrons,  
Electron precipitation, Effects on the atmosphere,  
PE81102F, MUAFOSR2310A2.

REPORT NO. LMSC/F247088

CONTRACT NO. F49620-88-C-0072

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0732, AFOSR

UNCLASSIFIED REPORT

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

ABSTRACT: (U) Precipitation of energetic electrons is an  
important energy input to the earth's upper atmosphere  
and can alter the chemistry and dynamics of that region.  
The precipitation can be studied on a global basis using  
a satellite X-ray imager to make maps of the X-rays  
produced when the electrons stop in the atmosphere. We  
have used 4-40 keV X-ray data from the S81-1 SEEP  
satellite instrument to classify the patterns of  
precipitation at high latitudes; the three principal  
types are strong auroral arcs on the night side, extended  
downside arcs, and isolated patches inside the polar cap.  
We also studied the characteristics of high energy  
(relativistic) electron precipitation with data from  
instruments that directly detect the electrons. This very  
penetrating radiation is important because the electrons  
deposit their energy down to altitudes as low as - 55 km.  
This study found that the precipitation was confined to  
narrow latitude bands, often at the outer boundary of the

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UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) USAF 1990 Research Initiation Program. Volume 1.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 91,

JUN 92 811P

PERSONAL AUTHORS: Darrah, Rod

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. DS

MONITOR: AFOSR, XF  
TR-92-0707, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A2524 854.

ABSTRACT: (U) This program is for follow-on research efforts for the participants in the Summer Faculty Research Program. Funding is provided to establish RIP awards to about half the number of participants in the SFRP. Participants in the 1990 SFRP competed for funding under the 1990 RIP. Evaluation of the proposals were made by the contractor. Evaluation criteria consisted of: (1) Technical excellence of the proposal, (2) Continuation of the SFRP effort, (3) Cost sharing by the university. The list of proposals selected for award was forwarded to AFOSR for approval of funding and for research efforts to be completed by 31 December 1991. The following summarizes the events for the evaluation of proposals and award of funding under the RIP. (A) RIP proposals were submitted to the contractor by 1 November 1991. The proposals were limited to \$20,000 plus cost sharing by the universities. The universities were encouraged to cost share, since this is an effort to establish a long term effort between the Air Force and the university. (B) Proposals were evaluated on the criteria listed above and the final award approval was given by AFOSR after consultation with the Air Force Laboratories. (C) Subcontracts were negotiated with the Universities. There were a total of 92 RIP awards made under the 1990 program.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 74J19F

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UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*CONTRACT  
ADMINISTRATION, \*CONTRACT PROPOSALS, AIR FORCE, AWARDS,  
CONTRACTORS, COSTS, SHARING, UNIVERSITIES, VOLUME, AIR  
FORCE BUDGETS.

(U) USAF 1990 Research Initiation Program. Volume 4.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 91.

IDENTIFIERS: (U) WUAFOSR2305D5, PE81102F, Cost sharing.

JUN 92 795P

PERSONAL AUTHORS: Darrah, Rod

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR, XF  
TR-92-0710, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A254 656.

ABSTRACT: (U) This program is for follow-on research efforts for the participants in the Summer Faculty Research Program. Funding is provided to establish RIP awards to about half the number of participants in the SFRP. Participants in the 1990 SFRP competed for funding under the 1990 RIP. Evaluation of the proposals were made by the contractor. Evaluation criteria consisted of: (1). Technical excellence of the proposal (2). Continuation of the SFRP effort (3). Cost sharing by the university. The list of proposals selected for award was forwarded to AFOSR for approval of funding and for research efforts to be completed by 31 December 1991. The following summarizes the events for the evaluation of proposals and award of funding under the RIP.(A). RIP proposals were submitted to the contractor by 1 November 1991. The proposals were limited to \$20,000 plus cost sharing by the universities. The universities were encouraged to cost share, since this is an effort to establish a long term effort between the Air Force and the university. (B). Proposals were evaluated on the criteria listed above and the final award approval was given by AFOSR after consultation with the Air Force Laboratories. (C). Subcontracts were negotiated with the Universities. There were a total of 92 RIP awards made under the 1990 program.

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UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) USAF 1990 Research Initiation Program. Volume 2.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 91,

JUN 92 432P

PERSONAL AUTHORS: Darrah, Rod

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR, XF  
TR-92-0708, AFOSR

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*CONTRACT  
ADMINISTRATION, \*CONTRACT PROPOSALS, AIR FORCE, AWARDS,  
CONTRACTORS, COSTS, SHARING, UNIVERSITIES, VOLUME, AIR  
FORCE BUDGETS.

IDENTIFIERS: (U) WJAFQSR2305D5, PE61102F, Cost sharing.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 4, AD-A254 855.

ABSTRACT: (U) This program is for follow-on research efforts for the participants in the Summer Faculty Research Program. Funding is provided to establish RIP awards to about half the number of participants in the SFRP. Participants in the 1990 SFRP competed for funding under the 1990 RIP. Evaluation of the proposals were made by the contractor. Evaluation criteria consisted of: (1) Technical excellence of the proposal, (2) Continuation of the SFRP effort, (3) Cost sharing by the university. The list of proposals selected for award was forwarded to AFOSR for approval of funding and for research efforts to be completed by 31 December 1991. The following summarizes the events for the evaluation of proposals and award of funding under the RIP. (A) RIP proposals were submitted to the contractor by 1 November 1991. The proposals were limited to \$20,000 plus cost sharing by the universities. The universities were encouraged to cost share, since this is an effort to establish a long term effort between the Air Force and the university. (B) Proposals were evaluated on the criteria listed above and the final award approval was given by AFOSR after consultation with the Air Force Laboratories. (C) Subcontracts were negotiated with the Universities. There were a total of 92 RIP awards made under the 1990 program.

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AD-A254 815 8/4 5/8

GEORGIA INST OF TECH ATLANTA COMPUTATIONAL MECHANICS CENTER

NEW YORK UNIV NY DEPT OF PSYCHOLOGY

(U) Innovative Methods in the Dynamics of Large Space Structures.

(U) Visual Motion Perception and Visual Information Processing.

DESCRIPTIVE NOTE: Final rept. 15 Jul 87-14 Sep 91.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 91-31 Jan 92,

JUL 92 10P

FEB 91 238P

PERSONAL AUTHORS: Atluri, Satya N.

PERSONAL AUTHORS: Sperling, George

REPORT NO. CMC-GIT-92-3

CONTRACT NO. AFOSR-92-0780

CONTRACT NO. F49620-87-C-0084

PROJECT NO. 2381

MONITOR: AFOSR, XF  
TR-92-0808, AFOSR

MONITOR: AFOSR, XF  
TR-92-0780, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents a summary of 14 papers published in archival literature, dealing with the issues of nonlinear dynamics of finitely deformed space structure mixed time finite element methods for large rotational motions of constrained multibody systems, and wave propagation in lattice structures.

ABSTRACT: (U) The publications describe progress in two related areas of visual information processing: motion processing and visual attention. The full equivalence between Reichart motion detection and Fourier motion analysis (first-order motion processing) was proved formally. A new experimental paradigm was developed to test the model of nonFourier (2nd-order) motion processing. This model, which accounts for the perception of motion-from-texture, consists of a stage of linear spatio-temporal filtering followed by fullwave rectification and then by standard (Reichart) motion analysis. It was demonstrated that human 2nd-order motion is, for practical purposes, one-dimensional (i.e., a single channel system). The spatial filter that this channel utilizes was measured and found to be lowpass. Work on attentional processes in visual task using rapid sequences of superimposed patterns showed that highly trained subjects were unable to use gross physical differences to filter out unattended items at an early stage of perceptual processing. On the contrary, the results are explained by postulating that attended and unattended elements of the input are tagged as such at an early-stage, and are then discriminated later on the of this tag. (Author)

DESCRIPTORS: (U) \*STRUCTURAL RESPONSE, \*SPACECRAFT, CONTROL, DYNAMICS, FLEXIBLE STRUCTURES, MOTION, PROPAGATION, STRUCTURES, WAVE PROPAGATION, SPACE STATIONS, COMPOSITE STRUCTURES, FINITE ELEMENT ANALYSIS, DEFORMATION, STIFFNESS, STRUCTURAL COMPONENTS, SPACECRAFT COMPONENTS.

IDENTIFIERS: (U) Dynamics, Control of flexible structures, Reduced order modeling, Space structures, \*Large space structures.

DESCRIPTORS: (U) \*ATTENTION, \*MOTION, \*SPACE PERCEPTION,

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CHANNELS, DETECTION, DOCUMENTS, FILTERS, FILTRATION, HUMANS, INFORMATION PROCESSING, INPUT, MODELS, ONE DIMENSIONAL, PATTERNS, PERCEPTION, PROCESSING, SEQUENCES, STANDARDS, TEST AND EVALUATION, TEXTURE, WORK, VISUAL PERCEPTION, PATTERN RECOGNITION.

NORTHWEST RESEARCH ASSOCIATES INC BELLEVUE WA

(U) Nonlinear Propagation of Zonal Winds in an Atmosphere with Newtonian Cooling and Equatorial Wavedriving.

JAN 91 30P

IDENTIFIERS: (U) PEG1102F, WU2313A5, \*Motion perception, \*Visual information processing, Motion compensation..

PERSONAL AUTHORS: Dunkerton, Timothy J.

CONTRACT NO. F49820-89-C-0051

PROJECT NO. 2310

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0810, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the Atmospheric Sciences, v48 n2 p238-263, 15 Jan 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Two-dimensional (latitude-height) simulations of the middle atmosphere were performed to study the role of nonlinear angular momentum advection and equatorial wave transport in the quasi-biennial oscillation, semiannual oscillation, and seasonal cycle. Realistic steady states were obtained when a mesospheric friction layer, representing gravity wave drag, was included in the problem. This device resolved an ambiguity in the nonlinear theory of middle atmosphere Hadley circulation, and led to the formation of an interior saddle point in angular momentum in agreement with observations. Extratropical one-way friction, representing Rossby wave drag, was found to enhance the easterly phase of stratospheric semiannual oscillation and lengthen the period of quasi-biennial oscillation due to increased upwelling in the Brewer-Dobson circulation.

DESCRIPTORS: (U) \*ATMOSPHERES, \*GRAVITY WAVES, \*ROSSBY WAVES, \*WIND, ADVECTION, AGREEMENTS, AMBIGUITY, ANGULAR MOMENTUM, CIRCULATION, CYCLES, DRAG, FRICTION, GRAVITY, HEIGHT, LATITUDE, LAYERS, MOMENTUM, OBSERVATION, OSCILLATION, PHASE, SIMULATION, THEORY, TRANSPORT, TWO DIMENSIONAL, UPWELLING, REPRINTS, REPRESENTATION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

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IDENTIFIERS: (U) PEG1102F, WJAFOSR2310CS, Middle atmosphere Hadley circulation, Quasi-biennial and semiannual oscillations.

ILLINOIS UNIV AT URBANA DEPT OF CIVIL ENGINEERING  
(U) Biodegradation of Polychlorinated Methanes in Methanogenic Systems.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 88-1 Mar 89.

91 110P

PERSONAL AUTHORS: Freedman, David L.

CONTRACT NO. AFOSR-88-0189

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0848, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research investigated biodegradation of several halogenated methanes under methanogenic conditions. Biodegradation of dichloromethane to CO<sub>2</sub> and acetic acid (both environmentally acceptable products) was demonstrated in a fixed-film reactor, operated at 20 deg C, a residence time as low as 0.25 day, and an influent concentration of 91 micro M. The biodegradability of chloroform was examined in a dichloromethane-degrading enrichment culture. Sustained consumption of chloroform (approximately 8.5 micron M) was achieved only when vitamin B 12 was also added. Initially, equimolar amounts of chloroform and B 12 were added; when the amount of B 12 added was gradually decreased to zero, chloroform degradation continued at the same rapid rate. Biodegradation of 14C chloroform yielded approximately 77% CO<sub>2</sub>, 10% carbon monoxide, 7% soluble compounds (about 15% of which consisted of acetate), and 2% nonsoluble compounds; no 14CH<sub>4</sub> was formed. Brominated methanes (dibromomethane, bromochloromethane, and bromomethane) degraded much more slowly' if at all, than dichloromethane, they inhibited methanogenesis and dichloromethane degradation. Sustained degradation of chloromethane was demonstrated for an extended period without the need for an electron donor. Preliminary results suggest chloromethane serves as an electron donor under methanogenic conditions, just as

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

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AD-A254 575 12/4 12/5

dichloromethane does. Biotransformation of carbon tetrachloride was also demonstrated in the dichloromethane-degrading enrichment culture. Biodegradation; methanogenic systems; chlorinated solvents; dichloromethane; chloroform; carbon tetrachloride; fixed-film.

DESCRIPTORS: (U) \*METHANES, \*BIODETERIORATION, ACETATES, ACETIC ACID, ACIDS, CARBON, CARBON MONOXIDE, CARBON TETRACHLORIDE, CHLOROFORM, CHLOROMETHANES, CONSUMPTION, CULTURE, DEGRADATION, ELECTRON DONORS, ELECTRONS, ENRICHMENT, FILMS, MONOXIDES, RATES, SOLVENTS, TIME, VITAMIN B COMPLEX, VITAMINS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2312A5, Polychlorinated methanes.

IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON (UNITED KINGDOM) BLACKETT LAB

(U) Numerical Optimization.

DESCRIPTIVE NOTE: Final technical rept..

92 71P

PERSONAL AUTHORS: Zirilli, Francesco

CONTRACT NO. DAJA45-85-C-0028

MONITOR: AFOSR, XF  
TR-92-0707, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In the framework of the proposed continuous approach to constrained optimization problems, we describe two new solution methods which resulted from the research. The first is a continuous inexact method for solving systems of nonlinear equations and complementarity problems (along the lines of the DAFNE Method), and the second is a continuous method for solving the linear programming problems (along the lines of Karmarkar's method) which is shown to be quadratically convergent. Some numerical experience on a number of test problems is reported.

DESCRIPTORS: (U) \*LINEAR PROGRAMMING, \*OPTIMIZATION, APPROACH, COMPUTER PROGRAMMING, EQUATIONS, NUMBERS, TEST AND EVALUATION.

IDENTIFIERS: (U) Numerical optimization, Constrained optimization, Systems of nonlinear equations, Complementarity problems, Linear programming, Karmarkar's method.

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AD-A254 568 11/2 9/1

BROWN UNIV PROVIDENCE RI DEPT OF COMPUTER SCIENCE

MANCHESTER UNIV (UNITED KINGDOM) SCHUSTER LAB

(U) Coordinating, Planning and Control.

(U) Laser Densification and Doping of Sol-Gel Glasses.

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-31 Aug 91.

DESCRIPTIVE NOTE: Final rept. 1 Sep 90-31 Dec 91.

AUG 91 391P

FEB 92 51P

PERSONAL AUTHORS: Dean, Thomas

PERSONAL AUTHORS: King, Terence A.

CONTRACT NO. F49820-88-C-0132

CONTRACT NO. AFOSR-90-0338

MONITOR: AFOSR, XF  
TR-92-0886, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) The research was devoted to the design of complex systems for applications in robotics, automated manufacturing, and time-critical decision support systems. In exploring the issues involved in the design of such systems, they investigated techniques from artificial intelligence, control theory, operations research, and the decision sciences. In the process, they attempted to draw correspondences between concepts from the various fields. However, this work was not intended as a grand unification of these disciplines, even as they pertain to the specific issues of interest. Instead, they presented tools from these areas as component technologies, each playing a pivotal role in the design of complex autonomous systems.

**DESCRIPTORS:** (U) \*DECISION SUPPORT SYSTEMS, \*ROBOTICS, \*SYSTEMS ENGINEERING, ARTIFICIAL INTELLIGENCE, CONTROL, CONTROL THEORY, INTELLIGENCE, MANUFACTURING, OPERATION, OPERATIONS RESEARCH, PLANNING, THEORY, TIME, TOOLS, WORK.

TASK NO. 08

PROJECT NO. 1693

MONITOR: AFOSR, XF  
TR-92-0803, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) An investigation into undoped and doped sol-gel glasses has been carried out for laser, optical and optoelectronic applications. Methods for the doping and characterization of sol-gel glasses have been developed. Lasers based on gel-silica glass doped with organic molecules and operating from the near UV to the near IR have been produced. The basic properties of the composite materials have been measured including dopant distribution, optical quality and photostability. Fundamental parameters and mechanisms for the doped systems of fluorescence lifetime, quantum efficiency and uniformity have been investigated. Controlled densification of the sol-gel glass to give increased refractive index has been demonstrated. This enables the writing of optical waveguides in bulk and thin films which open up many applications in optoelectronics and the surface densification of sol-gel glass for lightweight optics. New methods of densification of photosensitized sol-gel glass to give high spatial resolution micron size waveguides is described. Applications for the types of systems resulting from this work are reviewed and areas of future development described.

**DESCRIPTORS:** (U) \*COMPOSITE MATERIALS, \*SILICA GLASS, \*THIN FILMS, \*SILICATES, DOPING, EYEGLASSES, FILMS, FLUORESCENCE, GELS, INDEXES, LASERS, OPTICAL WAVEGUIDES.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

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AD-A254 543 11/8 20/11 11/8.1

OPTICS, PARAMETERS, QUALITY, QUANTUM EFFICIENCY,  
REFRACTIVE INDEX, RESOLUTION, SURFACES, WAVEGUIDES.

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Fatigue and Fracture of Intermetallic Alloys.

IDENTIFIERS: (U) WUAFOSR189306, PE83224C, \*Sol Gel glass,  
\*Laser densification.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 Mar 92,

JUL 92 71P

PERSONAL AUTHORS: Cooper, C. V.; Inoue, H. R.; Giamel, A.  
F.; Favrow, L. H.

REPORT NO. R92-917892-3

CONTRACT NO. F49620-89-C-0047

MONITOR: AFOSR, XF  
TR-92-0788, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All  
DTIC/NTIS reproductions will be in black and white.  
Prepared in cooperation with University of Illinois at  
Urbana-Champaign, Urbana, IL 61801.

ABSTRACT: (U) The compound, Al<sub>3</sub>Ti, was alloyed with 7.5  
at.% Fe to produce a cubic L1<sub>2</sub> structure. This material  
was arc cast and either directly homogenized or heat  
treated (HHT) or comminuted into powder and consolidated  
by hot isostatic pressing (HIP). Microstructures were  
carefully evaluated by optical and electron microscopy.  
Mechanical properties were measured as a function of  
temperature using compression and flexure. Utilizing a  
novel test fixture, both monotonic and cyclic tensile  
properties were determined as a function of temperature  
for specimens which had been sequentially cast, HIPed,  
and HHTed. Despite quasi-brittle behavior below 1000 deg  
C, failure was within the gauge section in most cases.  
The fracture surfaces showed increasing evidence of  
ductile tearing as the temperature was increased, and  
pores were determined to play an important role in the  
fracture process. The yield strength vs. temperature  
response was relatively flat up to intermediate  
temperature, possibly attributable to competing slip  
systems. The compressive yield strength and strain to  
failure were typically greater than those measured in  
tension, particularly at the lower temperatures. The  
fatigue data were reasonably well behaved, with fatigue

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AD-A254 543 CONTINUED

specimens showing clear evidence of striations. Attempts to alloy the binary D022 compound with Nb did not produce the desired cubic structure.

DESCRIPTORS: (U) \*ALLOYS, \*FATIGUE, \*MECHANICAL PROPERTIES, BEHAVIOR, COMPRESSION, CRYSTALS, DISLOCATIONS, ELECTRON MICROSCOPY, ELECTRONS, FAILURE, FUNCTIONS, HEAT, ISOSTATIC PRESSING, MATERIALS, MICROSCOPY, POWDERS, RECREATION, RESPONSE, STRIATIONS, STRUCTURES, SURFACES, TEARING, TEMPERATURE, TENSILE PROPERTIES, TENSION, TEST FIXTURES, TEST AND EVALUATION, TRANSITION TEMPERATURE, TRANSITIONS, YIELD, YIELD STRENGTH.

IDENTIFIERS: (U) A13T1, L12, Ibis Material, HPT(Homogenization Heat Treated), HIP(Hot Isostatic Pressing), Microstructures, Mechanical properties, Dislocations, Ductile to brittle, Transition temperature, D022 Crystal structure, Fatigue striations, Electron microscopy.

AD-A254 498 6/3

AMERICAN COLL OF TOXICOLOGY BETHESDA MD

(U) Carboxylesterases of the Testes: Role In Activation of Toxicants.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 May 90,

MAY 90 5P

PERSONAL AUTHORS: Ventura, Alexandra

CONTRACT NO. AFOSR-88-0180

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0800, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Organ specific distribution of carboxylesterases (Western blotting) was determined to be liver lung = testes = fat pancreas kidney. Carboxylesterase distribution among cell types of the testes was examined by in situ hybridization techniques. Results were inconclusive, as both the probe and the control hybridized to tissues macromolecules. More refinement of this techniques should provide better results. Other accomplishments include examination of the down-regulation of carboxylesterase levels by glucocorticoids. Apparently esterase levels are most dramatically down-regulated (approximately 8-fold) by dexamethasone phosphate (80 mg/kg x 5 days, i.p.) in the testes compared to the other tissues containing this enzyme.

DESCRIPTORS: (U) \*LIVER, \*LUNG, \*MACROMOLECULES, \*PANCREAS, \*TESTES, ACTIVATION, CELLS, CONTROL, DISTRIBUTION, ENZYMES, ESTERASES, FATS, HYBRIDIZATION, KIDNEYS, PHOSPHATES, PROBES, REGULATIONS, CARBOXY LYASES, TOXICITY.

IDENTIFIERS: (U) WUAFOSR2312A5, PE81102F, \*Glucocorticoids, Dexamethasone phosphate.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A254 495 5/9

STANFORD UNIV CA DEPT OF PSYCHOLOGY

(U) Decision Under Conflict: Resolution and Confidence in Judgment and Choice.

DESCRIPTIVE NOTE: Final rept. 1988-1992.

AUG 92 14P

PERSONAL AUTHORS: Tversky, Amos

CONTRACT NO. AFOSR-89-9984

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF  
TR-92-0802, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The major themes of the research supported under this grant are the discrepancy between normative and descriptive theory and the constructive nature of decision and judgement. In contrast to the classical theory that treats preferences as given and describes choice as a maximization process, the present approach holds that preferences and judgements are often constructed in the elicitation process. Furthermore, these constructions are contingent on the framing of the problem, the method of elicitation, and the context of choice. During the last three years, we have made considerable progress towards the development of a constructive analysis of choice, documented in the enclosed articles. The present report reviews the major themes: (1) Resolving Conflict; (2) Reference-dependent Theory; (3) The Aggregate/Individual Discrepancy; (4) Elicitation Effects and the Compatibility Principle; (5) Preference and Belief; and (6) Evidence and Confidence. These topics are discussed in turn.

DESCRIPTORS: (U) \*DECISION MAKING, \*JUDGEMENT (PSYCHOLOGY), \*CONFLICT, RESOLUTION, SELECTION, THEORY, CONFLICT, PROBLEM SOLVING.

IDENTIFIERS: (U) MUAFOSR2313A4, PE81102F.

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AD-A254 484 5/2

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF APPLIED MECHANICS AND ENGINEERING SCIENCES

(U) AFOSR Contractors Meeting in Propulsion.

DESCRIPTIVE NOTE: Technical rept..

JUL 92 298P

PERSONAL AUTHORS: Birkan, M. A.; Tishkoff, J. M.

PROJECT NO. 2308

MONITOR: AFOSR, XF  
TR-92-0740, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Abstracts are given for research in airbreathing combustion, rocket propulsion, and diagnostics in reacting media supported by the Air Force Office of Scientific Research. Instability, Flames, Propulsion, Gas Turbines Combustion, Shear Layer, Supersonic, Soot, Sprays, Lasers, Fluorescence, Spectroscopy, Rocket, Plasma, Scramjets.

DESCRIPTORS: (U) \*ABSTRACTS, \*GAS TURBINES, \*ROCKET PROPULSION, \*SPACE PROPULSION, \*SPACE TRANSPORTATION, AIR FORCE, COMBUSTION, FLAMES, FLUORESCENCE, INSTABILITY, LASERS, LAYERS, MEDIA, ROCKETS, SOOT, SPECTROSCOPY, SPRAYS, TURBINES, LIQUID ROCKET FUELS, PLUMES, KINETICS, RAMJET ENGINES, ELECTRON TRANSPORT.

IDENTIFIERS: (U) PE81102F, Plasma instabilities, Arcjet thrusters, Plasma propulsion, Polycyclic nitramines, Catcars, Soot formation.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A254 480 15/1 5/9 5/1  
 UNIVERSAL ENERGY SYSTEMS INC DAYTON OH  
 (U) US Air Force 1989 Research Initiation Program. Volume 3.  
 DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 90.  
 JUN 92 1377P  
 PERSONAL AUTHORS: Darrah, Rod  
 CONTRACT NO. F49620-88-C-0053  
 PROJECT NO. 2305  
 TASK NO. D5  
 MONITOR: AFOSR, XF  
 TR-92-0706, AFOSR

AD-A254 480 CONTINUED

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*CONTRACTORS,  
 \*COSTS, AIR FORCE AWARDS, LABORATORIES, NUMBERS, SHARING,  
 SUMMER, UNIVERSITIES, VOLUME.

IDENTIFIERS: (U) WUAFOSR2305D5, PE81102F, SFRP(Summer  
 Faculty Research Program), Proposals, Cost shares.

UNCLASSIFIED REPORT

ABSTRACT: (U) This program for follow-on research efforts for the participants in the Summer Faculty Research Funding is provided to establish RIP awards to about half the number of participants in the SFRP. Participants in the 1989 SFRP competed for funding under the 1989 RIP. Evaluation of the proposals were made by the contractor. Evaluation criteria consisted of: (1). Technical excellence of the proposal. (2). Continuation of the SFRP effort. (3). Cost sharing by the university. The list of proposals selected for award was forwarded to AFOSR for approval of funding and for research efforts to be completed by 31 December 1990. The following summarizes the events for the evaluation of proposals and award of funding under the RIP. (A). RIP proposals were submitted to the contractor by 1 November 1990. The proposals were limited to \$20,000 plus cost by the universities. The universities were encouraged to cost share, since this is an effort to establish a long term effort between the Air Force and the university. (B). Proposals were evaluated on the criteria listed above and the final award approval was given by AFOSR after consultation with the Air Force Laboratories. (C). Subcontracts were negotiated with the Universities. There were a total of 122 REP awards made under the 1989 program.

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DTIC REPORT BIBLIOGRAPHY SEARCH: CONTROL NO. T4J19F

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AD-A254 459 15/1 5/9 5/1 5/3  
UNIVERSAL ENERGY SYSTEMS INC DAYTON OH  
(U) US Air Force 1989 Research Initiation Program. Volume 2.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*CONTRACTORS, \*COSTS, AIR FORCE, AWARDS, LABORATORIES, NUMBERS, RODS, SHARING, SUMMER, UNIVERSITIES, VOLUME.

IDENTIFIERS: (U) WUAFOSR2305D5, PE61102F, SFRP(Summer Faculty Research Program), Cost sharing, Proposals.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 90.

JUN 92 545P

PERSONAL AUTHORS: Darrah, Rod

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR, XF  
TR-92-0705, AFOSR

# UNCLASSIFIED REPORT

ABSTRACT: (U) This program is for follow-on research efforts for the participants in the Summer Faculty Research Program. Funding is provided to establish RIP awards to about half the number of participants in the SFRP. Participants in the 1989 SFRP competed for funding under the 1989 RIP. Evaluation of the proposals were made by the contractor. Evaluation criteria consisted of: (1). Technical excellence of the proposal. (2). Continuation of the SFRP effort. (3). Cost sharing by the university. The list of proposals selected for award was forwarded to AFOSR for approval of funding and for research efforts to be completed by 31 December 1990. The following summarizes the events for the evaluation of proposals and award of funding under the RIP. (A). RIP proposals were submitted to the contractor by 1 November 1990. The proposals were limited to \$20,000 plus cost sharing by the universities. The universities were encouraged to cost share, since this is an effort to establish a long term effort between the Air Force and the university. (B). Proposals were evaluated on the criteria listed above and the final award approval was given by AFOSR after conclusion with the Air Force Laboratories. (C). Subcontracts were negotiated with the Universities. There were a total of 122 RIP awards made under the 1989 program.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) US Air Force 1989 Research Initiation Program. Volume 4.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 90.

JUN 92 861P

PERSONAL AUTHORS: Darrah, Rod

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR, XF  
TR-92-0719, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A254 457.

ABSTRACT: (U) This program is for follow-on research efforts for the participants in the Summer Faculty Research Program. Funding is provided to establish RIP awards to about half the number of participants in the SFRP. Participants in the 1989 SFRP competed for funding under the 1989 RIP. Evaluation of the proposals were made by the contractor. Evaluation criteria consisted of: (1) Technical excellence of the proposal; (2) Continuation of the SFRP effort; (3) Cost sharing by the university. The list of proposals selected for award was forwarded to AFOSR for approval of funding and for research efforts to be completed by 31 December 1990. The following summarizes the events for the evaluation of proposals and award of funding under the RIP. (A) RIP proposals were submitted to the contractor by 1 November 1990. The proposals were limited to \$20,000 plus cost sharing by the universities. The universities were encouraged to cost share, since this is an effort to establish a long term effort between the Air Force and the university. (B) Proposals were evaluated on the criteria listed above and the final award approval was given by AFOSR after consultation with the Air Force Laboratories. (C) Subcontracts were negotiated with the Universities. There were a total of 122 RIP awards made under the 1989

program.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*CONTRACTORS, \*COSTS, AIR FORCE, AWARDS, LABORATORIES, NUMBERS, RODS, SHARING, SUMMER, UNIVERSITIES, VOLUME.

IDENTIFIERS: (U) WUAFOSR2305D5, PE81102F, SFRP(Summer Facility Research Program), Funding, Cost sharing.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

AWARDS, CONTRACTORS, LABORATORIES, NUMBERS, RODS, SHARING,  
SUMMER, UNIVERSITIES, VOLUME.

(U) US Air Force 1989 Research Initiation Program . Volume  
1.

IDENTIFIERS: (U) WJAFOSR2305DS, PEB1102F, Summer faculty  
research program, Proposals, Projects, Contracting.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 90.

JUN 92 1113P

PERSONAL AUTHORS: Darrah, Rod

CONTRACT NO. F49620-88-C-0053

PROJECT NO. 2305

TASK NO. D5

MONITOR: AFOSR, XF  
TR-92-0704, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program is for follow-on efforts for the participants in the Summer Faculty Research Funding is provided to establish RIP awards to about half the number of participants in the SFRP. Participants in the 1989 SFRP competed for funding under the 1989 RIP. Evaluation of the proposals were made by the contractor. Evaluation criteria consisted of: (1). Technical excellence of the proposal. (2). Continuation of the SFRP effort. (3). Cost sharing by the university. The list of proposals selected for award was forwarded to AFOSR for approval of funding and for research efforts to be completed by 31 December 1990. The following summarizes the events for the evaluation of proposals and award of funding under the RIP. (A). RIP proposals were submitted to the contractor by 1 November 1990. The proposals were limited to \$20,000 plus cost by the universities. The universities were encouraged to cost share, since this is an effort to establish a long term effort between the Air Force and the university. (B). Proposals were evaluated on the criteria listed above and the final award approval was given by AFOSR after consultation with the Air Force Laboratories. (C). Subcontracts were negotiated with the Universities. There were a total of 122 REP awards made under the 1989 program.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*COSTS, AIR FORCE,

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A284 438

6/4

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Super Auditory Localization for Improved Human-Machine Interfaces.

DESCRIPTIVE NOTE: Progress rept. 1 Jan-31 Dec 91,

JUN 92

5P

PERSONAL AUTHORS: Durlach, Nathaniel I.

CONTRACT NO. AFOSR-90-0200

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0770, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in RLE Progress rept., n134 p312-313, 1 Jan-31 Dec 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Work by Nat Durlach and his collaborators is summarized here.

DESCRIPTORS: (U) \*AUDITORY ACUITY, AVAILABILITY, HUMANS, INTERFACES, MACHINES, REPRINTS, WORK, ORIENTATION(DIRECTION), MAN MACHINE SYSTEMS, HEARING.

IDENTIFIERS: (U) WJAFOSR2313CS.

AD-A254 434

6/1

SOCIETY OF TOXICOLOGY WASHINGTON DC

(U) Molecular Characterization of the Ah-Receptor: Immunoaffinity Purification, Amino Acid Sequencing and Generation of Epitope Specific Antibodies.

DESCRIPTIVE NOTE: Annual summary rept.,

DEC 91

7P

PERSONAL AUTHORS: Cassidy, Joan

CONTRACT NO. AFOSR-89-0194

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0783, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This one year new investigator award resulted in sequencing the Ah receptor, identifying the ligand binding domain of this receptor and development of a purification scheme that can generate milligram quantities of recombinant Ah receptor in a few days time.

DESCRIPTORS: (U) \*AMINO ACIDS, \*ANTIBODIES, \*GENETICS, ACIDS, AWARDS, LIGANDS, PURIFICATION, QUANTITY, TIME, GENES, TOXICITY, AROMATIC COMPOUNDS.

IDENTIFIERS: (U) PE81102F, AFOSR2312A5, Genetic encoding, AH Receptors, Immunoaffinity purification, Amino acid sequences, Epitope specific antibodies, Halogenated aromatic compounds.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J18F

AD-A254 380

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AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Air Force Office of Scientific Research Technical Report Summaries.

DESCRIPTIVE NOTE: Quarterly rept. Jan-Mar 92.

92

324P

PERSONAL AUTHORS: Tyrrell, Debra L.

MONITOR: AFOSR, XF  
TR-92-0812, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The AFOSR Technical Report Summaries are published quarterly of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center for that quarter.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*TECHNICAL INFORMATION CENTERS, AIR, AIR FORCE, DIVISION, INFORMATION CENTERS, TECHNICAL INFORMATION CENTERS, CONTRACTS, BIBLIOGRAPHIES, ABSTRACTS, INFORMATION SYSTEMS, INDEXES, REPORTS.

IDENTIFIERS: (U) Research and development, Technical reports.

AD-A254 380 4/1 20/5 7/2

NORTH CAROLINA CENTRAL UNIV DURHAM

(U) High Resolution Molecular Spectroscopy of Atmospheric Species.

DESCRIPTIVE NOTE: Final rept. 1 Jul 91-30 Jun 92.

JUN 92 15P

PERSONAL AUTHORS: Dutta, Jyotsna M.; Jones, Charles R.

CONTRACT NO. F49620-89-C-0080

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0797, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The pressure-broadening of the 2 (1,1) - 2 (1,2), 3 (1,3) - 2 (2,1), and 7 (3,4) - 6 (4,3) transitions of HD0 were studied between 90K and 800K. The broadening gases were He, H2, O2, and N2. Results for the temperature dependence of the pressure broadening parameters and collisional cross sections are discussed. The HD0 transitions selected for study belong to widely different lower state energies. Such a selection allows to observe any dependence that 300K broadening parameters and temperature coefficients may have on the rotational quantum numbers. All these have considerable theoretical interest.

DESCRIPTORS: (U) \*ATMOSPHERICS, \*HIGH RESOLUTION, \*MOLECULAR SPECTROSCOPY, COEFFICIENTS, CROSS SECTIONS, NUMBERS, PARAMETERS, PRESSURE, RESOLUTION, SELECTION, SPECTROSCOPY, TEMPERATURE, TEMPERATURE COEFFICIENTS, TRANSITIONS, HELIUM, HYDROGEN, OXYGEN, NITROGEN, COLLISIONS, GASES, COOLING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2, \*Species, Pressure broadening, Lower state energies, Rotational quantum numbers, HD0, Intersellar medium.

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WASHINGTON UNIV SEATTLE

WAFERS, WATER, GALLIUM ARSENIDES, ALUMINUM ALLOYS,  
SCHOTTKY BARRIER DEVICES, X RAY DIFFRACTION.

(U) Investigation of High Efficiency Monolithic  
Multibandgap Solar Cells.

IDENTIFIERS: (U) PE81102F, WJAFOSR2301A7.

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

NOV 91 26P

PERSONAL AUTHORS: Olsen, Larry

CONTRACT NO. AFOSR-91-0095

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XF  
TR-92-0784, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program involved investigations of AlGaAs/GaAs multijunction solar cells. Most of the low level effort was devoted to studies of the electronic properties of AlGaAs films. Finite diffusion lengths could only be obtained for Al(x)Ga(1-x)As films with the aluminum concentration in the range from 0 to 0.1. Photoresponse of Al/AlGaAs Schottky barriers were analyzed to measure minority carrier diffusion length (L). Values of L for p-type AlGaAs with x=0 were typically in the range of 0 to 0.5 micron. It is clear that much more effort must be made to reduce oxygen and water impurity levels in the WSU barrel-type reactor before improved AlGaAs Schottky barriers is explained as being due to improper mixing of Al and Ga precursors. Results are discussed for films grown with improved mixing which do not exhibit the apparent bandgap shift. Estimated performance for a two-cell, AlGaAs/GaAs structure are given based on characteristics of Al(.37)Ga(.63)As cells fabricated from wafers obtained from Varian, and GaAs cells fabricated for epi wafers grown with the WSU reactor.

DESCRIPTORS: (U) \*SOLAR CELLS, \*THIN FILMS,  
\*SEMICONDUCTORS, ALUMINUM, BARRELS, BARRIERS, DIFFUSION,  
EFFICIENCY, ELECTRONICS, FILMS, IMPURITIES, LENGTH, LOW  
LEVEL, MINORITIES, MIXING, OXYGEN, PRECURSORS, VALUE,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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MASSACHUSETTS INST OF TECH CAMBRIDGE TECHNOLOGY LAB FOR  
ADVANCED COMPOSITES

(U) Nonlinear Stall Flutter of Wings With Bending-Torsion  
Coupling.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb-31 Oct 91.

DEC 91 277P

PERSONAL AUTHORS: Dunn, Peter E.; Dugundji, John

REPORT NO. TELAC-91-16A

CONTRACT NO. AFOSR-91-O159

PROJECT NO. 2302

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0783, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The nonlinear, stalled, aeroelastic behavior of rectangular, graphite/epoxy, cantilevered plates with varying amounts of bending-torsion stiffness coupling and with NACA 0012 Styrofoam airfoil shapes is investigated for low Reynolds number flow (<200,000). A general Rayleigh-Ritz formulation is used to calculate point load static deflections, and nonlinear static vibration frequencies and mode shapes for varying tip deflections. Nonlinear lift and moment aerodynamics are used in the context of the Rayleigh-Ritz formulation to calculate static airload deflections. The nonlinear, stalled ONERA model using non-constant coefficients - initially developed by Tran and Petot - is reformulated into a harmonic balance form and compared against a time-marching Runge-Kutta scheme. Low angle-of-attack, linear flutter calculations are done by applying Fourier analysis to extract the harmonic balance method and a Newton-Raphson solver to the resulting nonlinear Rayleigh-Ritz aeroelastic formulation. Nonlinear flutter, Stall flutter, Composites Aeroelasticity.

DESCRIPTORS: (U) \*AEROELASTICITY, \*AIRFOILS, \*FLUTTER,  
\*GRAPHITE EPOXY COMPOSITES, \*COMPOSITE WINGS.

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AERODYNAMICS, ANGLE OF ATTACK, ANGLES, ATTACK, BALANCE,  
BEHAVIOR, BENDING, COEFFICIENTS, CONSTANTS, COUPLINGS,  
DEFLECTION, FLOW, FORMULATIONS, FOURIER ANALYSIS,  
FREQUENCY, GRAPHITE, HARMONICS, LIFT, LOW ANGLES, MODELS,  
MOMENTS, NUMBERS, PLATES, REYNOLDS NUMBER, SHAPE, STATICS,  
STIFFNESS, TIME, TORSION, VIBRATION, STALLING.

IDENTIFIERS: (U) PE81102F, WJAFOSR2302AS.



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CALIFORNIA INST OF TECH PASADENA

(U) Shock Enhancement and Control of Hypersonic Combustion.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 91-31 Mar 92,

JUN 92 21P

PERSONAL AUTHORS: Marble, Frank E.; Zukoski, Edward E.

CONTRACT NO. AFOSR-92-0804

PROJECT NO. 3484

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0804, AFOSR

UNCLASSIFIED REPORT

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

ABSTRACT: (U) Experiments concerning the details of combustion in large vortices in the Caltech Unsteady Combustion Facility, using simultaneous measurements of pressure, shadowgraphy, and chemiluminescence are now about 90% complete. The detail of these results document a very different ignition mechanism and combustion pattern than previous experiments have suggested. Shock tube studies of shock enhanced mixing of helium into air, utilizing the Rayleigh scattering technique have been completed. Because of their greater sensitivity in the low concentration range, these measurements are significantly more accurate than those obtained with laser induced fluorescence and demonstrate that mixing is considerably more rapid and more complete than reported previously. Preliminary results have been obtained from experiments on the interaction of shock induced mixing with shear layers in the GALCIT M = 2.5 supersonic wind tunnel.

DESCRIPTORS: (U) \*COMBUSTION, \*RAYLEIGH SCATTERING, \*SHOCK TUBES, \*SHEAR PROPERTIES, AIR, AUGMENTATION, CHEMILUMINESCENCE, DOCUMENTS, FACILITIES, FLUORESCENCE, HELIUM, IGNITION, INTERACTIONS, LASER INDUCED

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FLUORESCENCE, LASERS, LAYERS, MEASUREMENT, MIXING, PATTERNS, PRESSURE, SCATTERING, SENSITIVITY, SHOCK, STREAMS, SUPERSONIC COMBUSTION, SUPERSONIC WIND TUNNELS, TUBES, TUNNELS, VORTICES, WIND, WIND TUNNELS.

IDENTIFIERS: (U) PE61103D, WJAFOSR3484AS, \*Hypersonic combustion, Enhancement, Hypervelocity mixing, Shadowgraphy.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT  
OF MATHEMATICS

SMITHSONIAN ASTROPHYSICAL OBSERVATORY CAMBRIDGE MA

(U) Pulse Propagation in Random Media.

(U) High Resolutions Studies of the Structure of the Solar  
Atmosphere.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 90-30 Jun  
92,

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Jul 91-30 Jun 92,

JUL 92 4P

JUN 92 10P

PERSONAL AUTHORS: Kohler, Werner

PERSONAL AUTHORS: Habbal, Shadia R.

CONTRACT NO. AFOSR-90-0137

CONTRACT NO. AFOSR-91-0244

PROJECT NO. 2304

PROJECT NO. 2311

TASK NO. A4

TASK NO. AS

MONITOR: AFOSR, XF

MONITOR: AFOSR, XF  
TR-92-0791, AFOSR

TR-92-0801, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes results obtained in  
the study of how waves are reflected and transmitted by a  
randomly layered medium. We assume that temporally pulsed  
energy (plane wave, beam or radiated energy from a  
localized source) illuminates this material. Work that  
was initially done for the acoustic and electromagnetic  
problems is being extended in these two areas of  
application. The fundamental approach is also being  
applied to the elastic medium problem.

DESCRIPTORS: (U) \*ACOUSTICS, \*WAVEGUIDES, APPROACH,  
ENERGY, MATERIALS, PLANE WAVES, WORK, ELASTIC PROPERTIES.

IDENTIFIERS: (U) Pulse propagation, Random layers.

ABSTRACT: (U) During this first year we have  
concentrated on the analysis, and the image enhancement  
and processing of an extensive set of the EUV/Skylab data  
for the search of empirical characteristics of coronal  
heating in different scale magnetic regions on the Sun.  
Student involvement in our research projects has been  
quite successful. These students are Martina Arndt, Fred  
Blundell, Amy Mossman, Gretchen McPhee and Eric Woods.  
During this funding period we have also collaborated with  
Prof. You Qin Hu, from the University of Science and  
Technology of China, who visited the Solar and Stellar  
Physics Division for three months, and with Dr. Ruth  
Esser who has recently joined the Division as a physicist.

DESCRIPTORS: (U) \*SOLAR ATMOSPHERE, \*SOLAR ACTIVITY,  
AUGMENTATION, HEATING, IMAGES, PHYSICS, PROCESSING, SCALE,  
SUN, HIGH RESOLUTION, SOLAR CORONA, IMAGE PROCESSING,  
TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2311AS.

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STANFORD UNIV CA DEPT OF CHEMISTRY

(U) State-Resolved Reaction Dynamics.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 88-30 Nov 91.

JUL 92 23P

PERSONAL AUTHORS: Zare, Richard N.

REPORT NO. 6871

CONTRACT NO. AFOSR-89-0284

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0792, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) This research effort is comprised of two groups of experiments. The first group measures and characterizes the electron ejected in a photoionization event. The second group is concerned with understanding the role of energy in affecting the outcome of ion-molecule reactions. High resolution, angle-resolved photoelectron spectroscopy was carried out following resonance enhanced multiphoton ionization (REMPI) of nitric oxide. These measurements have led to a complete description of this photoionization event. Photoelectron spectroscopy was also used to measure the degree of vibrational state-selectivity resulting from REMPI of NH<sub>3</sub> and HBr/DBr. Additionally, the rotational state distributions resulting from HBr/DBr/HCl REMPI were measured using LIF. These state distributions were used in the study of the near resonant charge transfer reaction of DBr<sup>+</sup> + HBr, where the reagent ion was state-selectively prepared with REMPI and the product state distributions were monitored with LIF. Vibrationally state-selected ammonia ions generated by REMPI were used to investigate the effect of kinetic and vibrational energy in determining the product formation tendencies of the reaction NH<sub>3</sub><sup>+</sup> + NO<sub>3</sub>. Measurement of the product cross sections has shown the differing effects of vibrational

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and translational excitation on dynamics of this ion-molecule system. Resonance-enhanced multiphoton ionization (REMPI), photoelectrons, photoionization dynamics, laser-induced fluorescence, ion-molecule reactions.

**DESCRIPTORS:** (U) \*CHARGE TRANSFER, \*PHOTOELECTRONS, \*PHOTOIONIZATION, \*ION MOLECULE INTERACTIONS, AMMONIA, ANGLES, CROSS SECTIONS, DISTRIBUTION, DYNAMICS, ELECTRONS, ENERGY, EXCITATION, FLUORESCENCE, HIGH RESOLUTION, IONIZATION, IONS, KINETICS, LASER INDUCED FLUORESCENCE, LASERS, MEASUREMENT, MOLECULES, OXIDES, RESOLUTION, RESONANCE, SPECTROSCOPY, TRANSFER, VIBRATION, MOLECULAR ROTATION.

**IDENTIFIERS:** (U) PE81102F, WJAFOSR2303B1, \*State resolved, \*Reaction dynamics, REMPI(Resonance Enhanced Multiphoton Ionization), Selectivity, Rotational state, Gas phase charged molecules, Nitric oxides.

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MASSACHUSETTS INST OF TECH CAMBRIDGE TECHNOLOGY LAB FOR  
ADVANCED COMPOSITES

(U) Nonlinear Aeroelasticity of Composite Structures.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-31 Jan 91,

OCT 91 24P

PERSONAL AUTHORS: Dunn, Peter E.; Dugundji, John

CONTRACT NO. F49620-86-C-0086

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0807, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The nonlinear, stalled, aeroelastic behavior of rectangular, graphite/epoxy, cantilevered plates with varying amounts of bending-torsion stiffness coupling and with NACA 0012 Styrofoam airfoil shapes is investigated for low Reynolds number flow (<200,000). A general Rayleigh-Ritz formulation is used to calculate point load static deflections, and nonlinear static vibration frequencies and mode shapes for varying tip deflections. Nonlinear lift and moment aerodynamics are used in the context of the Rayleigh-Ritz formulation to calculate static airload deflections. The nonlinear, stalled ONERA model using non-constant coefficients - initially developed by Tran and Patot - is reformulated into a harmonic balance form and compared against a time-marching Runge-Kutta scheme. Low angle-of-attack, linear flutter calculations are done by applying Fourier analysis to extract the harmonic balance method and a Newton-Raphson solver to the resulting nonlinear Rayleigh-Ritz aeroelastic formulation. Nonlinear flutter, Stall flutter, Composites, Aeroelasticity.

DESCRIPTORS: (U) \*GRAPHITE EPOXY COMPOSITES, \*STALLING, \*FLUTTER, \*COMPOSITE WINGS, AERODYNAMICS, AEROELASTICITY, AIRFOILS, ANGLE OF ATTACK, ANGLES, ATTACK, BALANCE, BEHAVIOR, BENDING, COEFFICIENTS, CONSTANTS, COUPLINGS, DEFLECTION, FLOW, FLUTTER, FORMULATIONS, FOURIER ANALYSIS,

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FREQUENCY, GRAPHITE, HARMONICS, LIFT, LOW ANGLES, MODELS, MOMENTS, NUMBERS, PLATES, REYNOLDS NUMBER, SHAPE, STATICS, STIFFNESS, TIME, TORSION, VIBRATION, THREE DIMENSIONAL, COMPOSITE STRUCTURES, LAMINATES, NONLINEAR ANALYSIS, ALUMINUM.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2302B1, Styrofoam, ONERA Computer program..

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F  
PENNSYLVANIA UNIV PHILADELPHIA DEPT OF MATERIALS SCIENCE  
AND ENGINEERING Composition(Chemistry).

(U) Plasticity of Single Crystalline Al3X Intermetallic Compounds.

DESCRIPTIVE NOTE: Final rep. 1 Nov 88-31 Dec 91.

JUN 92 16P

PERSONAL AUTHORS: Vitek, V.; Pope, D. P.; Luzzi, D. E.

CONTRACT NO. AFOSR-89-0062

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0785, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Single crystals of six different compositions were grown, five of Al3Ti + Fe and one of Al3Ti + Cr. The flow stress was measured as a function of temperature, orientation and composition. Al2Ti precipitates are the major strengthening phase and form platelets on the 100 planes of the L12 matrix. Deformation occurs primarily by  $\langle 110 \rangle$  111 slip, with SISF dissociation at low temperatures and by APB dissociation at high temperatures. Simulations of dislocation cores using many body potentials have revealed a variety of core configurations in the L12 and D022 form, all of which are sessile and one of which provides a twinning mechanism. Al3Ti, Dislocations, Ductility, Flow Strength, Intermetallic Compounds.

DESCRIPTORS: (U) \*INTERMETALLIC COMPOUNDS, \*SINGLE CRYSTALS, \*ALUMINUM COMPOUNDS, BODIES, CONFIGURATIONS, CORES, CRYSTALS, DEFORMATION, DISLOCATIONS, DISSOCIATION, DUCTILITY, FLOW, FUNCTIONS, HIGH TEMPERATURE, PHASE, PRECIPITATES, SIMULATION, TEMPERATURE, TITANIUM, STRENGTH(MECHANICS), IRON, CHROMIUM, CRYSTAL STRUCTURE.

IDENTIFIERS: (U) PE61102F, WUAFOR2306A1, \*Plasticity, Orientation, Platelets, Slips, Sessile, Twinning mechanism, Transmission electron microscopy, L1(2) form.

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## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 74J19F

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AD-A254 278 20/5 7/4 20/2

MASSACHUSETTS GENERAL HOSPITAL BOSTON

OREGON STATE UNIV CORVALLIS DEPT OF ELECTRICAL AND  
COMPUTER ENGINEERING(U) Cognition in the Brain: Investigations Using Positron  
Emission Tomography.

(U) Atomic Approaches to Defect Thermochemistry.

DESCRIPTIVE NOTE: Final technical rept..

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 Mar 92.

JUL 92 17P

APR 92 251P

PERSONAL AUTHORS: Alpert, Nathaniel M.

PERSONAL AUTHORS: Van Vechten, James A.; Wager, John F.

CONTRACT NO. AFOSR-91-0029

CONTRACT NO. AFOSR-89-0309

PROJECT NO. 2313

PROJECT NO. 2308

TASK NO. A4

TASK NO. B1

MONITOR: AFOSR. XF  
TR-92-0786, AFOSRMONITOR: AFOSR. XF  
TR-92-0782, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

ABSTRACT: (U) The AFOSR-sponsored workshop Cognition in the Brain: Investigations Using Positron Emission Tomography, was held on June 18 and 17, 1991 at the Massachusetts General Hospital in Boston. The goal of this workshop was to identify and begin a continuing discussion of the major issues affecting the generation and testing of new hypotheses about cognitive processing. The workshop covered three major topics: (1) Anatomic localization of components of cognitive processing; (2) Issues of data analysis arising from cognitive function experiments; and (3) Task design in cognitive function studies with PET. Positron Emission Tomography (PET), cognitive function, experiments/studies.

DESCRIPTORS: (U) \*BRAIN, \*COGNITION, \*FUNCTIONS, \*TOMOGRAPHY, EMISSION, HOSPITALS, HYPOTHESES, MASSACHUSETTS, POSITRONS, PROCESSING, WORKSHOPS.

IDENTIFIERS: (U) PE81102F, MUAFOSR2313A4, PET(Positron Emission Tomography), Cognitive functioning, Experiments/studies.

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## UNCLASSIFIED

ABSTRACT: (U) We have achieved insight into the role of H in semiconductor crystal growth in processes such as organometallic chemical vapor deposition, OMCD. If allowed, H will compensate shallow dopants and suppress the formation of other compensators when the Fermi level moves significantly from the intrinsic level at growth or processing temperatures, T. This can be a great advantage because the H can be removed at low T with no rearrangement of other atoms. This has led to the first attainment of good p-type GaN and to improvement of n-type GaN. It should work for any semiconductor. We have improved the thermodynamic analysis of heterojunction band offsets as functions of T and strain. We have done the first fundamental studies of the diffusion equation with boundary conditions appropriate for crystal growth and diffusion and obtained major insights. We devised a simple new experiment to study interstitial impurity diffusion in semiconductors with striking results. We demonstrated that host interstitials play no role in thermal in Si or GaAs and similar low ionicity crystals and have explained the 'U-shaped' profile of transition metal impurities. We have verified that the DX center can be getter out of AlGaAs without reducing donor concentration and studied its properties by various capacitance transient. We have characterized the aging and charge trapping properties of ZnS ACTFEL display

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materials. We have calculated the entropy of atomic hopping.

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

DESCRIPTORS: (U) \*THERMODYNAMICS, \*DEFECT ANALYSIS, \*THERMOCHEMISTRY, ATOMS, BOUNDARIES, CAPACITANCE, CHEMICALS, COMPENSATORS, CRYSTAL GROWTH, CRYSTALS, DEPOSITION, DIFFUSION, ENTROPY, EQUATIONS, FUNCTIONS, GETTERS, HETEROJUNCTIONS, IMPURITIES, INTERSTITIAL, MATERIALS, METALS, PROCESSING, PROFILES, SEMICONDUCTORS, TEMPERATURE, TRANSIENTS, TRANSITION METALS, TRANSITIONS, VAPOR DEPOSITION, VAPORS, WORK, CRYSTAL DEFECTS, HYDROGEN, ORGANOMETALLIC COMPOUNDS, DOPING, SILICON, GALLIUM ARSENIDES, IONS, ALUMINUM GALLIUM ARSENIDES, AGING(MATERIALS), TRAPPING(CHARGED PARTICLES), ZINC SULFIDES.

(U) Formation of Premicellar Clusters of 2-p-Toluidinonaphthalene-8-sulfonate with Cationic Detergents.

92 8P

PERSONAL AUTHORS: Niu, Shufang; Gopidas, K.R.; Turro, Nicholas J.; Gabor, Gavriella

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. 82

IDENTIFIERS: (U) PES1102F, WJAFOSR2308B1, \*Atomic approaches, Fermi levels, Gallium nitride, U Shaped profile, Donor concentrations, ACTFEL Display materials, Atomic hopping.

MONITOR: AFOSR, XF

TR-92-0773, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Langmuir, v8 n5 p1271-1277, 1992.  
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) 2-P-Toluidinonaphthalene-8-sulfonate (TNS), a well-known fluorescent probe, forms premicellar aggregates with detergents such as cetyltrimethylammonium bromide (CTAB) concentrations just below their critical micelle concentration. A narrow fluorescent band, very small Stokes shift, and very high quantum yield are the characteristics of the hydrophobic environment provided by the premicellar aggregates. Studies of the temperature dependence of fluorescence indicated that these species exist in solution as a separate microheterogeneous phase. These results are corroborated by results obtained from fluorescence polarization studies. The length of the alkyl chain is very critical in this case, and no such phenomenon is observed when the chain length is less than 14 carbon atoms. We propose that these species are formed by the entrapment of TNS by the alkyl chains of CTAB molecules.

DESCRIPTORS: (U) \*DETERGENTS, ATOMS, AVAILABILITY, BROMIDES, CARBON, CHAINS, ENVIRONMENTS, FLUORESCENCE, LENGTH, MOLECULES, PHASE, POLARIZATION, PROBES, REPRINTS, SULFINATES, SURFACE ACTIVE SUBSTANCES, TEMPERATURE, YIELD, ALKYL RADICALS, IONS, SOLVENTS, ABSORPTION, EMISSION

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SPECTRA, NITROGEN, AMMONIUM COMPOUNDS.

TEXAS TECH UNIV LUBBOCK DEPT OF ELECTRICAL ENGINEERING

IDENTIFIERS: (U) Fluorescent probes, Surfactants, Micelles, PE81102F, WUAFOSR230382, \*TNS(2-p-Toluidinonaphthalene-6-Sulfonate), \*Cationic, Formation, \*Premicellar clusters, Microheterogeneous phases, Alkyl chains, CTAB(Cetyltrimethylammonium Bromide), Aggregates, CMC(Critical Micelle Concentration), Hydrophobic sites, TNS.

(U) High-Power Microwave Breakdown of Dielectric Interfaces.

DESCRIPTIVE NOTE: Annual technical rept. 15 Apr 91-14 Apr 92.

JUL 92 15P

PERSONAL AUTHORS: Kristiansen, M.; Hatfield, L.L.; Crawford, Mark

CONTRACT NO. AFOSR-91-0280

PROJECT NO. 2301

TASK NO. ES

MONITOR: AFOSR, XF  
TR-92-0779, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this project is to study the electrical breakdown, due to microwaves which occurs on the surface of vacuum/atmosphere interfaces. This is an annual technical report for AFOSR Grant No. 91-0280, that began in April, 1991 and concluded one year later. This contract was continuing work started on AFOSR Grant No. 88-0102. The final report for that grant was submitted in November, 1991. This report will discuss results relating to: placing magnets on the waveguide to prevent the electron beam from hitting the window, frequency measurements of the microwave signal, and the design, construction, and testing of a device for reducing window breakdown.

DESCRIPTORS: (U) \*DIELECTRICS, \*MAGNETS, \*MICROWAVES, \*WAVEGUIDES, \*ATMOSPHERIC WINDOWS, \*ATMOSPHERIC DISTURBANCES, \*BREAKDOWN(ELECTRONIC THRESHOLD), \*ATMOSPHERES, \*ELECTRON BEAMS, \*ELECTRONS, \*FREQUENCY, \*HIGH POWER, \*INTERFACES, \*MEASUREMENT, \*POWER, \*RADIO EQUIPMENT, \*SIGNALS, \*SURFACES, \*VACUUM, \*ATMOSPHERIC PHYSICS, \*PLASMAS(PHYSICS), \*REDUCTION.

IDENTIFIERS: (U) Microwaves, Window-breakdown, Surface flashover, Radio frequency. WUAFOSR2301ES, MAGIC Computer

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programs, Space charges.

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Mechanistic Models for Soot Formation.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 81-31 May 82,

JUL 82 74P

PERSONAL AUTHORS: Colket, Meredith B., III; Hall, Robert J.

REPORT NO. UTRC-82-9

CONTRACT NO. F49620-81-C-0056

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XF  
TR-92-0806, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) One percent toluene in argon in a single pulse shock tube coupled to a new GC/MSD analytical system. Many high molecular weight species were identified and this information is being used to examine and compare PAH formation mechanisms. Ring formation mechanisms during the oxidative pyrolysis of methane were compared and the dominant pathway was found to be recombination of propargyl radicals. Using an appropriately simplified reaction set, benzene profiles were predicted for the case of an opposed-jet, methane-air diffusion flame. A soot model was updated to include effects from particle aging. A band radiation model was developed to treat radiation from flames with varying degrees of optical thickness. This code was used to model the effects of radiation from gas-phase species in a flame but can be extended to the case of particle radiation.

DESCRIPTORS: (U) \*ARGON, \*PYROLYSIS, \*SOOT, \*TOLUENES, AIR, BENZENE, DIFFUSION, FLAMES, HYDROCARBONS, METHANE, MODELS, MOLECULAR WEIGHT, PARTICLES, PHASE, PROFILES, RADIATION, RINGS, THERMODYNAMICS, THICKNESS, WEIGHT, SHOCK TUBES.

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SEARCH CONTROL NO. T4J19F

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IDENTIFIERS: (U) Soot formation modeling, Band radiation, Toluene pyrolysis, Formation and thermodynamics of polycyclic hydrocarbons, Ring formation, PE81102F, WUAFOSR2308BS, Propargyl radicals, Opposed-jet, Optical thickness, PAH(Polyaromatic Hydrocarbons).

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Adsorption of Anions on Ultra-Thin Metal Deposits on Single Crystal Electrodes. Part 1. Voltammetric and Radiochemical Study of Bisulphate Adsorption on Pt(111) Electrodes Containing Cadmium Adatoms,

82 18P

PERSONAL AUTHORS: Varga, K.; Zelenay, P.; Horanyi, G.; Wiecekowsk, A.

CONTRACT NO. AFOSR-88-0368

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0774, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Electroanal. Chem., V327 p281-208 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The formation of submonolayer coverages of cadmium on Pt(111) and polycrystalline Pt electrodes has been characterized using cyclic voltammetry, and adsorption of bisulphate on the Cd-covered surfaces has been measured by radioactive labelling. Cyclic voltammograms of platinum (111) and polycrystalline platinum electrodes in Cd 2+ containing solutions have been compared. The voltammograms differ with respect to current-potential peak symmetries which shows that the deposition reversibility depends on the surface crystallographic orientation of platinum. Assuming that a total discharge of Cd2+ takes place, the charge measured in the potential range studied would indicate that no more than half a monolayer of cadmium is formed on Pt(111). On the contrary, if the discharge is incomplete and a full monolayer of cadmium is formed, the apparent cadmium electroreduction valency is 0.8. However, the radioactive labelling data indicate that some well-resolved cadmium adatom structure are inactive while some are very active toward anion adsorption. We conclude that the inactive Cd deposits are oxidized and are present on the surface in

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## DTIC REPORT BIBLIOGRAPHY

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either the oxide or the hydroxide form. Therefore, at this stage of research, the coulometric determination of electroreduction valencies is merely formal. Once a part of the oxidized cadmium deposits is transformed to the metal phase, bisulphate adsorption begins and conforms to the well-known surface behaviour categorized as enhanced anion adsorption on underpotentially deposited ultra-thin metal films on foreign metal substrates.

DESCRIPTORS: (U) \*ADATOMS, \*ADSORPTION, \*ANIONS, \*DEPOSITION, \*METAL FILMS, \*POLYCRYSTALLINE, \*THIN FILMS, CADMIUM, DEPOSITS, DETERMINATION, ELECTRODES, FOREIGN, HYDROXIDES, OXIDES, PLATINUM, STRUCTURES, SUBSTRATES, SURFACES, VOLTAMMETRY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1, Ultra thin films, Single crystal electrodes, Radio chemistry.

ILLINOIS UNIV AT URBANA

(U) Cyclic Voltammetry of Platinum Single Crystal Electrodes in Solutions Containing Urea.

81 7P

PERSONAL AUTHORS: Rubel, M.; Rhee, C. K.; Wleckowski, A.

CONTRACT NO. AFOSR-89-0388

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0789, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Electroanal. Chem, v315 p301-308 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The classification of electrochemical adsorption processes on platinum-type metals includes, as a distinctive group, the reversible adsorption of saturated carboxylic acids and urea. An extension of this classification to single crystal electrodes has not yet been attempted. However, voltammetry and adsorption characteristics of acetic acid on Pt(111) electrodes have been reported. In view of the similar behavior of acetic acid and urea on polycrystalline platinum, one might expect similar anomalous voltammetric behavior of these two molecules on Pt(111). The data that we report below confirm, on the one hand, the validity of this assumption and, on the other, add more evidence in favor of high-energy (subsurface) hydrogen formation on the (111) plane of platinum. We have also carried out the investigations of urea surface electrochemistry with some other platinum surfaces, including Pt(100), Pt(110) and polycrystalline Pt.

DESCRIPTORS: (U) \*VOLTAMMETRY, \*ELECTROCHEMISTRY, \*SURFACE CHEMISTRY, UREA, SINGLE CRYSTALS, PLATINUM, ELECTRODES, REPRINTS.

IDENTIFIERS: (U) \*Platinum sing crystal electrodes,

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WJAFOSR2302A1, PES1102F.

SAM TECHNOLOGY INC SAN FRANCISCO CA

(U) Mental Workload Assessment in the Cockpit: Feasibility  
of Using Electrophysiological Measurements. Phase 1.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 90-28 Feb  
81.

APR 92 49P

PERSONAL AUTHORS: Gevins, A. S.; Leong, H. M.

CONTRACT NO. F49620-90-C-0077

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0809, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Limitations in people's ability to process and respond to information have become a limiting factor in advanced military aircraft systems. Accordingly, the USAF OSR has been sponsoring research on measuring mental workload as a prerequisite to developing cockpit systems which take the pilot's mental state into account in optimizing overall system performance. During Phase I, we performed a feasibility study in which we analyzed physiological data from four USAF fighter test pilots in search of ways to distinguish between two laboratory Mft which had the same stimulus and response components but differed in level of mental workload. Several electrophysiological measures, alone and in combination, were investigated for their discriminating power including regional brain electrical activity, scalp muscle potentials, and hem and eye activity. Measures were restricted to those which could be recorded in the cockpit, and, in the case of brain signals, to those least likely to be contaminated by head, body and eye movement artifacts. Using a neural network algorithm, we achieved an average of 97% accuracy in classifying independent testing data for the four subjects as either high or low mental workload.

DESCRIPTORS: (U) \*ELECTROPHYSIOLOGY, \*MILITARY AIRCRAFT,

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\*PILOTS, \*REACTION TIME, ACCURACY, AIRCRAFT, ALGORITHMS, ARTIFACTS, BODIES, BRAIN, COCKPITS, EYE, EYE MOVEMENTS, FEASIBILITY STUDIES, HEAD(ANATOMY), LABORATORIES, LIMITATIONS, MEASUREMENT, MUSCLES, NETWORKS, NUMBERS, PHASE, POWER, RESPONSE, SIGNALS, TEST AND EVALUATION, WORKLOAD.

TEXAS UNIV HEALTH SCIENCE CENTER AT SAN ANTONIO

(U) Cellular and Molecular Level Responses After Radiofrequency Radiation Exposure, Alone or in Combination with X-Rays or Chemicals.

DESCRIPTIVE NOTE: Annual technical rept. 1 Apr 91-31 Mar 92.

JUL 92 33P

PERSONAL AUTHORS: Meltz, Martin L.

REPORT NO. K-GAU0-00-030-102

CONTRACT NO. AFOSR-91-0208

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0790, AFOSR

UNCLASSIFIED REPORT

IDENTIFIERS: (U) Mental Workload Electrophysiology. PE85502F, WUAFOSR3005A1, Information processing, Military aircraft systems, Optimizing system performance, Fighter test pilots.

ABSTRACT: (U) The focus of the first year's activities, at a time when a major recruitment of personnel was underway, revolved around: selection of the appropriate cell line for performing the mammalian cell mutagenicity studies; preliminary studies with the Balb/c 3T3 cell transformation assay; mutation spectrum analysis of the spontaneous mutants arising in AS52 and BH4 chinese hamster ovary (CHO) cell lines; liposome encapsulation studies of the polymer diazolumelanin (DALM); and redesign of the thermal control system originally constructed as a prototype for the Radiofrequency Radiation Division at USAF Armstrong Laboratory. Most importantly, although the original proposal called for the study of the possible mutagenic interaction of microwaves and ionizing radiation using the AS52 line of CHO cells, the results of the mutation spectrum analysis study led to the decision to alter future protocols to perform these studies with the BH4 cells; otherwise, the experiments would predominantly be measuring small deletion type mutations, and would not have enough sensitivity to pick up alterations of other types of mutation which might occur due to the microwave exposures.

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In addition, the liposome studies revealed the difficulty of encapsulating chemically synthesized DADM in this biological system; these studies will need to be furthered using other resources. The redesign and construction of a modified thermal control system was begun, allowing for one control unit to perform the temperature measurement and temperature control functions in two separate incubator systems.

DESCRIPTORS: (U) \*CHEMICALS, \*RADIATION, \*RADIOFREQUENCY, \*RESPONSE, \*X RAYS, ADDITION, AIR, AIR FORCE, CELLS, CONSTRUCTION, CONTROL, CONTROL SYSTEMS, DIVISION, ENCAPSULATION, FUNCTIONS, HANSTERS, INTERACTIONS, IONIZING RADIATION, LABORATORIES, LIPOSOMES, MEASUREMENT, MICROWAVES, MUTATIONS, OVARIES, PERSONNEL, POLYMERS, PROTOTYPES, RESOURCES, SELECTION, SENSITIVITY, SPECTRUM ANALYSIS, TEMPERATURE, TEMPERATURE CONTROL, TIME, TRANSFORMATIONS, GENES, RADIOBIOLOGY.

IDENTIFIERS: (U) \*Cellular responses, \*Molecular responses, \*Exposure, PE61102F, WJAFOSR2312AS.

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Organization of the Optical Society of America Photonic Science Topical Meeting Series. Volume 3. The Microphysics of Surfaces: Beam-Induced Processes Held in Santa Fe, New Mexico on 11-13 February 1991.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91.

MAY 92 85P

PERSONAL AUTHORS: Quin, Jarus W.

CONTRACT NO. AFOSR-91-0178

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF  
7R-92-0515, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual items, see AD-P007 899 thru AD-P007 937.

ABSTRACT: (U) Contents: Beam Assisted Film Growth; Photon and Hot Electron Induced Surface Reactions; Initiation and Growth of Surface Layers; Beam Assisted Etching; Laser Induced Desorption and Reaction; Processing and Applications; Structure and Deposition of Metal Overlayers; Surface Modification and Analysis; and Nanoscale Structure and Lithography.

DESCRIPTORS: (U) \*SURFACE CHEMISTRY, \*SYMPOSIA, SURFACE PROPERTIES, PARTICLE BEAMS, OPTICAL MATERIALS, PHOTONICS.

IDENTIFIERS: (U) WJAFOSR2308A1, PE61102F. Compilation reports, Chemideposition.

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NORTHERN ARIZONA UNIV FLAGSTAFF COLL OF HEALTH PROFESSIONS

(U) Effects of Early Bright, Late Bright and Dim Illumination upon Circadian Neuroendocrine, Electrophysiological and Behavioral Responses.

DESCRIPTIVE NOTE: Final rept. May 91-May 92.

JUL 92 58P

PERSONAL AUTHORS: Hannon, Patrick R.; Brainard, George; Gibson, William; French, Jonathan; Hopson, Margaret

CONTRACT NO. AFOSR-91-0271

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0793, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) This study assessed the effects of bright light on biological and behavioral measures to determine if bright light can reduce fatigue and enhance human work performance. Female subjects (N=37) were exposed to one of 3 lighting conditions in a between groups research design. Subjects in the bright light groups were exposed to 5000 lux white light from 1800 hrs to 2400 hrs (Early Bright) or from 2400-0600 hrs (Late Bright from 1800-0600 hrs Dim Red). Blood sample were taken every 90 minutes. Repeated measures ANOVA indicated a significant interaction effect (light x time) for tympanic temperature, ( $F=3.339$ ,  $p=.001$ ). The bright light conditions maintained higher tympanic temperatures from 2300 hrs through 0400 hrs. Plasma melatonin measures indicated a main effects difference of  $F=4.009$ ,  $p=.029$ . Most importantly, the results showed that the light x time of night interaction for melatonin was significant at  $F=59.436$ ,  $p=.000$ . The suppression of plasma melatonin was greatest from 2230 hrs through 0500 hrs in the Early Bright and Late Bright groups. Cortisol was not affected by the ambient lighting conditions. Dim red light resulted in higher scores on the Stanford Sleep Scale from 2400 hrs through 0500 hrs (light x time,  $F=2.595$ ,

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$p=.023$ ). Subjects under the bright light conditions performed better on the cognitive measures of Code Substitution accuracy ( $F=3.918$ ,  $p=.030$ ) and Column Addition accuracy ( $F=4.980$ ,  $p=.017$ ). These data show some improvements in cognitive performance and alertness associated with bright light exposure and occur with changes in tympanic temperature and plasma melatonin at critical time periods.

**DESCRIPTORS:** (U) \*ATTENTION, \*CORTISOL, \*FATIGUE, \*WHITE LIGHT, \*PSYCHOLOGY, \*PERFORMANCE(HUMAN), \*BEHAVIORAL SCIENCES, ACCURACY, ADDITION, BLOOD, FEMALES, HUMANS, INTERACTIONS, LIGHT, NIGHT, SCALE, SLEEP, SUPPRESSION, TEMPERATURE, TIME, WORK, BIOLOGY.

**IDENTIFIERS:** (U) WJAFOSR2312A3, PE61102F.

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CHICAGO UNIV IL DEPT OF EDUCATION

IDAHO UNIV MOSCOW CENTER FOR HAZARDOUS WASTE REMEDIATION RESEARCH

(U) Bias in Reporting Location.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 91-28 Feb 92.

(U) In Situ Biodegradation of Nitroaromatic Compounds in Soil.

APR 92 6P

DESCRIPTIVE NOTE: Annual rept. 15 Jun 91-14 Jun 92.

PERSONAL AUTHORS: Huttenlocher, Janellen; Hedges, Larry V.

JUN 92 27P

CONTRACT NO. AFOSR-90-0218

PERSONAL AUTHORS: Crawford, Ronald L.

PROJECT NO. 2313

CONTRACT NO. AFOSR-91-0315

TASK NO. BS

PROJECT NO. 3484

MONITOR: AFOSR, XF  
TR-92-0777, AFOSR

TASK NO. D7

MONITOR: AFOSR, XF  
TR-92-0781, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Two papers emerged from this project during the period. One major paper, 'Reconstructing the Past: Category Effects in Estimation', will appear in Volume 28 of The Psychology of Learning and Motivation. A second paper, tentatively titled 'Conceptual Combination for Categories with Graded Structure', is in preparation for The Psychological Review. Experiments have been conducted on estimation of the distance between spatial locations. Other experiments have examined whether categories are imposed when information is used at retrieval, or when the information is originally encoded.

DESCRIPTORS: (U) \*PSYCHOLOGY, LEARNING, MOTIVATION, SPATIAL DISTRIBUTION, PERCEPTION(PSYCHOLOGY).

IDENTIFIERS: (U) WUAFOSR2313BS, PE61102F, Boundary effects, Location.

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigations on the in situ biodegradation of nitroaromatic compounds have progressed nicely. Laboratory studies have identified the primary intermediate compounds from anaerobic metabolism to be hydroxyaromatic compounds that are all biodegradable. Studies have identified the environmental parameters affecting the initial transformation of TNT and RDX in anaerobic cultures. Optimum pH and temperatures for biodegradation is a pH of 8 and temperatures of 25-35 degrees C. Microbiological studies will continue to determine ways of enhancing the biodegradation of these compounds.

DESCRIPTORS: (U) \*RDX, \*TNT, \*BIODETERIORATION, LABORATORIES, METABOLISM, PARAMETERS, TEMPERATURE, TRANSFORMATIONS, SOIL TESTS, ANAEROBIC PROCESSES.

IDENTIFIERS: (U) WUAFOSR3484D7, PE61103D, \*Nitroaromatic compounds, In situ analysis, \*Biodegradation.

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SOUTHERN METHODIST UNIV DALLAS TX DEPT OF MATHEMATICS

(U) Singular Perturbation Methods for Nonlinear Dynamical Systems and Waves.

small periodic forcing causes the existence of an infinite sequence of resonance layers that coalesce on the separatrix.

DESCRIPTORS: (U) \*OSCILLATORS, \*PARTIAL DIFFERENTIAL EQUATIONS, \*PERTURBATIONS, \*TRAVELING WAVES, AMPLITUDE, BEHAVIOR, BOUNDARIES, CROSSINGS, DETERMINATION, DIFFERENTIAL EQUATIONS, EQUATIONS, LAYERS, MODULATION, ORBITS, OSCILLATION, PHASE, RESONANCE, SEQUENCES, TIME, VARIATIONS, WORK.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 87-28 Feb 92.

JUL 92 18P

PERSONAL AUTHORS: Haberman, Richard

IDENTIFIERS: (U) Nonlinear oscillators, Nonlinear waves, Separatrix crossing, Slow variations, Dynamical systems, WJAFOSR2304A9, PE81102F.

CONTRACT NO. AFOSR-87-0134

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF  
TR-92-0787, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress has been made on understanding the complex behavior of physical processes described by nonlinear ordinary and partial differential equations through the use of singular perturbation methods. Modulation equations for the amplitude and phase of dissipatively perturbed strongly nonlinear oscillators and traveling waves have been derived from the action equation using the usual method of multiple scales. Equivalent results have been obtained using the method of averaging developed for the first time for a nonlinear partial differential equation, the Klein-Gordon equation, describing dispersive waves. In another study, Whitham's averaged Lagrangian principle has been generalized to account for arbitrary perturbations of the initial conditions. In other work, Bourlind and Haberman analyzed the slow crossing of an unperturbed homoclinic orbit (separatrix) for dynamical systems. Solutions in the neighborhood of the separatrix are matched to the nonlinear slowly varying oscillations, resulting in the determination of accurate analytic formulas for the boundaries of the basin of attraction and connection formulas across the separatrix for the amplitude and phase. Under current investigation are generalizations of the slow crossing of a separatrix to arbitrary Hamiltonian systems and to nonchaotic situations in which

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VIRGINIA UNIV CHARLOTTESVILLE DEPT OF PSYCHOLOGY  
(U) Perceptual Constraints on Understanding Physical Dynamics.

DESCRIPTIVE NOTE: . Annual rept. 1 Dec 90-30 Nov 91.

NOV 91

4P

PERSONAL AUTHORS: Proffitt, Dennis R.; Glidden, David

CONTRACT NO. AFOSR-91-0057

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF  
TR-92-0788, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The work completed covers four distinct sets of experiments. (1) Dynamical understandings of multidimensional systems: Two sets of published studies, one theoretical article, and one doctoral dissertation have been completed. These works demonstrate that people employ heuristics when evaluating ongoing dynamical systems and that their ability to extract relevant motion information is limited by general principles of perceptual organization. (2) Learning to evaluate dynamical systems: Our work indicates that judgements of rotation, translation, size, and angle form an algebraic difference structure. However, the operations that can be performed on translation and size are different from those that can be applied to rotation and angle. (3) Path perception in both apparent and continuous motions: One set of studies has been published in which it is shown that the apparent motion of an object that undergoes an orientation change in depth is resob and by a perceived curved trajectory in depth. (4) Basic issues in motion information processing. Two the sets of experiments have been published. It was found that in both the perception of depth in small object rotations and in motion parallax the perceptual system extracts only a subset of the motions present in optical flow and combines this with inherent perceptual biases.

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DESCRIPTORS: (U) \*DYNAMICS, \*PERCEPTION, \*PHYSICS, ANGLES, COGNITION, DEPTH, FLOW, INFORMATION PROCESSING, LEARNING, MOTION, OPERATION, ORGANIZATIONS, PATHS, PROCESSING, ROTATION, STRUCTURES, THESES, TRAJECTORIES, TRANSLATIONS, WORK, DISPLACEMENT, JUDGEMENT(PSYCHOLOGY), PHYSICAL PROPERTIES, VOLUME, QUANTITY, SIZES(DIMENSIONS).

IDENTIFIERS: (U) Perception, Cognition, Apparent motion, Motion parallax, PE81102F, WJAFOSR2313A4.

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EYE RESEARCH INST OF RETINA FOUNDATION BOSTON MA

(U) Perception of Lightness and Brightness in Complex Patterns.

DESCRIPTIVE NOTE: Annual rept. 1 May 81-30 Apr 82.

JUN 82 24P

PERSONAL AUTHORS: Arend, Lawrence E., Jr

CONTRACT NO. AFOSR-88-0377

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0778, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Perception of surface color plays important part in many everyday visual tasks. Psychophysical and neurophysiological data on early visual processes suggest a number of potential sensory limitations on the accuracy of surface-color perception. A new paradigm has been used to clarify the relationships between early visual processes and perception of achromatic surface colors (shades of gray). Psychophysical measurements of perceived surface color were made using achromatic stimulus patterns that were complex enough to support unambiguous perception of surfaces and lights. Lightness (apparent reflectance), brightness (apparent luminance) and local brightness contrasts were all measured using the same stimulus patterns. According to a number of models, lightness is closely related to local brightness contrast, but the data indicated that the relationship is more complicated than previously supposed. The brightness contrast data are well described by Stiles' threshold-vs-radiance curve, which is widely thought to be a characteristic of retinal adaptation processes. Both brightness and lightness are slightly higher on dark gray backgrounds than on white backgrounds. This perceptual error appear to be independent of illumination level.

DESCRIPTORS: (U) \*BRIGHTNESS, \*VISUAL PERCEPTION,

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\*PSYCHOPHYSIOLOGY, \*NEUROPHYSIOLOGY, \*EXPERIMENTAL PSYCHOLOGY, ACCURACY, ADAPTATION, BACKGROUND, COLORS, COMPARISON, CONTRAST, ILLUMINATION, IMAGES, LABORATORIES, LIMITATIONS, LUMINANCE, MEASUREMENT, MODELS, PATTERNS, PERCEPTION, RADIANCE, REFLECTANCE, SURFACES, COLOR DISPLAYS, LABORATORY TESTS, STIMULI, ILLUMINATED SIGHTS, WORK MEASUREMENT.

IDENTIFIERS: (U) PE91102F, WUAFOSR2313A5, Psychophysical measurement, Perceived surface colors.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

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MEDICAL COLL OF VIRGINIA RICHMOND DEPT OF NEUROLOGY

(U) The Effects of Hydrazines of Neuronal Excitability.

DESCRIPTIVE NOTE: Final rept. 1 May 87-31 Dec 91,

DEC 91 29P

PERSONAL AUTHORS: DeLorenzo, Robert J.

CONTRACT NO. AFOSR-87-0235

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
92-0752, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The hippocampal slice preparation has been used to demonstrate that hydrazines cause seizures. Electrophysiological, biophysical and pharmacological techniques were used to examine the effects of hydrazines at both a single neuron and a systems level in mammalian hippocampus. The investigators have demonstrated that hydrazines increase neuronal excitability and the rate of neuronal firing, but the mechanisms by which they produce these effects remains to be elucidated.

DESCRIPTORS: (U) \*HIPPOCAMPUS, \*HYDRAZINES, \*ELECTROPHYSIOLOGY, NERVE CELLS, PREPARATION, RATES, ANIMALS, HAZARDS, HEALTH, LABORATORIES, TOXICITY, DRUGS, RESPIRATORY SYSTEM, PHARMACOLOGY, MILITARY APPLICATIONS, INDUSTRIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, Seizures, Neuronal excitability.

AD-A254 091 8/3

MONTANA STATE UNIV BOZEMAN DEPT OF CHEMISTRY

(U) Development of Methods for Detection of Lipid Peroxidation Products in Human Tissues Generated by Environmental Toxins.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 91-30 Jun 92,

JUN 92 4P

PERSONAL AUTHORS: VAN Kuijk, Frederick J.

CONTRACT NO. AFOSR-90-0327

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0755, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research to date has resulted in the synthesis of isotope labelled 8-oxononanoate and the development of generic methods for the introduction of a variety of isotopic labels in the 4-hydroxyalkenals. Additional studies demonstrated that 4-hydroxyalkenals could be released from protein sulphydryl groups. Future studies will investigate whether 4-hydroxynonenal binds to the sulphydryl groups on human rhodopsin interfering with the visual transduction process.

DESCRIPTORS: (U) \*EYE PIGMENTS, \*PROTEINS, DETECTION, HUMANS, ISOTOPE, LABELS, LIPIDS, SYNTHESIS, VANS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, \*Lipid peroxidation, Human tissues, Protein sulphydryl groups.

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COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) A Laser Flash Photolysis Study of Magnetic Field Effects in Photoinduced Electron Transfer between Ru(bpy)3(2+) and N,N'-dimethylviologen in Micellar Solutions.

92

14P

PERSONAL AUTHORS: Turro, Nicholas J.; Khudyakov, Igor V.; Gopidas, Karical R.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XF  
TR-92-0772, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics, v162 p131-143 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The kinetics of electron transfer between photoexcited Ru(bpy)32+ and N,N'-dimethylviologen 3 (MV. 2+) have been studied by means of laser flash photolysis in sodium dodecyl sulfate (SDS) and sodium laurate (SL) micelles. The decay of photoexcited Ru(bpy)2+ follows first-order kinetics with  $k_{obs} = 10(8) - 10(7)S^{-1}$ , and dependences of  $k_{obs}$  vs. surfactant and ODS obs quencher concentrations were obtained. Analysis of the data showed that the quenching is mainly intramolecular. Although SDS solutions show no escape of the radicals MV(+) and Ru(bpy)32+ from the micelles, for solutions of SL micelles an escape value  $0.8 \pm 0.08$  was determined. The dependences of  $k_{obs}$  on the concentration of SL and SDS show a drop in the vicinity of the cmc. Radical MV S is not incorporated into the micelles. An increase of  $\phi_{HES}$  in the SL micelles up to 20-25% was observed under application of an external magnetic field ( $B = 0.2-0.47$  T) during steady-state irradiation and laser flash photolysis studies. The magnetic field effect is mainly described according to a hyperfine coupling mechanism. Geminate recombination kinetics of the pair 3(MV+, Ru(bpy)3(2+)) was observed in

AD-A254 084 CONTINUED

both SDS and SL micelles. Pertinent kinetic analyses were made and the requirements for geminate recombination kinetics observations were discussed. Photoinduced electron transfer, Ruthenium complexes, Solar energy.

DESCRIPTORS: (U) \*ELECTRON TRANSFER, \*FLASHES, \*LASERS, \*MAGNETIC FIELDS, \*PHOTOLYSIS, \*RUTHENIUM, \*SODIUM, AVAILABILITY, CHEMICALS, COUPLINGS, DECAY, DROPS, ELECTRONS, ENERGY, EXTERNAL, IRRADIATION, KINETICS, OBSERVATION, PHYSICS, QUENCHING, REPRINTS, REQUIREMENTS, SOLAR ENERGY, STEADY STATE, SULFATES, SURFACE ACTIVE SUBSTANCES, TRANSFER, VALUE.

IDENTIFIERS: (U) PES1102F, WJAFOSR230382, \*N,N'-dimethylviologen, SDS(Sodium Dodecyl Sulfate), \*Micellar solutions, Hyperfine coupling mechanics, Geminate recombinations.

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MEMPHIS STATE UNIV TN ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) An MCSCF Study of the Electric Properties of the Be Atom.

FEB 92 5P

DESCRIPTIVE NOTE: Final rept. Dec 90-Dec 91.

PERSONAL AUTHORS: Pluta, Tadeusz; Kurtz, Henry A.

91 24P

CONTRACT NO. AFOSR-90-0010

PERSONAL AUTHORS: Wleckowski, A.; Zelenay, P.; Varga, K.

PROJECT NO. 2303

CONTRACT NO. AFOSR-89-0368

TASK NO. 83

PROJECT NO. 2303

MONITOR: AFOSR, XF  
TR-92-0771, AFOSR

TASK NO. A1

MONITOR: AFOSR, XA  
TR-92-0776, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v189 n3 p255-285, 7 Feb 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The polarizability (alpha), second hyperpolarizability (gamma), and the dipole-dipolequadrupole hyperpolarizability (B) is calculated by a finite-field procedure for the Be atom using variation RHF and MCSCF methods and nonvariational MBPT(2). The values obtained are compared to previous calculations. The main advantage of the MCSCF methods is that it allows the use of the dipole moment expansion instead of the energy expansion. This leads to much more reliable values for gamma and B.

DESCRIPTORS: (U) \*ATOMS, \*BERYLLIUM, \*ELECTRICAL PROPERTIES, AVAILABILITY, CHEMICALS, DIPOLE MOMENTS, DIPOLES, ENERGY, EXPANSION, MOMENTS, OPTICS, PHYSICS, REPRINTS, VALUE, VARIATIONS, MOLECULES, INTERACTIONS, TAYLORS SERIES.

IDENTIFIERS: (U) Nonlinear Optics, Hyperpolarizabilities. PEG1102F, WUAFOSR230383, \*MCSCF Study.

Availability: Pub. in Jnl. Chim. Phys. v88 p1247-1270, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Adsorption of bisulfate anions on single crystal Pt(111) electrode, ordered and disordered and on polycrystalline platinum has been studied by the use of radioactive labeling method and cyclic voltammetry. The studies have revealed that the saturation surface concentration of bisulfates is 20% higher on the ordered Pt(111) surface than on the polycrystalline electrode. The increased adsorption may most likely be due to a favorable spatial configuration of the anions and surface water molecule networks at the single crystal interface. A consistent model of adsorption on the ordered surface emerges if one assumes that a form of hydrogen exists that is stable at relatively positive electrode potentials, adsorption of which is modified by coadsorbed (bi)sulfate. Available, although not yet direct, evidence is presented which shows that this form of hydrogen is a subsurface hydrogen. The significance of surface geometry and stability in the anomalous voltammetric behavior is discussed vs. that of the long range order effects on the solution side of the Pt(111) solid-liquid interface.

DESCRIPTORS: (U) \*ADSORPTION, \*PLATINUM, \*VOLTAMMETRY,

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\*RADIOACTIVITY, \*LABELED SUBSTANCES, ABSTRACTS, ANIONS, AUDITORY SIGNALS, AVAILABILITY, BEHAVIOR, CONFIGURATIONS, CRYSTALS, ELECTRODES, GEOMETRY, HYDROGEN, INTERFACES, LIQUIDS, MODELS, MOLECULES, NETWORKS, POLYCRYSTALLINE, REPRINTS, SATURATION, SINGLE CRYSTALS, SOLIDS, STABILITY, SUBSURFACE, SURFACE WATERS, SURFACES, WATER, SULFATES, ELECTROCHEMISTRY, RADIOCHEMISTRY, ELECTROLYTES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1, \*Bisulfates, Ordered surfaces, Disordered surfaces, Gas phases, In situ measurements.

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Reduction of Perchlorate on Rhodium and its Specificity to Surface Crystallographic Orientation.

DESCRIPTIVE NOTE: Final rept. Apr 89-Apr 90.

91 17P

PERSONAL AUTHORS: Rhee, C.K.; Wasberg, M.; Wleckowski, A.; Zelenay, P.

CONTRACT NO. AFOSR-89-0388

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0775, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Catalysis Letters, v10 p149-184, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Catalytic properties of Rh(100), Rh(111) and polycrystalline rhodium electrodes in the process of perchlorate reduction in aqueous media have been studied. The reduction rates obtained under various conditions, as well as results of ultra-high vacuum (LEED, Auger) surface analyses of emersed Rh(100) surfaces, have provided evidence that surface chloride is the main reduction product. A temperature dependent chloride desorption has also been found via measurements of steady-state reduction currents and through chemical analysis of the electrolytic perchlorate solutions. The data demonstrate that under transient conditions, that is, when surface chloride formation determines the reaction rates the reduction current decreases in the order: Rh(100) > Rh(poly) > Rh(111). Under steady-state conditions the rate order is: Rh(100) = Rh(poly) > Rh(111). The reduction process is pH dependent and, is a prerequisite requires a contact adsorption of perchlorate on the metal sites. Prospects for using rhodium as a catalyst or catalytic additive in electrocatalysis of inorganic species are discussed.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

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AD-A254 088 8/3 8/15

CALIFORNIA UNIV IRVINE

DESCRIPTORS: (U) \*PERCHLORATES, \*REDUCTION, \*RHODIUM, \*SURFACES, ADDITIVES, ADSORPTION, AUGERS, AVAILABILITY, CATALYSIS, CATALYSTS, CHEMICAL ANALYSIS, CHEMICALS, CHLORIDES, DESORPTION, ELECTRODES, HIGH VACUUM, MEASUREMENT, MEDIA, METALS, POLYCRYSTALLINE, RATES, REACTION KINETICS, REPRINTS, SITES, STEADY STATE, TEMPERATURE, TRANSIENTS, VACUUM, ULTRAHIGH VACUUM, ELECTROLYTES, ELECTROCATALYSTS, SINGLE CRYSTALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1,  
\*Crystallographic orientation, \*Specificity, Aqueous media,  
Inorganic species.

(U) Cellular Analogs of Operant Behavior.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 88-31 May 92,

JUL 92 182P

PERSONAL AUTHORS: Stein, Larry; Belluzzi, James D.; McAfee, Donald

CONTRACT NO. AFOSR-88-0212

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0784, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Using the hippocampal-slice preparation, we attempted to demonstrate for the first time the operant conditioning of pyramidal cell bursting activity using local micropressure applications of transmitters and drugs as reinforcement; the same injections administered independently of bursting provided a control for direct pharmacological stimulation or facilitation of neuronal firing. The results suggested that the spontaneous activity of individual CA1 pyramidal cells may be reinforced with burst-contingent injections of dopamine D1 and D2 and cannabinoid receptor agonists, whereas CA3 bursting may be reinforced with mu-opioid agonists. Many of these indications of cellular operant conditioning were confirmed at the behavioral level in parallel studies of hippocampal and intravenous self-administration. The results are consistent with the hypothesis that, in the brain slice experiments, drug injections facilitated hippocampal bursting by a cellular mechanism analogous to behavioral reinforcement.

DESCRIPTORS: (U) \*DOPAMINE, \*DRUGS, \*HIPPOCAMPUS, \*PHARMACOLOGY, \*OPIUM ALKALOID, ANALOGS, BEHAVIOR, BRAIN, CELLS, CONTROL, MANAGEMENT, PLASTIC PROPERTIES, PREPARATION, RUPTURE, TIME, TRANSMITTERS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A254 042 4/2 20/4 8/3

IDENTIFIERS: (U) Cellular operant conditioning, Synaptic plasticity, Drug self-administration, Dopamine, Opioids, Reinforcement transmitters, Reinforcement receptors, PE81102F, WUAFOSR2312A1, \*Operant conditioning, Pyramidal cells.

FLORIDA STATE UNIV TALLAHASSEE GEOPHYSICAL FLUID DYNAMICS INST

(U) Nonlinear Dynamics Underlying Atmospheric Predictability.

DESCRIPTIVE NOTE: Final rept. 15 Jul 89-14 Jul 92.

AUG 92 23P

PERSONAL AUTHORS: Pfeffer, Richard L.

CONTRACT NO. AFOSR-89-0482

PROJECT NO. 3484

TASK NO. A7

MONITOR: AFOSR, XF  
TR-92-0798, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the three years of this University Research Initiative, 7 papers have been published in quality scientific journals with high standards of review and 3 have been submitted for publication based on full or partial support of AFOSR-89-0482, including the work of four Ph.D. candidates (one of whom received his Ph.D degree within the last two years). There was partial support from this grant on a software package for solving a general second order parameter involved system of elliptic partial differential equations on a two dimensional domain with Dirichlet and/or Neuman boundary conditions.

DESCRIPTORS: (U) \*CONVECTION(ATMOSPHERIC), \*FLUID DYNAMICS, \*ATMOSPHERIC MOTION, DIFFERENTIAL EQUATIONS, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, QUALITY, STANDARDS, TWO DIMENSIONAL, COMPUTER PROGRAMS, CLIMATOLOGY, ABSTRACTS, OCEAN BOTTOM TOPOGRAPHY, STRATIFICATION, FLUID MECHANICS, BOUNDARY LAYER FLOW, ATMOSPHERIC TEMPERATURE, SYMPOSIA, ATMOSPHERE MODELS.

IDENTIFIERS: (U) PE81103D, WUAFOSR3484A7, Stationary waves, Baroclinic waves, Shear flow, Baroclinic flow.

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NEW MEXICO STATE UNIV LAS CRUCES COMPUTING RESEARCH LAB

(U) Complex Cognitive Information Processing: A  
Computational Architecture (COMPOSIT) With a  
Connectionist Implementation.

DESCRIPTIVE NOTE: Final rept. 15 May 88-14 Jan 92,

JUL 92 23P

PERSONAL AUTHORS: Barnden, John A.

CONTRACT NO. AFOSR-88-0215

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0795, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We developed several novel representational and processing techniques for use in connectionist systems designed for high-level AI-like applications such as common-sense reasoning and natural language understanding. The techniques were used, for instance, in a connectionist system (Composit/SYLL) that implements Johnson-Laird's mental-model theory of human syllogistic reasoning. This theory was chosen as a case study for verifying the power of the techniques, because it was developed independently of the project, contains complex symbolic structures of various types, and requires complex sequences of operations. The resulting connectionist system is probably the most advanced, complex, and complete connectionist rule-based system in existence. It has a more complete scheme for binding rule-variables and for role binding than any other connectionist system. The representational techniques developed in the project were Relative-Position encoding (RPE) and Pattern-Similarity Association (PSA). Rpe allows structure to be encoded by the relative positioning of connectionist activation patterns within a subnetwork. PSA allows structure to be encoded by having different substructures include similar activation subpatterns. These techniques are similar to data structuring techniques used in computer memory (in

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particular, PSA is similar to associative addressing), but they had not previously been used in any non-trivial way in connectionism. The most distinctive processing technique developed in the project was the Temporal-Winner-Take-All (TMTA) method for selection in connectionist networks. This is more convenient and efficient for some purposes than conventional WTA methods.

DESCRIPTORS: (U) \*INFORMATION PROCESSING, \*COMPUTER ARCHITECTURE, ACTIVATION, ADDRESSING, ANALOGIES, ARCHITECTURE, CASE STUDIES, CODING, COMPUTERS, DEGRADATION, HUMANS, LANGUAGE, MODEL THEORY, MODELS, NATURAL LANGUAGE, NETWORKS, OPERATION, ORGANIZATIONS, PATTERNS, POWER, PROCESSING, REASONING, RULE BASED SYSTEMS, SELECTION, SENSITIVITY, SEQUENCES, SIGNALS, STRUCTURES, THEORY, VARIABLES, SYMBOLS.

IDENTIFIERS: (U) Connectionism, Neural networks, Connectionist Rule-based systems, Symbolic processing, Variable binding, Role binding, Structure-sensitivity, Systematicity, Compositionality, PE81102F, WJAFOSR2304A2, Reduced representations, Holistic processing, Winner-take-all, Belief representation, Analogy, Case-based reasoning, Graceful degradation, Robustness, Mental models.

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BOSTON UNIV MA

(U) Interactive Ionosphere Modeling: A Comparison Between  
TIGCM and Ionosonde Data.

local time. Observed effects are interpreted in terms of  
plausible electric field, neutral wind, and neutral  
composition changes during the storm period and where  
possible ionosphere, modeling, ionosonde.

JUN 92 12P

DESCRIPTORS: (U) \*IONOSONDES, \*IONOSPHERE, \*IONOSPHERIC  
DISTURBANCES, \*MAGNETIC STORMS, \*GEOMAGNETISM,  
ATMOSPHERICS, \*CIRCULATION, COORDINATES, DYNAMICS,  
ELECTRIC FIELDS, GLOBAL, GRAPHICS, LATITUDE, LAYERS,  
MODELS, POLYNOMIALS, SIMULATION, STORMS, THERMOSPHERE,  
VARIATIONS, WIND, ATMOSPHERIC MOTION, IONOSPHERIC MODELS,  
REPRINTS.

PERSONAL AUTHORS: Codrescu, M. V.; Roble, R. G.; Forbes,  
J. M.

CONTRACT NO. F4820-92-J-0092

PROJECT NO. 2310

TASK NO. BS

MONITOR: AFOSR, XF  
TR-92-0757, AFOSR

IDENTIFIERS: (U) WJAFOSR2310BS, PE81102F, TIGCM.

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Geophysical Research, v97  
nA6 p8591-8600, 1 Jun 92. Available only to DTIC users.  
No copies furnished by NTIS.

ABSTRACT: (U) Results from a time dependent geomagnetic  
storm simulation of the coupled thermosphere and  
ionosphere using the new interactive thermosphere-  
ionosphere general circulation model (TIGCM) (Roble et al.  
, 1988) of the National Center for Atmospheric Research  
are compared with F2- layer data obtained from a  
latitudinal chain of East Asian ionosonde stations  
situated close to the -165 deg magnetic meridian and  
separated by about 5 deg in magnetic latitude. This is  
among the first extended comparisons (10 days) between  
the TIGCM modeled ionosphere and data, where the effects  
of neutral dynamics on the ionosphere are studied using a  
global, fully interactive thermosphere-ionosphere model.  
The ionosonde stations provide latitudinal coverage that  
extends from 15 deg to 50 deg magnetic north. Hourly  
values from both the simulation results and ionosonde  
data for hmf2, foF2, and meridional neutral winds, for  
the period March 18-28, 1979, are fitted in latitude  
using Legendre polynomials, and variations from quiet-  
time values are displayed in latitude-UT coordinates.  
Color graphics fo both the simulation and data are used  
to illustrate the equatorward penetration of ionospheric  
disturbances and their dependence on Kp, storm time, and

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KING'S COLL LONDON (UNITED KINGDOM) DEPT OF PHYSICS

(U) Numerical Modelling of Fringing Fields and their Use for Complex Permittivity Measurements at High Frequencies.

DESCRIPTIVE NOTE: Annual technical rept. Feb 81-Feb 92,

MAR 92

22P

PERSONAL AUTHORS: Gabriel, Camelia

CONTRACT NO. AFOSR-91-0122

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
TR-97-0747, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Interest in the use of open ended coaxial probes for dielectric measurements stems from their suitability to a variety of applications in material science, chemical, biochemical and biomedical fields. This report deals with the theoretical principles involved in the implementation of this technique and the simplifying assumptions adopted in practice. A rigorous formulation based on transmission line theory will be derived and compared to a number of simpler models reported in the literature and used for dielectric measurements with various degrees of success. Complex permittivity, non-destructive measurement.

DESCRIPTORS: (U) \*DIELECTRICS, CHEMICALS, FORMULATIONS, MATERIALS, MEASUREMENT, MODELS, NUMBERS, PROBES, THEORY, TRANSMISSION LINES.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2312A5.

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RHODE ISLAND UNIV KINGSTON DEPT OF MECHANICAL ENGINEERING AND APPLIED MECHANICS

(U) Mechanisms and Modelling of Environment-Dependent Fatigue Crack Growth in a Nickel Based Superalloys.

DESCRIPTIVE NOTE: Final rept. 1989-1991,

DEC 91

252P

PERSONAL AUTHORS: Ghonem, H.; Zheng, D.

REPORT NO. URI-MSL-921

CONTRACT NO. AFOSR-89-0285

PROJECT NO. 2302

TASK NO. BS

MONITOR: AFOSR, XF  
TR-92-0787, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) At loading frequencies below that of the transitional frequency level, which is typical of mission cycles of jet engines, the elevated temperature fatigue crack growth process in Alloy 718 is viewed to be fully environment-dependent. Of all the crack growth stages, this process, while is the most critical in high temperature application due to its highly accelerated crack growth rate, is the least studied or understood. The objective of this research program is to focus on the understanding of the mechanism controlling this oxidation-dependent stage in order to develop the ability to predict its associated crack growth performance under different environment conditions. For this purpose, three major studies have been carried out; the first was to provide evidence of the existence of the fully environment-dependent stage in which the crack growth rate would be equal to the oxygen penetration rate at the crack tip. The second study was to establish a crack tip oxidation mechanism on the basis of material, environmental and loading parameters interactions in the crack tip region. The last objective of this program is to establish a micromechanical based quantitative model to predict the environmentally-dominated crack growth

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stage.

CREIGHTON UNIV HEALTH SCIENCES CENTER OMAHA NE

DESCRIPTORS: (U) \*ALLOYS, \*CRACKS, \*ENVIRONMENTS, \*FATIGUE, \*SUPERALLOYS, \*NICKEL, \*GROWTH(GENERAL), BOUNDARIES, CYCLES, DIFFUSIVITY, DUCTILITY, ENGINES, FREQUENCY, GRAIN BOUNDARIES, HIGH TEMPERATURE, HOMOGENEITY, INTERACTIONS, JET ENGINES, MATERIALS, MISSIONS, MODELS, OXIDATION, OXYGEN, PARAMETERS, PENETRATION, RATES, REGIONS, TEMPERATURE, TIME, MECHANICS.

IDENTIFIERS: (U) Growth rate, Grain boundary ductility, Oxidation diffusivity, Intergranular, Homogeneity, Hold time, Slip, Cyclic loading frequencies, Alloy 718.

(U) Production of Reactive Oxygen Species by Polyhalogenated Cyclic Hydrocarbons (PCH).

DESCRIPTIVE NOTE: Annual rept. 15 Jun 91-14 Jul 92.

JUL 92 139P

PERSONAL AUTHORS: Stohs, Sidney J.

CONTRACT NO. AFOSR-90-0278

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0758, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of this research strongly support the hypothesis that polyhalogenated cyclic hydrocarbons (PCH) induce production of reactive oxygen species which may contribute to many of the toxic manifestations associated with these xenobiotics. A non-invasive method for assessing lipid peroxidation and oxidative stress has been developed. This method involves the simultaneous determination of the peroxidative lipid-urinary metabolites formaldehyde, malondialdehyde, acetaldehyde and acetone by HPLC. The investigators demonstrated that PCH can induce the formation of reactive oxygen species both in vitro and in vivo. Thus, PCH as endrin and lindane can induce formation of reactive oxygen species directly, and may not involve an indirect, hormonal or messenger system. These PCH can induce formation of reactive oxygen species in peritoneal macrophages, mitochondria and microsomes. Thus, multiple sources of reactive oxygen species exist in response to PCH. Antioxidants can inhibit the formation of reactive oxygen species. A relationship appears to exist between the ability to induce reactive oxygen species and the formation of oxidative tissue damage including lipid peroxidation, DNA single strand breaks, and decreased membrane fluidity. In addition, PCH induce altered calcium and iron homeostasis.

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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DESCRIPTORS: (U) \*ACETALDEHYDE, \*FORMALDEHYDE, \*OXYGEN, \*TOXICITY, ACETONES, ADDITION, ANTIOXIDANTS, CALCIUM, DAMAGE, DETERMINATION, HOMEOSTASIS, HYDROCARBONS, IRON, LIPIDS, MACROPHAGES, MEMBRANES, METABOLITES, MICROSONES, MITOCHONDRIA, PRODUCTION, RESPONSE, STRANDS, VISCOSITY, URINARY SYSTEM, IN VITRO ANALYSIS, IN VIVO ANALYSIS, DEOXYRIBONUCLEIC ACIDS.

IDENTIFIERS: (U) WJAFOSR2312A5, PE81102F, \*Reactive, \*PCH(Polyhalogenated Cyclic Hydrocarbons), Species, \*Xenobiotics, Lipid peroxidation, Oxidative stress, \*Malondialdehydes, \*Endrin, \*Lindane, Peritoneal, Tissue damage.

RHODE ISLAND UNIV NARRAGANSETT GRADUATE SCHOOL OF OCEANOGRAPHY

(U) Role of Resuspended Sediments in the Transport and Bioaccumulation of Toxic Organic Contaminants in Nearshore Marine Environment.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 91-31 May 92.

MAY 92 18P

PERSONAL AUTHORS: Latimer, James S.; Quinn, James G.

CONTRACT NO. AFOSR-91-0304

PROJECT NO. 3484

TASK NO. RS

MONITOR: AFOSR, XF  
TR-92-9748, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The resuspension - deposition continuum plays a significant part in the distribution of fine grained sediments and associated organic pollutants in aquatic systems. The chemistry of resuspension was investigated during a year long study by submitting a variety of sediments, including relatively contaminated homogenized dredge spoils and moderately contaminated stratigraphically intact sediments, to artificial resuspension using a particle entrainment simulator. Fine grained sediments were entrained into the test cylinder under conditions that are similar to the resuspension energy that would be expected in a typical estuary. Samples of the resuspended material were collected under a variety of experimental conditions, for the evaluation of organic contaminants such as polycyclic aromatic hydrocarbons (typically associated with oil pollution as well as petrogenically derived) and PCBs (a mixture of toxic organic constituents associated with industrial pollution) as well as for geotechnical parameters such as grain size and particle number and organic carbon content. Results thus far indicate that the volume weighted resuspended sediment load is proportional to the shear stress energy applied for any given core. Moreover, each core has a relatively characteristic erodibility pattern.

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apparently depending upon the distinctive characteristics of the sediment, for example, grain size composition, biological density, homogeneity, etc. Resuspension, deposition, organic contaminants, PES, hydrocarbons Poly chlorinated biphenols, estuaries, fine sediments, shear stress energy, erodibility.

DESCRIPTORS: (U) \*AROMATIC HYDROCARBONS, \*CONTAMINANTS, \*ESTUARIES, \*OIL POLLUTION, \*POLLUTANTS, CARBON, CHEMISTRY, CORES, DENSITY, DEPOSITION, DISTRIBUTION, ENERGY, ENTRAINMENT, FINES, GRAIN SIZE, HOMOGENEITY, HYDROCARBONS, MATERIALS, MIXTURES, NUMBERS, OILS, PARAMETERS, PARTICLES, PATTERNS, POLLUTION, SEDIMENTS, SIMULATORS, TEST AND EVALUATION, VOLUME.

IDENTIFIERS: (U) WJAFOSR3484RS, PE81103D.

MISSOURI UNIV-ST LOUIS DEPT OF PHYSICS

(U) Quantum 1/f Noise in High Technology Applications Including Ultrasmall Structures and Devices.

DESCRIPTIVE NOTE: Annual rept. no. 3, 15 Jun 81-14 Jun 92.

JUL 92 44P

PERSONAL AUTHORS: Handel, Peter H.

CONTRACT NO. AFOSR-88-0416

MONITOR: AFOSR, XF  
TR-92-0746, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The practical application of the quantum 1/f effect to quartz resonators and to infrared detectors present in this report allows us for the first time to understand and to extend the stability limits of quartz resonators. It also explains 1/f noise in most semiconductor devices and in infrared detectors considered in this report in the presence of radiation, although 1/f noise has been already successfully pushed below background in pSi on p-type Si Schottky diodes at RADC-Hanscomb. A fundamental breakthrough was performed through the first direct derivation of the coherent quantum 1/f effect from a special quantum-electrodynmic propagator, and from the author's general sufficient 1/f chaos criterion presented in the previous yearly report. Finally, the quantum 1/f cross-correlations derived by the author have been used to recalculate and to graph the quantum 1/f mobility fluctuations in Si and gallium arsenide samples as a function of temperature and doping, in good agreement with the measurements of Tacano in Japan and Hooge in the Netherlands. Quantum 1/f Noise Theory and Applications, 1/f Noise, Electronic Noise in Semiconductor Devices, Quantum 1/f Effect, Quartz Resonators, Noise in Ultrasmall Devices, Chaos, Nonlinear Dynamics.

DESCRIPTORS: (U) \*INFRARED DETECTORS, \*QUARTZ RESONATORS, \*SEMICONDUCTOR DEVICES, \*NOISE(ELECTRICAL AND ELECTROMAGNETIC), AGREEMENTS, BACKGROUND, CHAOS, CORRELATION, DETECTORS, DIODES, DOPING, DYNAMICS, ELECTRONICS, FUNCTIONS, GRAPHS, JAPAN, MEASUREMENT, Resonators, Noise in Ultrasmall Devices, Chaos, Nonlinear Dynamics.

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AD-A253 908 11/8 9/1

AD-A253 922 CONTINUED

MOBILITY, NETHERLANDS, NOISE, QUARTZ, RADIATION,  
RESONATORS, SEMICONDUCTORS, STABILITY, TEMPERATURE,  
THEORY, TIME, SILICON, SCATTERING.

SRI INTERNATIONAL MENLO PARK CA

(U) Mechanical Properties of Semiconductors and Their  
Alloys.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1.

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-13 Jan 82.

FEB 82 330P

PERSONAL AUTHORS: Sher, A.; Berding, M. A.; Paxton, A. T.;  
Krishnamurthy, .; Chen, A.-B.

CONTRACT NO. F49620-88-K-0009

PROJECT NO. 2308

TASK NO. 81

MONITOR: AFOSR, XF  
TR-92-0680, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A wide range of subjects have been treated in this contract. We have devoted time to the development and applications of two first principles computational methods: one, the full-potential linear muffin tin orbital (FP-LMTO) method is somewhat mature and highly accurate, while the other, linear combination of atomic orbitals (LCAO), is less accurate but more flexible and is easily incorporated into the other calculation methods we have in place, e.g., surface Green's function methods and CPA. Tight binding has also been used. These methods have been applied to solve a host of mechanical-property problems including elastic constants, cleavage energies, sublimation energies, interactions between surface atoms relating to their surface order-disorder state and growth theory, surface segregation, bulk order-disorder theory and phase stability, the effect of dislocations on electronic transport and electro-optic properties of semiconductors, the Ni-Al intermetallic phase diagram, planar fault energies in L12 alloys, high-performance structural metal alloy design, and a contribution to understanding the Jones theory of metal alloying. Many of these subjects have been brought to publishable conclusions. Whenever possible, we have presented our detailed results in the form of preprints and reprints, with only brief summaries of the work given here. In

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instances where the research is incomplete, we have given somewhat longer expositions. Mechanical properties, semiconductors, first principles, FP-LMT0, LCAD, tight binding.

DESCRIPTORS: (U) \*MECHANICAL PROPERTIES, \*SEMICONDUCTORS, \*NICKEL ALLOYS, \*ALUMINUM ALLOYS, ALLOYS, ATOMIC ORBITALS, ATOMS, CLEAVAGE, CONSTANTS, CONTRACTS, DIAGRAMS, DISLOCATIONS, ELECTRONICS, FAULTS, FUNCTIONS, INTERACTIONS, METALS, OPTICS, PHASE, PHASE DIAGRAMS, REPRINTS, STABILITY, SUBLIMATION, SURFACES, THEORY, TIME, TIN, TRANSPORT, WORK, GREENS FUNCTIONS, ELECTROOPTICS, ELECTRON TRANSPORT, HIGH TEMPERATURE, PLASTIC PROPERTIES.

IDENTIFIERS: (U) LPN-SRI-6882, FP-LMT0(Full) Potential Linear Muffin Tin Orbital).

AD-A253 904

8/3

CALIFORNIA UNIV IRVINE CENTER FOR THE NEUROBIOLOGY OF LEARNING AND MEMORY

(U) Synaptic Plasticity and Memory Formation.

DESCRIPTIVE NOTE: Final rept. 15 May 89-14 May 92.

MAY 92 7P

PERSONAL AUTHORS: Lynch, Gary

CONTRACT NO. AFOSR-89-0383

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0743, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work conducted during AFOSR-89-0383 indicates that long-term potentiation is induced and stabilized by variants of the chemistries that regulate adhesive relationships. Expression of the potentiation effect involves modification of a subgroup of postsynaptic receptors; this modification includes a change in the kinetics of the receptor's ion channel. New evidence linking long-term potentiation to memory was obtained during the tenure of the grant and pharmacological agents that promote its occurrence were identified. Based on this information, attempts to design and synthesize memory enhancing drugs have been initiated. The following paragraphs briefly describe these developments and cite relevant publications; a fuller description is found in the application for continuation of AFOSR support.

DESCRIPTORS: (U) \*SYNAPSE, \*NERVE CELLS, ADHESIVES, CHANNELS, DOCUMENTS, DRUGS, GRANTS, IONS, KINETICS, MODIFICATION, PLASTIC PROPERTIES, WORK.

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## DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

AD-A253 800 21/5

AD-A253 899 20/1

## OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(U) Fundamental Studies on Erosion in MPD Thrusters.

(U) Simulation in the Ultrasonic Submersion Test for Layered Anisotropic Plates.

DESCRIPTIVE NOTE: Final rept. 30 Sep 87-30 Sep 91.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89 - 31 Aug 92.

APR 92 88P

NOV 91 13P

PERSONAL AUTHORS: Subramaniam, V. V.

PERSONAL AUTHORS: Keer, Leon M.

CONTRACT NO. AFOSR-87-0380

REPORT NO. 0850-350-C452

PROJECT NO. 2308

CONTRACT NO. AFOSR-88-0399

TASK NO. AS

MONITOR: AFOSR, XF

TR-92-0785, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this research is to understand and quantify the mechanisms responsible for evaporative erosion in steady state magnetoplasma dynamic (MPD) thrusters. This is necessary in order to predict thruster characteristics and lifetimes for a given design. The Back-EMF theory of Onset has been refined and expanded to enable prediction of erosion rates for steady state, self-field MPD thrusters. This theory is capable of explaining both the observed oscillations as well as the increased erosion observed at Onset. This work represents the first time that the plasma discharge and electrode processes have been coupled.

DESCRIPTORS: (U) \*THRUSTERS, EROSION, PLASMA CONTROL, ELECTRODES, THERMIONIC EMISSION, STEADY STATE.

IDENTIFIERS: (U) PE81102F, LPN-OSURF766307/718842, WJAFOSR2308AS, Magnetoplasma dynamics.

ABSTRACT: (U) This is a report describing the research performed during the past two years. The project has been funded for two years, and additional funding for a third year is requested. The contents of this report includes the following: (1) A description of the typical ultrasonic submersion test set-up; and (2) A brief summary concerning the research achievements for the past two years. A renewal of one year was requested to complete work already brought to a high level during the past two years and is currently being funded. Composites, wave propagation, non-destructive evaluation.

DESCRIPTORS: (U) \*ULTRASONICS, \*ACOUSTICS, PROPAGATION, TEST SETS, TEST AND EVALUATION, WAVE PROPAGATION, WORK, INSPECTION.

IDENTIFIERS: (U) \*Anisotropic plates.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 849 17/9 12/1  
RAYTHEON CO WAYLAND MA EQUIPMENT DIV  
(U) Tomographic Mathematical Ideas Applied to Radar Detection.

AD-A253 844 7/2 20/12 20/5  
HARVARD UNIV CAMBRIDGE MA DEPT OF CHEMISTRY  
(U) Application of Scanning Tunneling Microscopy to Inorganic Chemistry.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Jan 92,

91 81P

JAN 92 43P  
PERSONAL AUTHORS: Bernfeld, Marvin

PERSONAL AUTHORS: Wu, Xian L.; Lieber, Charles M.

CONTRACT NO. F49620-89-C-0118

CONTRACT NO. AFOSR-90-0029

PROJECT NO. 7090

PROJECT NO. 2303

TASK NO. 00

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0718, AFOSR

MONITOR: AFOSR, XF  
TR-92-0807, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) By integrating the echoed pulses after detection, a Chirp diversity radar incorporating tomographic methods possesses none of the symptoms associated with conventional pulse Doppler techniques. The point spreading is a thumbtack-like function. Thus, range-Doppler coverage is unlimited since there are no ambiguity pop-ups to restrict this coverage. In addition, it appears that the mainlobe width depends exclusively on bandwidth. In contrast, the classic thumbtack ambiguity function is affected both by bandwidth and, inversely, by the integration time. More important than the preceding discovery is the property that ambiguity function is not constrained by radar uncertainty principles. Hence, the sands of the beach is not a suitable analogy to describe this ambiguity function. It is concluded that this superthumbtack characteristic offers superior resolution for an accurate interpretation of radar backscatter with respect to detection, parameter estimates, and imaging.

DESCRIPTORS: (U) \*DIVERSITY RADAR, \*APPLIED MATHEMATICS, \*TOPOGRAPHY, ADDITION, AMBIGUITY, ANALOGIES, BANDWIDTH, BEACHES, CONTRAST, DETECTION, ESTIMATES, FUNCTIONS, INTEGRATION, PARAMETERS, PULSES, RADAR, RESOLUTION, SIGNS AND SYMPTOMS, TIME, UNCERTAINTY, WIDTH.

IDENTIFIERS: (U) WUAFOSR709000, PE82301E.

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Availability: Pub. in Progress in Inorganic Chemistry, v39 p431-510 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The application of scanning tunneling microscopy (STM) to Inorganic Chemistry is reviewed with an emphasis on work carried out in the author's laboratory. The STM and theory of tunneling is discussed first, and then applications of this technique to low-dimensional material, semiconductors, and adsorbates is reviewed. STM, AFM, Materials, Low-Dimensional, Inorganic Chemistry.

DESCRIPTORS: (U) \*INORGANIC CHEMISTRY, \*MICROSCOPY, \*SCANNING, \*TUNNELING, ADSORBATES, CHEMISTRY, LABORATORIES, MATERIALS, SEMICONDUCTORS, THEORY, WORK, REPRINTS, TRANSITION METALS, ALKALI METALS, HIGH TEMPERATURE, INTERFACES, MOLECULES.

IDENTIFIERS: (U) Low dimensional inorganic materials, Dichalcogenides, GIC(Graphite Intercalation Compounds), Quasi-one-dimensional materials, Copper oxide superconductors, Macromolecules, PE81102F, WUAFOSR2303A2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 823 9/5 20/10

AD-A253 795 7/3 20/2 7/4

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Organization of the Optical Society of America  
Photonic Science Topical Meeting Series, Volume 7.  
Quantum Optoelectronics Held in Salt Lake City, Utah  
on 11-13 March 1991.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91.

MAY 92 328P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. AFOSR-91-0178

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0519, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual items, see AD-P007 819 thru AD-P007 889.

ABSTRACT: (U) Contents: Spectroscopy of Quantum-Confined Structures; Modulators; Quantum Effects in Microcavity Lasers; Magnetic and Collective Phenomena: Quantum-Well Lasers and Amplifiers; Nonlinear and Dynamical Effects in Heterostructures; Quantum-Well Devices; Tunneling.

DESCRIPTORS: (U) \*QUANTUM ELECTRONICS, SYMPOSIA, LASER APPLICATIONS, MAGNETIC PROPERTIES, AMPLIFIERS, HETEROJUNCTIONS, TUNNELING(ELECTRONICS), MODULATORS.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2308A1, Compilation Reports, Quantum wells, Optical modulators, Photonics, \*Optoelectronics.

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Silaamidide Salts: Synthesis, Structure, and Reactions.

91 8F

PERSONAL AUTHORS: Underiner, Gail E.; Tan, Robin P.; Powell, Douglas R.; West, Robert

CONTRACT NO. AFOSR-89-0004

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF  
TR-92-0844, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the American Chemical Society, v113 n22 p8437-8443, 1991. Available to DTIC users only.

ABSTRACT: (U) Five silaamidides have been prepared and characterized. Reactions of silaamidides with alcohols, amines, hydrogen bromide, n-butyllithium, and benzaldehyde are described. (Author)

DESCRIPTORS: (U) \*SILICON COMPOUNDS, \*STRUCTURES, \*CHEMICAL REACTIONS, \*SYNTHESIS(CHEMISTRY), REPRINTS, SINGLE CRYSTALS, LITHIUM, BUTYL RADICALS, PHENYL RADICALS, POTASSIUM, CHLORINE COMPOUNDS, ALCOHOLS, AMINES, HYDROGEN, BROMIDES, BENZALDEHYDES, CHEMICAL BONDS, CARBON, ATOMS, NITROGEN, CATIONS, ANIONS.

IDENTIFIERS: (U) \*Silaamidide salts, Orthorhombic, Multiple bonds, Allylic structures, Crown etherate salts, PEB1102F, WUAFOSR23031B2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 784 CONTINUED

AD-A2E3 784 7/6 7/3 20/13  
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF  
CHEMISTRY

(U) Poly(organophosphazenes) with Azoxybenzene Side Groups.  
Synthesis and Morphology.

91 8P

PERSONAL AUTHORS: Allcock, Harry R.; Kim, Chulhee

CONTRACT NO. AFOSR-89-0234

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF  
TR-92-0843, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Macromolecules, v24 n10 p2841-2845, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Azoxybenzene derivatives with chiral alkoxy terminal units were introduced as side chains in poly(organophosphazenes). The thermal behavior, morphology, and related electrical properties were investigated by using differential scanning calorimetry (DSC), X-ray diffraction, and measurements of the pyroelectric coefficient. From the DSC studies, suppression of side-chain crystallization by the azoxy group was evident. The thermal behavior was dependent on the spacer length and on the structure of the terminal units on the azoxybenzene group. A polyphosphazene with triethylenoxy spacer units and azoxybenzene groups, with a 2-octyloxy terminal unit at the para position, was amorphous and showed only a glass transition. However, 2-butoxy and 2-methyl-1-butoxy terminal groups imposed a layered morphology on the polymers. An X-ray diffraction study suggested that these polymers have a tilted layer morphology. Spontaneous polarization for the aligned polyphosphazenes was measured by integration of the pyroelectric coefficient with respect to temperature. Polymers, Polyphosphazenes, Electrical behavior, Polymer morphology, Materials, Synthesis.

DESCRIPTORS: (U) \*CRYSTALLIZATION, \*ELECTRICAL PROPERTIES, \*MORPHOLOGY, \*POLYMERS, \*SYNTHESIS, BEHAVIOR, CALORIMETRY, CHAINS, COEFFICIENTS, DIFFRACTION, GLASS, INTEGRATION, LAYERS, LENGTH, MATERIALS, MEASUREMENT, POLARIZATION, SCANNING, SPACERS, STRUCTURES, SUPPRESSION, TEMPERATURE, TERMINALS, TRANSITIONS, X RAY DIFFRACTION, X RAYS, REPRINTS, PHOSPHAZENE, BENZENE, LIQUID CRYSTALS.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303B2, \*Polyorganophosphazenes, \*Azoxybenzene side groups, Phosphorus nitrogen backbone, Alkoxy groups, Aryloxy groups, Azoxy group, Tilted layer morphology.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 793 CONTINUED

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Lubrication by Molecular Monolayers at Ni-Ni Interfaces.

Monolayers, Surface science, High loads, Low speeds, Boundary layer additives, Amphiphiles.

FEB 92 9P

PERSONAL AUTHORS: Gellman, Andrew J.

CONTRACT NO. AFOSR-89-0278

PROJECT NO. 2303

TASK NO. BS

MONITOR: AFOSR, XF  
TR-92-0642, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Vac. Sci. Technol. A, v10 n1 p180-187, Jan/Feb 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) An ultrahigh vacuum (UHV) tribometer has been used to study the frictional properties of sulfided Ni(100) surfaces modified by molecular films of ethanol ranging in thickness from submonolayer to multilayer. The instrument has been designed to allow preparation and characterization of the surfaces of pairs of metal single crystals under UHV conditions. Friction (shear) and adhesion (tensile/compressive) forces can then be measured between the two while in sliding contact. We observe very high and erratic friction forces between two Ni (100) surfaces with c(2x2) overlayers of sulfur. Adsorption of ethanol at coverages of greater than one monolayer results in a decrease in the coefficient of friction and sliding of one surface over the other with a well defined coefficient of friction.

DESCRIPTORS: (U) \*ETHANOLS, \*FRICTION, \*SURFACES, \*NICKEL, \*INTERFACES, \*MOLECULAR STRUCTURE, \*LUBRICATION, ADHESION, ADSORPTION, COEFFICIENTS, CRYSTALS, FILMS, METALS, PREPARATION, SINGLE CRYSTALS, SLIDING, SLIDING CONTACTS, SULFUR, THICKNESS, ULTRAHIGH VACUUM, VACUUM, REPRINTS, SULFIDES, SHEAR PROPERTIES, TRIBOLOGY, ALCOHOLS.

IDENTIFIERS: (U) PE61102F, MUAFOSR2303BS, \*Monolayers,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

AD-A253 792 17/5 20/6

AD-A253 792 CONTINUED

CALSPAN UB RESEARCH CENTER BUFFALO NY

(U) A Preliminary Study Associated with the Experimental Measurement of the Aero-Optic Characteristics of Hypersonic Configurations.

A flight test program based on existing sounding rocket technology was examined in order to design a high confidence flight test to validate the LENS ground test results. Hypersonic Vehicles, Endo-Atmospheric Interceptor, Optical Seeker, Aero-Optics Instrumentation, GASP.

DESCRIPTIVE NOTE: Final rept. 10 Feb 19-9 Feb 92,

JUN 92 158P

DESCRIPTORS: (U) \*HYPERSONIC FLOW, \*OPTICAL PROPERTIES, \*BOUNDARY LAYER FLOW, ATMOSPHERICS, BORESIGHTING, CONTAMINATION, ENVIRONMENTS, EQUATIONS, FACILITIES, FLIGHT, GROUND BASED, HOLOGRAPHY, HYPERSONIC VEHICLES, INSTRUMENTATION, INTERCEPTORS, LAYERS, MISSIONS, MODELS, MOTION, OPTICS, RADIOMETRY, ROCKETS, SHOCK, SHOCK TUNNELS, SOUNDING ROCKETS, SPECTROMETRY, STATE OF THE ART, TEST AND EVALUATION, TRANSPORTATION, TURBULENCE, VELOCITY, WAVE EQUATIONS, LIGHT HOMING.

PERSONAL AUTHORS: Holden, Michael S.

CONTRACT NO. F49620-91-C-0028

PROJECT NO. 2307

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0692, AFOSR

IDENTIFIERS: (U) PEB1102F, WUAFOSR2307AS, Hypersonic boundary layer.

UNCLASSIFIED REPORT

ABSTRACT: (U) A program of fundamental, experimental research and analysis has been conducted to design additional components necessary to modify, assemble and develop a ground-based facility (LENS) to duplicate flowfield environment around a hypersonic endo-atmospheric interceptor to evaluate optical seeker performance. Aero-optic instrumentation, used to measure the aero-optical characteristics of the viscous and shock layer over transpiration-and-filmed cooled nosetips at hypersonic speeds were also investigated. In the design of the facility, particular care was taken in designing the systems for a contamination-free hypersonic flow and in isolating the loads associated with the operation of the shock tunnel from the model support system and the aero-optic instrumentation. Five instrumentation systems, including holography, imagery, boresight/jitter, radiometry and spectrometry were evaluated to provide consistent evaluation in ENDQ-LEAP mission environments. State-of-the-art CFD codes with capabilities determining the inherent salient flowfield features such as turbulence and reacting chemistry were investigated and the GASP code was selected as the basic computational method. The stress levels and motion of shock tunnels were studied and analyzed using two approaches, a numeric marching code and a numeric solution to the wave equation.

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photofragmentation, Molecular dications, Storage systems,  
Optical emission spectra.

COLORADO UNIV AT BOULDER

(U) Characterization of Triplet States in Doubly Charged  
Positive Ions: Assignment of the 3 p1 g-3 Sigma u+  
Electronic Transition in N22+.

81 4P

PERSONAL AUTHORS: Szaflarski, Diane M.; Mullin, Amy S.;  
Yokoyama, Kazushige; Ashfold, Michael N.; Linberger, W.  
C.

CONTRACT NO. AFOSR-89-0074

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR, XF  
TR-92-0847, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v95 n8  
p2122-2124, 1991. Available to DTIC users only. No copies  
furnished by NTIS.

ABSTRACT: (U) The first direct spectroscopic evidence  
and characterization of triplet states in a molecular  
dication is reported. The 3 p1 g-3 Sigma u+ electronic  
absorption between excited states of N22+ is recorded by  
ion-laser coaxial beam photofragmentation spectroscopy.  
Over 300 rotational lines are resolved and 13 parameters  
characterizing the upper and lower electronic states are  
determined. The results are compared with calculated  
potential energy curves. Dissociation lifetimes of the  
upper rotational levels are measured and possible  
mechanisms of dissociation are discussed. Molecular  
dications; photodissociation lifetimes; photodissociation  
mechanisms; triplet electronic states of N22+.

DESCRIPTORS: (U) \*ABSORPTION, \*DISSOCIATION, \*ELECTRONIC  
STATES, \*PHOTODISSOCIATION, ELECTRONICS, ENERGY, IONS,  
LASERS, PARAMETERS, POTENTIAL ENERGY, SPECTROSCOPY,  
REPRINTS, CATIONS, CHEMICAL BONDS, NITROGEN.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B1, \*Doubly  
charged positive ions, \*Triplet states, Coaxial beam

AD-A253 791

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 780 7/3 20/2 20/5 AD-A253 788 4/1 12/5

UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

RENSSELAER POLYTECHNIC INST TROY NY

(U) Structures of Two Novel Heptacyclic Compounds: A Cage Ketone and a Cage Enone,

(U) Probing Cosmic Infrared Sources: A Computer Modeling Approach.

90 5P

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 88-30 Apr 92.

PERSONAL AUTHORS: Watson, William H.; Kashyap, Ram P.; Marchand, Alan P.; Ren, Chien-Tai

JUN 92 278P

CONTRACT NO. AFOSR-88-0132

PERSONAL AUTHORS: Leung, Chun M.

PROJECT NO. 2303

CONTRACT NO. AFOSR-88-0104

TASK NO. A3

PROJECT NO. 2311

MONITOR: AFOSR, XF  
TR-92-0610, AFOSR

MONITOR: AFOSR, XF

TR-92-0759, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

Availability: Pub. in Acta Crystallogr., Sect. C: Cryst. Struct. Commun., v48 p1276-1279, 1990. Available to DTIC users only. No copies furnished by NTIS.

Reprint: Structures of Two Novel Heptacyclic Compounds: A Cage Ketone and a Cage Enone.

DESCRIPTORS: (U) \*KETONES, \*CYCLIC COMPOUNDS, \*STRUCTURES, REPRINTS, HYDROCARBONS, X RAYS, CRYSTAL STRUCTURE, CARBONYL COMPOUNDS, HYDROLYSIS, ACIDS, CHEMICAL BONDS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A3, \*Heptacyclic compounds, Cage ketones, Cage enones, HCTD(Heptacyclotetradecanes), Wolff-Kishner reduction, Wittig reaction, Molecular mechanics calculations.

ABSTRACT: (U) Phenomenological computer models were constructed to interpret observations of cosmic infrared sources and to make predictions which would stimulate further studies. The research was divided into four areas: (1) Detailed radiation transport models, incorporating both the equilibrium heating of large dust grains and the transient heating of very small grains, were constructed for interstellar dust clouds and circumstellar dust shells of evolved stars to parameterize the observed radiation characteristics in terms of their physical source properties. (2) Existing methods of analysis (e.g., semi-analytical methods for determining the dust mass, dust temperature, and grain emissivity laws) in infrared astronomy were critically evaluated to determine the conditions under which these approaches were valid and reliable. Semi-empirical relationships were then developed to facilitate the rapid interpretation of infrared observations. (3) Theoretical models were developed to study various physical phenomena involving dust grains, e.g., molecule formation on grains, grain formation in expanding circumstellar envelopes. (4) Several computational techniques were investigated which could automate and improve the efficiency of existing radiation transport codes for modeling infrared sources. astronomy, Circumstellar Grains, Astrophysics.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 788 CONTINUED

AD-A253 785 9/1 7/2 20/2 7/3

Interstellar Grains, Cosmic Dust, Radiation Transport.

WESTINGHOUSE SCIENCE AND TECHNOLOGY CENTER PITTSBURGH PA

DESCRIPTORS: (U) \*COSMIC DUST, \*COMPUTERIZED SIMULATION, APPROACH, ASTRONOMY, ASTROPHYSICS, CLOUDS, COMPUTERS, DUST, DUST CLOUDS, EFFICIENCY, EMISSION, HEATING, MASS, MODELS, MOLECULES, OBSERVATION, PREDICTIONS, RADIATION, STARS, TEMPERATURE, TRANSIENTS, TRANSPORT.

(U) Improved Gallium Nitride and Aluminum Nitride Electronic Materials.

DESCRIPTIVE NOTE: Annual rept. 20 Feb 91-18 Feb 92,

APR 92 44P

IDENTIFIERS: (U) PE01102F, WJAFOSR2311A1.

PERSONAL AUTHORS: Partlow, W. D.; Choyke, W. J.; Devaty, R. P.; Yates, John T., Jr.; Bornschauer, Karl-Heinz

REPORT NO. WGD-12523-CE

CONTRACT NO. F49620-91-C-0032

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0720, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the progress in the first year of a three-year program to improve the quality of gallium and aluminum nitride electronic materials. In this period the experimental apparatus for the ultrahigh vacuum characterization of nitride growth processes was upgraded to increase the capability for experimental control and characterization of growth surfaces. These improvements include the addition of a cooled atomic hydrogen source and a reverse view LEED apparatus. Vibrational studies of the methyl radical on Si(100) surfaces were completed, increasing the understanding of the kinetics and stability of this radical, important for understanding growth from alkyl precursors. Cathodoluminescence and infrared reflectometry measurements were performed on numerous samples of epitaxial aluminum nitride to build up a base for materials quality determination.

DESCRIPTORS: (U) \*ALUMINUM, \*ELECTRONICS, \*GALLIUM, \*MATERIALS, \*NITRIDES, \*ULTRAHIGH VACUUM, ADDITION, CATHODOLUMINESCENCE, CONTROL, DETERMINATION, HYDROGEN, KINETICS, MEASUREMENT, METHYL RADICALS, PRECURSORS, QUALITY, STABILITY, SURFACES, VACUUM, VIBRATIONAL SPECTRA,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A253 782 8/4

SILICON, ALKYL RADICALS, EPITAXIAL GROWTH.

SOCIETY OF TOXICOLOGY WASHINGTON DC

IDENTIFIERS: (U) WJAFOSR2308B1. Cooled atomic hydrogen source. LEED(Low Energy Electron Diffraction), Infrared reflectometry, Reverse view.

(U) Joint Actions of Developmental Toxicants.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 80-30 Nov 81,

JUN 91 24P

PERSONAL AUTHORS: Dawson, Douglas A.

CONTRACT NO. AFOSR-89-0187

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0655, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) For the embryolethality tests, semicarbazine and isoniazid showed a slightly less-than-additive embryolethal response. Potentially different lethal modes of action may be observed for compounds that are thought to be teratogenic by the same mode of action. For the embryolethal binary mixture test of hydroxyurea and isoniazid the 3:1 mixture showed an antagonistic response, while the 1:1 and 1:3 mixtures were response additive, as expected. The antagonistic response may have been the result of poorer absorption of hydroxyurea by the severely malformed embryos, as isoniazid had a much greater concentration (in mg/L) than did hydroxyurea even though the effective (lethal) concentration for hydroxyurea was nearly three times that for isoniazid. Short-chain carboxylic acids showed concentration additive joint actions for induction of malformation. Combinations of DNA synthesis inhibitor showed response additive to antagonistic joint actions at malformation-inducing concentrations. Since each compound inhibits a different enzyme in the process of DNA synthesis inhibition, a response additive relationship was expected. The studies have shown that joint toxic action responses for the malformation endpoint are as seen in studies with other systems using other endpoints. The ten acid mixture study clearly showed that a series of chemicals, given at very low effect concentrations, can combine to produce a

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significant response.

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

DESCRIPTORS: (U) \*EMBRYOS, \*ENZYMES, ABSORPTION, ACIDS, ADDITIVES, CARBOXYLIC ACIDS, CHAINS, CHEMICALS, INHIBITION, INHIBITORS, ISONIAZID, MIXTURES, RESPONSE, SYNTHESIS, TEST AND EVALUATION.

(U) A Systematic Coupled-Cluster Investigation of Structure and Vibrational Frequencies of the Lowest Electronic States of Ketenyl Radical.

92 8P

IDENTIFIERS: (U) PEG1102F, WJAFOSR2312A5.

PERSONAL AUTHORS: Szalay, Peter G.; Stanton, John F.; Bartlett, Rodney J.

CONTRACT NO. AFOSR-80-0079

PROJECT NO. 2301

TASK NO. DS

MONITOR: AFOSR, XF  
TR-92-0745, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v193 n8 p573-570 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Structure and harmonic frequencies of ketenyl radical from UHF, MBPT(2), CCSD and CCSD(T) calculations using DZP and TZ2P basis sets are presented. The equilibrium structure or the ground state is bent, while the linear structure represents a saddle point on the potential energy surface. The results are in good agreement with the available experimental information. In addition, we also present those geometrical parameters and harmonic frequencies which are not available from experiment: ketenyl radical, ab initio, vibrational spectrum.

DESCRIPTORS: (U) \*FREQUENCY, \*KETENES, \*STRUCTURES, \*VIBRATIONAL SPECTRA, \*ELECTRONIC STATES, \*LOW LEVEL, ADDITION, AGREEMENTS, ENERGY, GROUND STATE, HARMONICS, PARAMETERS, POTENTIAL ENERGY, SURFACES, REPRINTS, PHOTOLYSIS, QUANTUM THEORY, GEOMETRY.

IDENTIFIERS: (U) WJAFOSR2301DS, \*Ketenyl radicals, Ab initio calculations, \*Coupled cluster investigations, UHF(Unrestricted Hartree Fock) method, Basis sets.

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AD-A253 731 20/4

GEORGIA INST OF TECH ATLANTA SCHOOL OF MECHANICAL  
ENGINEERING

IOWA STATE UNIV AMES DEPT OF AEROSPACE ENGINEERING

(U) Computational Studies of Vortex Breakdown.

(U) Study of a Viscous Sublayer Model in the Analysis of 3-  
D Shock/Boundary Layer Interaction Flow Fields.

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

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-31 Dec 91,

JUN 92 26P

JUN 92 25P

PERSONAL AUTHORS: Naitzel, G. P.; Watson, John P.

PERSONAL AUTHORS: Inger, George R.

CONTRACT NO. AFOSR-91-0047

CONTRACT NO. AFOSR-91-0048

PROJECT NO. 2307

PROJECT NO. 2307

TASK NO. AS

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0758, AFOSR

MONITOR: AFOSR, XF  
TR-92-0724, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Axisymmetric vortex breakdown was simulated numerically within an enclosed circular cylinder with: (1) fixed cylindrical wall-endwall and one rotating lid; and (2) rotating cylindrical wall-endwall with a differentially rotating lid. Variations of the two dynamical parameters permitted the calculation of cases in which incipient vortex breakdown was observed. A vortex breakdown criterion recently proposed by Brown & Lopez was tested against these numerical solutions. Vortex breakdown, Computational fluid dynamics, Incipient breakdown.

DESCRIPTORS: (U) \*VORTICES, AXISYMMETRIC, CIRCULAR, PARAMETERS, VARIATIONS, WALLS, ROTATION.

IDENTIFIERS: (U) Computational fluid dynamics, Vortex breakdown.

ABSTRACT: (U) At high Reynolds number, it has been experimentally and computationally well-confirmed that the 3-D interactive physics is vertically organized into the triple-deck type of structure. The governing integral-type equations that characterize the non-reversed flow portion of the interactive wall layer model are formulated in the form of a set of nonlinear partial first order differential equations, including three-dimensional aspects. Also modeled was the splitting of the layer into an upper region of non-reversed flow and an underlying region of slow, reversed flow. The shock structure and nonlinear rotational inviscid flow behavior of the overlying region were explored by means of a suitable 3-D shock/boundary layer approach which include separation. The NASA Langley code 'Laura' was modified to include these new wall layer equations. Verse flow boundary layer, Three dimensional shock, Separation.

DESCRIPTORS: (U) \*SHOCK, \*HYPERSONIC FLOW, \*BOUNDARY LAYER FLOW, BOUNDARIES, BOUNDARY LAYER, DIFFERENTIAL EQUATIONS, INTEGRALS, INVISCID FLOW, LAYERS, MODELS, REYNOLDS NUMBER, SPLITTING, STRUCTURES, WALLS, FLOW SEPARATION, THREE DIMENSIONAL FLOW.

IDENTIFIERS: (U) WUAFOSR2307AS, PE81102F, LAURA Computer program.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL  
LABS

COMPRESSIBLE FLOW, COMPUTERS, DEPOSITION, EQUATIONS,  
GRANTS, HEAT, HYMENOPTERA, MESH, MODELS, MONTE CARLO  
METHOD, SHOCK, SHOCK WAVES, SIMULATION, STRUCTURES,  
TRANSFER, VAPORS, VELOCITY.

(U) Investigations of the Motion of Discrete-Velocity  
Gases.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 89-30 Nov  
81.

JUN 92 9P

PERSONAL AUTHORS: Sturtevant, B.

CONTRACT NO. AFOSR-89-0389

PROJECT NO. 2307

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0741, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The accomplishments of this grant include:

(1) A direct simulation Monte Carlo method for rarefied  
gasdynamics, patterned after the DSMC of G. A. Bird, in  
which molecular velocities are discretized to be integers  
(IDSMC) was developed. The method has been implemented on  
coarse-grained multi-computers such as the Intel iPSC,  
Symult 2010 and Intel Gamma with a self-adaptive  
rectangular mesh to optimize load balancing. (2) A finite-  
difference method for solving the discrete-velocity  
(lattice gas) Boltzmann equations has been formulated and  
implemented. Calculations were made of problems in heat  
transfer, shock wave structure and vapor deposition. (3)  
The applicability of multi-speed discrete-velocity gases  
to compressible flows has been examined from a  
fundamental point of view. The equation of state, the  
anisotropies and the advection velocities for multi-speed  
models on the square and triangular lattices were derived.  
It was shown that the pathologies shown by multi-speed  
lattice gases can be made rather small. Cellular automata,  
lattice gases, molecular gasdynamics, direct simulation  
Monte-Carlo method, Boltzmann equation.

DESCRIPTORS: (U) \*HEAT TRANSFER, \*VAPOR DEPOSITION, \*GAS  
FLOW, ADVECTION, AUTOMATA, BIRDS, BOLTZMANN EQUATION,

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AD-A253 727 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF ELECTRICAL  
ENGINEERING AND COMPU TER SCIENCE

RATS. WAVE PROPAGATION.

(U) Interaction of Electromagnetic Fields with  
Chondrocytes in Gel Culture.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2312A5, Radiobiology,  
Radiation biology, Electromagnetic fields, Radiofrequency  
wave propagation, \*Chondrocytes.

DESCRIPTIVE NOTE: Final rept. 15 Jan 92-14 Jan 94.

JAN 92 26P

PERSONAL AUTHORS: Grodzinsky, Alan J.; Buschmann, Michael  
D.; Gluzband, Yehezkiel A.

CONTRACT NO. AFOSR-91-0153

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0742, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The specific objectives of this research period were: (1) to quantify the effect of applied electric fields on chondrocyte metabolism, using a range of stimulation frequencies and amplitudes; (2) to compare the chondrocyte biosynthetic response to applied fields at early times in agarose gel culture before an extracellular matrix has accumulated and at later times after significant deposition of matrix around and between the cells; and (3) to begin to interpret the biosynthetic response to applied fields in terms of models of physical mechanisms. The results of these studies suggest that electric fields applied to chondrocytes in agarose can modulate the synthesis of proteoglycans and protein constituents. Biosynthesis may be inhibited or stimulated depending on the amplitude of the applied current density. In addition, the presence of extracellular matrix may enhance the ability of normal chondrocytes and cells in intact cartilage to respond to electric fields, although the presence of matrix was not required for the stimulatory response to be observed with Swarm rat chondrosarcoma cells.

DESCRIPTORS: (U) \*ELECTROMAGNETIC FIELDS, CURRENT  
DENSITY, ELECTRIC FIELDS, GELS, INTERACTIONS, PROTEINS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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ECDYNAMICS RESEARCH ASSOCIATES INC ALBUQUERQUE NM

(U) Adaptive Grid Generation Using Elliptic Generating Equations with Precise Coordinate Controls.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Sep 86.

SEP 86 3P

PERSONAL AUTHORS: Roache, Patrick J.

REPORT NO. ERA-1-82

CONTRACT NO. F49620-84-C-0079

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF  
TR-97-0726, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant contributions in algorithms and codes for automatic grid generation were made in the following specific areas: automatic generation of multidimensional Fortran code via Symbolic Manipulation (Artificial Intelligence), requiring user input of only the governing partial differential equations or the governing variational principles; rigorous techniques for verification of codes, algorithms, and discretization methods; a new and effective formulation for variational methods; analysis of mathematical properties (ellipticity, convexity) of PDE and variational methods including volume, orthogonality, smoothness and other controls; identification and explanations of previously unreported anomalies in common grid generation algorithms, including non-uniqueness due to solution bifurcation and grid folding; identification and explanation of previously unreported ambiguities in common discrete evaluations of transformation Jacobians; use of a reference grid to control target grid properties; development of a solution adaptive method for surface grid generation; development of a hybrid method of solution adaptive grid generation which properly isolates the multigrid methods to elliptic grid generation; development of an algorithm for economically generating sub-grid grid generation

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discretization required for multigrid solution techniques; correct interpretation of the 'smoothness' property of elliptic grid generation.

DESCRIPTORS: (U) \*FORTRAN, \*GRIDS, \*REPORTS, \*FLUID DYNAMICS, \*COMPUTATIONS, \*WORKSHOPS, ALGORITHMS, AUTOMATIC, CONTROL, DIFFERENTIAL EQUATIONS, EQUATIONS, FOLDING, IDENTIFICATION, INPUT, ORTHOGONALITY, PARTIAL DIFFERENTIAL EQUATIONS, SURFACES, TARGETS, TRANSFORMATIONS, VARIATIONAL METHODS, VARIATIONAL PRINCIPLES, VERIFICATION, VOLUME.

IDENTIFIERS: (U) WJAFOSR2304A3, PE61102F.



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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 670 4/2 12/8 AD-A253 670 CONTINUED

CALIFORNIA UNIV SANTA BARBARA

IDENTIFICATION SYSTEMS, MULTISPECTRAL.

(U) Automatic Cloud Classification from Multi-Spectral  
Satellite Data Over Oceanic Regions.

IDENTIFIERS: (U) PE81102F, WUAFOSR2310A1, Bayesian  
classification, Cloud classification, AUHRR(Advanced Very  
High Resolution Radiometry).

DESCRIPTIVE NOTE: Final rept. 15 Jan 91-14 Jan 92,

JAN 92 172P

PERSONAL AUTHORS: Gautier, Catherine

CONTRACT NO. AFOSR-91-0143

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0728, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) This project was aimed at developing an operational expert system to perform the classification of satellite images into cloud types. The approach we have used is based on a number of assumptions. The first one is that such a classification is possible with satellite images of 1 km (or more) resolution. A second assumption, which lays the foundations for all classifications, is that there exists a parameter space wherein some clustering of the data occurs, so the task is to identify this parameter space from the data. An additional assumption necessary to physically interpret the results, but not necessary for the classification itself, is that the clusters found in this parameter space can be related to cloud types or physical features. We chose a Bayesian classifier for our classification. We believe that this type of classifier is best suited for the task because clouds are fuzzy objects which have overlapping characteristics. Also, with a Bayesian classifier, each point in the parameter space has a probability to belong to each class, although this probability may be anywhere between zero and one.

**DESCRIPTORS:** (U) \*CLASSIFICATION, \*CLOUDS, \*PATTERN RECOGNITION, \*IMAGE PROCESSING, \*EXPERT SYSTEMS, \*BAYES THEOREM, APPROACH, CLUSTERING, IMAGES, PARAMETERS, PROBABILITY, RESOLUTION, METEOROLOGICAL SATELLITES,

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## DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

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AD-A253 687 7/2 20/2

SIERRA MONOLITHICS INC REDONDO BEACH CA

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Josephson Junction Digital Waveform Generation for Very Wideband Radars.

(U) Epitaxial Magnetic Oxides.

DESCRIPTIVE NOTE: Final rept. 1 Aug 91-31 Jan 92,

DESCRIPTIVE NOTE: Final technical rept. 11 Nov 88-30 Apr 92,

JAN 92

39P

JUN 92 149P

PERSONAL AUTHORS: Rowe, Dave

PERSONAL AUTHORS: Kryder, M. H.; Stancil, D. D.; Laughlin, D. E.; Wang, W.; Ramesh, M.

CONTRACT NO. F49620-91-C-0068

CONTRACT NO. AFOSR-89-0097

MONITOR: AFOSR, XF

TR-92-0722, AFOSR

PROJECT NO. 2305

## UNCLASSIFIED REPORT

TASK NO. C1

ABSTRACT: (U) The ultimate goal of this program is to design, fabricate and test an ultra-wideband DDS based upon superconducting JJ logic technology which has direct insertion applications in present and future DOD Radar, Communication, or ECM systems. The Phase I objectives are to define the DDS system parameters, develop the DDS architecture for the identified system, perform detailed circuit designs and a system performance appraisal. In addition, a teaming arrangement with a superconducting foundry will be evaluated for Phase II device evaluation.

DESCRIPTORS: (U) \*RADAR, \*JOSEPHSON JUNCTIONS, CIRCUITS, LOGIC, PARAMETERS, PHASE, TEST AND EVALUATION, CIRCUIT ANALYSIS.

IDENTIFIERS: (U) Radar architecture, Machine logic.

MONITOR: AFOSR, XF  
TR-92-0721, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) Research was carried out on the heteroepitaxial growth of magnetic oxides (garnets and hexaferrites) on a variety of substrates. These new materials technologies are being used for the development of novel microwave, millimeter wave and optical signal processing devices. Liquid phase epitaxy (LPE) sputtering and pyrolysis (thermal decomposition of spin coated material) have been used to grow these materials. For integrated microwave and optical signal processing devices, two-layer LPE grown garnets with one layer having a narrow resonance linewidth (<1 Oe) and the other a high Faraday rotation (>0.1 deg/um) have been developed. Silicon-on-garnet technology was developed and demonstrated capable of producing high quality integrated semiconductor and magnetic devices on a common substrate. Sputter deposition and pyrolysis were developed as alternative lower temperature processes capable of depositing garnets onto non-garnet substrates, and thin film hexaferrites with near-bulk values of magnetization and uniaxial anisotropy were grown by sputter deposition. garnets, hexaferrites, microwave materials, ring, millimeter wave materials, magneto-optical materials, sputtering-liquid phase epitaxy.

DESCRIPTORS: (U) \*GARNET, \*OXIDES, \*EPITAXIAL GROWTH,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

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ANISOTROPY, DECOMPOSITION, DEPOSITION, FILMS, LAYERS,  
LIQUID PHASES, LIQUIDS, MAGNETIC DEVICES, MAGNETIZATION,  
MAGNETOS, MATERIALS, MICROWAVES, MILLIMETER WAVES,  
OPTICAL MATERIALS, PHASE, PROCESSING, PYROLYSIS, QUALITY,  
RESONANCE, RINGS, ROTATION, SEMICONDUCTORS, SIGNAL  
PROCESSING, SIGNALS, SILICON, SPUTTERING, SUBSTRATES,  
TEMPERATURE, THIN FILMS, VALUE.

IDENTIFIERS: (U) WUAFOSR2305C1, PE81102F.

AD-A253 637 20/12

ARIZONA STATE UNIV TEMPE COLL OF ENGINEERING AND APPLIED  
SCIENCES

(U) Spatial Light Modulators with Arbitrary Quantum Well  
Profiles.

DESCRIPTIVE NOTE: Annual rept. 14 Jan 81-82,

FEB 92 42P

PERSONAL AUTHORS: Marcos, George N.; Bajaj, Krishan K.

CONTRACT NO. AFOSR-90-0118

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0857, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the year 2 technical report for the University Research Initiative (URI) program Spatial Light Modulators with Arbitrary Quantum Well Profiles. During the second year of the program we have continued to optimize optical modulator design, growth, and fabrication. A new method for self-consistent solution of Schrodinger and Poisson equations was developed and used to predict modulator active region performance and vertical cavity surface emitting laser device performance. A comprehensive comparison of asymmetric triangular quantum wells (ATQM) using GaAs/AlGaAs, InGaAs/GaAs, and InGaAs/AlGaAs showed InGaAs/AlGaAs quantum wells to have the highest optical efficiency. A MBE compositional grading technique was used to achieve record narrow photoluminescence linewidths for nonrectangular quantum wells. Bragg reflectors for use in Fabry Perot modulators were measured in-situ by spectroscopic ellipsometry (SE). Advances were made in the growth and fabrication of p-i-n optical modulators, including the development of via hole etching through the substrate for transmission mode modulators. A simple variational method for calculating excitonic properties in quantum confined structures with arbitrary potential profiles in the presence of applied electric and magnetic fields were developed and applied to the study of energy levels of hydrogenic impurities.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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Also a new theory of radiative transition linewidths due to alloy disordering in semiconductor alloys has been presented and applied to AlGaAs and InGaP bulk alloys. GaAs (Gallium Arsenide), Quantum Well, Excitons, InGaAs (Indium Gallium Arsenide), Spatial Light Modulators, AlGaAs (Aluminum Gallium Arsenide), MBE (Molecular Beam Epitaxy).

AMERICAN CERAMIC SOCIETY INC WESTERVILLE OH

(U) Ceramic Transactions. Volume 21. Proceedings of the Symposium on Microwave Theory and Application in Materials Processing Annual Meeting of the American Ceramic Society (23rd) Held in Cincinnati, Ohio on April 29-May 3 1991.

DESCRIPTORS: (U) \*EXCITONS, \*LIGHT MODULATORS, \*QUANTUM ELECTRONICS, ALUMINUM GALLIUM ARSENIDES, CAVITIES, COMPARISON, EFFICIENCY, ENERGY LEVELS, ETCHING, FABRICATION, GALLIUM ARSENIDES, IMPURITIES, LIGHT, MAGNETIC FIELDS, MOLECULAR BEAMS, PHOTOLUMINESCENCE, PROFILES, REFLECTORS, SEMICONDUCTORS, STRUCTURES, SUBSTRATES, SURFACES, THEORY, TRANSITIONS, VARIATIONAL METHODS, INDIUM COMPOUNDS, EPITAXIAL GROWTH.

IDENTIFIERS: (U) PES1103F, WJAFOSR3483A3, Quantum wells, Indium gallium arsenides.

DESCRIPTIVE NOTE: Final rept. 28 Apr 91-27 Apr 92,

APR 92 620P

PERSONAL AUTHORS: Clark, David E.; Gac, Frank D.; Sutton, Willard H.

CONTRACT NO. AFOSR-91-0229

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0670, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual items, see AD-PO07 718 thru AD-PO07 783.

ABSTRACT: (U) The symposium was held during the 93rd Annual Meeting of The American Ceramic Society in Cincinnati, OH, April 29-May 3, 1991. One objective was to assemble the experts in this emerging technology for the purpose of identifying problem areas and defining potential solutions. A second objective was to explore new applications where microwave energy can have significant impact. A third objective was to bring together researchers, materials fabricators, and microwave equipment manufacturers for the purpose of expediting technology transfer and commercialization of important discoveries in this field. Participants from 7 countries presented 80 papers at the symposium. A combination of keynote, invited, and contributed presentations provided excellent overviews of existing programs, microwave/materials interactions, measurements, equipment design, modeling, and applications. Microwave/Material Interactions; Modeling; Dielectric Measurements; Microwave sintering; Microwave Processing of Nonoxides;

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A253 630 4/2 12/9

Microwave Applications in Waste Management; Joining/  
Composite Fabrication with Microwave Energy; Novel.

COLORADO STATE UNIV FORT COLLINS ENGINEERING RESEARCH  
CENTER

DESCRIPTORS: (U) \*FABRICATION, \*MICROWAVES, \*CERAMIC  
MATERIALS, \*SYMPOSIA, \*PRODUCTION ENGINEERING,  
DIELECTRICS, ENERGY, INTERACTIONS, JOINING, MATERIALS,  
MEASUREMENT, MICROWAVE EQUIPMENT, SINTERING, TECHNOLOGY  
TRANSFER, WASTE MANAGEMENT.

(U) Mesoscale Severe Weather Development under Orographic  
Influences.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 Mar 92.

JUN 92 36P

IDENTIFIERS: (U) PE61102F, WJAFOSR2306A2.

PERSONAL AUTHORS: Reiter, Elmar R.; Teixeira, Luiz

CONTRACT NO. F49620-89-C-0038

PROJECT NO. 2310

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0730, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research summarized in this report addresses the lack of response of centralized weather services to specific user needs. Distributed weather prediction on tactical workstations can overcome most of the current barriers. Such a forecasting system, running on a 486/33 PC, has been developed and tested extensively in Colorado snowstorm and blizzard conditions. The system incorporates a mesoscale numerical prediction model, a detailed geographical database, and a graphics user interface based on Microsoft Windows 3.1. Through this user interface the user can assimilate local observations with simple mouse point-and-click actions. The system can make use of observational data and heuristic rules. A prototype, customized for Colorado, has been tested under real-time and operational conditions. Concepts of object-oriented nowcasting, using artificial intelligence tools, such as 'fuzzy logic' have been developed. Mesoscale Weather Prediction, Hybrid Modeling, Nowcasting, Object-Oriented.

DESCRIPTORS: (U) \*WEATHER FORECASTING, \*MILITARY  
REQUIREMENTS, ARTIFICIAL INTELLIGENCE, COLORADO  
FORECASTING, GRAPHICS, INTERFACES, MODELS, PREDICTIONS,  
PROTOTYPES, REAL TIME, USER NEEDS, WEATHER, MATHEMATICAL  
PREDICTION, STORMS, COMBAT SUPPORT, HYBRID SYSTEMS,

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OROGRAPHY.

AMERICAN CERAMIC SOCIETY INC WESTERVILLE OH

IDENTIFIERS: (U) PES1102F, WJAFOSR2310CS, Nowcasting.

(U) Atomic Structure, Bonding and Properties of Ceramics.

DESCRIPTIVE NOTE: Final rept. 1 Sep 81-31 Aug 92,

JUN 92 13P

PERSONAL AUTHORS: Halbrook, W. P.; Bonnell, Dawn A.

CONTRACT NO. AFOSR-81-0398

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF  
TR-82-0716, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This contract was for the partial support of a meeting entitled Atomic Structure, Bonding and Properties of Ceramics sponsored by the American Ceramic Society - Basic Science Division on October 16-18, 1991 in Marco Island, FL. The meeting objective was as follows. Advances in experimental techniques that probe electronic structure and atomic bonding (such as XPS, UPS, STM, optical spectroscopy) have recently allowed these methods to be applied to oxide and nonoxide ceramics. Concurrent developments in computer capability now allow modeling and theoretical calculations in some of these complex materials systems. For the first time experimentalists and theorists can begin to address the same phenomena in materials of interest to the ceramics community. The objective of this meeting is to bring together those who relate properties of materials (mechanical, optical, and electrical) to experimentally determined electronic structure and atomic bonding with theorists who can make predictions of electronic structure and properties. This objective was met by structuring the meeting such that 50% of the oral presentations (representing > 70% of the program based upon time) were by invited speakers who had longer than the traditional time allotted to speak. The meeting was deemed a success by attendees, that topics were considered in some depth, with ample time left for discussion. In fact, this meeting is now considered one of the model formats for Basic Science Division

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Conferences.

LOYOLA UNIV OF CHICAGO IL PARMLY HEARING INST

DESCRIPTORS: (U) \*BONDING, \*ELECTRONICS, \*STRUCTURES, \*ATOMIC STRUCTURE, \*MECHANICAL PROPERTIES, \*OPTICAL PROPERTIES, \*ELECTRICAL PROPERTIES, \*CERAMIC MATERIALS, COMMUNITIES, COMPUTERS, CONTRACTS, DEPTH, DIVISION, FORMATS, ISLANDS, MATERIALS, MODELS, OXIDES, PREDICTIONS, PROBES, TIME, SYMPOSIA.

(U) Auditory Processing of Complex Sounds Across Frequency Channels.

DESCRIPTIVE NOTE: Final technical rept. 1 May 89-30 Apr 92,

JUN 92 24P

IDENTIFIERS: (U) PEG1102F, WJAFOSR2306A2, Meetings, Basic science division conferences.

PERSONAL AUTHORS: Shofner, William P.; Dye, Raymond H.; Yost, William A.

CONTRACT NO. AFOSR-89-0335

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF  
TR-92-0714, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research supported by this grant is directed towards gaining an understanding how the auditory system processes complex sounds. The results of binaural psychophysical experiments in human subjects suggest (1) that spectrally synthetic binaural processing is the rule when the number of components in the tone complex are relatively few (less than 10) and there are no dynamic binaural cues to aid segregation of the target from the background, and (2) that waveforms having large effective envelope depths are on the average more easily lateralized than those having small effective envelope depths. Psychophysical experiments in human subjects using sinusoidally amplitude modulated narrowband noises and complex patterns of modulation of tonal carriers have been directed toward understanding auditory object perception. Results from experiments and theoretical modelling suggest that slow temporal modulation of different spectral components can be used by the auditory system to fuse these components into one auditory image. The results of psychophysical experiments show that the effects of noise bandwidth on intensity discrimination of noise in chinchillas are similar to data from human subjects; the results can be accounted for by a modification of the ideal energy detector.

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SEARCH CONTROL NO. T4J18F

AD-A283 812 CONTINUED

Neurophysiological experiments have been directed at gaining an understanding of how auditory neurons encode pitch related information in the temporal properties of discharges. The results show that a temporal representation at the level of the cochlear nucleus can account for some, but not of the pitches of rippled noise. Auditory processing, hearing, complex sounds, psychophysics, neurophysiology.

DESCRIPTORS: (U) \*SOUND, \*AUDITORY NERVE, \*SIGNAL PROCESSING, \*AUDITORY PERCEPTION, AMPLITUDE, BACKGROUND, BANDWIDTH, DEPTH, DETECTORS, DISCRIMINATION, DYNAMICS, ENERGY, HEARING, HUMANS, IMAGES, INTENSITY, MODULATION, NARROWBAND, NERVE CELLS, NEUROPHYSIOLOGY, NOISE, PATTERNS, PSYCHOPHYSICS, TARGETS, WAVEFORMS, FREQUENCY, PSYCHOACOUSTICS.

IDENTIFIERS: (U) PE01102F, WUAFOSR2313A6, Complex sounds, Binaural processors.

AD-A283 810 8/5

ARMED FORCES INST OF PATHOLOGY WASHINGTON DC

(U) Combined Effects of Hyperbaric Oxygen and Antimicrobials in a Model of Gas Gangrene.

DESCRIPTIVE NOTE: Final technical rept. Jul 91-Jun 92.

JUN 92 30P

PERSONAL AUTHORS: Muhlrich, K. H.; Anderson, L. H.; Mehra, W. J.

CONTRACT NO. AFOSR-90-0317

PROJECT NO. 2312

TASK NO. A6

MONITOR: AFOSR, XF  
TR-92-0712, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The efficacy of hyperbaric oxygen (HBO) alone and in combination with several antimicrobial agents was evaluated in a lethal model of gas gangrene in mice. Myonecrosis was induced by injecting -1079 washed C. perfringens into the right upper thigh-muscle of mice; immediately following bacterial inoculation, penicillin, imipenem, clindamycin or metronidazole were administered via intraperitoneal injection. HBO treatments P02 = 301 kPa for 90 min, B.I.D. X days began immediately after antimicrobial injections. Survival of mice was monitored for 72 h. Mice treated with clindamycin or metronidazole survived significantly longer than mice treated with penicillin G or imipenem (P = 0.05). HBO alone did not prolong time-to-death in control animals as compared to air. Also, HBO did not potentiate the efficacies of any of the antimicrobials tested in this model. Hyperbaric Oxygen, Clostridial myonecrosis, Alpha toxin, antimicrobials.

DESCRIPTORS: (U) \*ANTIMICROBIAL AGENTS, \*CLOSTRIDIUM, \*BACTERIAL DISEASES, \*HYPERBARIC MEDICINE, AIR, DEATH, DISEASES, INOCULATION, MUSCLES, OXYGEN, PENICILLINS, LETHALITY, CLOSTRIDIUM PERFRINGENS.

IDENTIFIERS: (U) Hyperbaric oxygen, Myonecrosis, Imipenem,

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Citindamycin, Metronidazole, Alpha toxin.

AD-A253 559 7/4 20/10 20/2 11/6.1

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND  
BIOCHEMISTRY

(U) Oxidation, Nitridation, and Fluorine Etching of Si.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-30 Apr 92.

JUN 92 18P

PERSONAL AUTHORS: Carter, Emily A.

CONTRACT NO. AFOSR-88-0108

MONITOR: AFOSR, XF  
TR-92-0717, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We summarize herein our accomplishments made possible by AFOSR Grant No. 89-0108. In particular, we carried out studies of the structure and dynamics of Si, Ge, and SiGe surfaces and interfaces, using isothermal molecular dynamics and isobaric-isothermal Monte Carlo techniques. Concomitantly, we calculated the fundamental interactions of fluorine atoms with silicon using ab initio quantum mechanics, in order to understand the mechanism of etching of silicon by fluorine. Fundamental results from those studies suggest that the surface is highly disordered during etching and that this disorder is produced from the energy released during the extremely exothermic reaction of F atoms with silicon. In order to understand oxidation and nitridation of silicon by H<sub>2</sub>O and NH<sub>3</sub>, we must begin by determining the nature of the interaction of H atoms with Si, since they are generated during these reactions and desorption of H atoms can be rate-limiting. We completed studies of H atom adsorption, diffusion, and desorption, learning about the complicated nature of diffusion and desorption on the Si(100) surface. We also developed two new ab initio electronic structure tools: (1) pseudospectral full configuration interaction, a method for treating electron correlation numerically and (2) a reaction barrier following method for finding transition states for chemical reactions.

DESCRIPTORS: (U) \*DESORPTION, \*DIFFUSION, \*ETCHING, \*FLUORINE, \*OXIDATION, \*SILICON, \*GERMANIUM, ADSORPTION, ATOMS, BARRIERS, CHEMICAL REACTIONS, CHEMICALS.

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CONFIGURATIONS, CORRELATION, DYNAMICS, ELECTRONICS, ELECTRONS, ENERGY, EXOTHERMIC REACTIONS, INTERACTIONS, INTERFACES, LEARNING, MECHANICS, RATES, STRUCTURES, SURFACES, TRANSITIONS, ALLOYS, SUPERLATTICES, MONTE CARLO METHOD, CRYSTALS, SIMULATION, ALLOYS, SUPERLATTICES.

NATIONAL ACADEMY OF SCIENCES WASHINGTON DC  
(U) Solid State Sciences Committee Forum.

DESCRIPTIVE NOTE: Final rept. 1 Mar 91-29 Feb 92.

IDENTIFIERS: (U) PE81102F, \*Nitridation, Isothermal molecular dynamics, Abinitio quantum mechanics, Disordered surfaces, Isobaric calculations, Pseudospectral full configuration, Interaction, Electronic structure.

MAY 92 21P

PERSONAL AUTHORS: Smith, Philip

CONTRACT NO. AFOSR-91-0185

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR, XF  
TR-92-0723, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The 1991 SSSC Forum was conducted under the auspices of the Board on Physics and Astronomy's Solid State Sciences Committee (SSSC) and cosponsored with the National Materials Advisory Board (NMAB). The Forum was the culmination of a year-long dissemination effort following up the NCR study Materials Science and Engineering for the 1990s that was released in September of 1989 and successfully brought together experts and policy makers in the field of advanced materials processing to discuss issues pertinent to the field. Support for the Forum was provided by the Air Force Office of Scientific Research (AFOSR), the Department of Energy (DOE), the National Science Foundation (NSF), and the office of Naval Research (ONR).

DESCRIPTORS: (U) \*SOLID STATE PHYSICS, AIR FORCE, MATERIALS, POLICIES, SYMPOSIA, MILITARY RESEARCH, RESEARCH MANAGEMENT.

IDENTIFIERS: (U) WJAFOSR2305A9, PE81102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 547 12/4

AD-A253 543 12/3

CALIFORNIA UNIV DAVIS

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) Computational Nonlinear Control.

(U) Stochastic Control and Nonlinear Estimation.

DESCRIPTIVE NOTE: Annual technical rept. no. 1.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 88-31 Mar 92.

MAY 92 8P

JUL 92 7P

PERSONAL AUTHORS: Krener, A. J.

PERSONAL AUTHORS: Fleming, Wendell H.; Kushner, Harold J.

REPORT NO. 3-448724-22528

CONTRACT NO. AFOSR-89-0015

CONTRACT NO. AFOSR-91-0228

PROJECT NO. 2304

TASK NO. AS

TASK NO. A1

MONITOR: AFOSR, XF

MONITOR: AFOSR, XF

TR-92-0728, AFOSR

TR-92-0715, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) The goal of this research is to develop a computationally feasible approach to the design of compensators for nonlinear plants such as high performance aircraft and robots. The basic approach is to take parts of the current theory of nonlinear control, and extend and modify them as needed so as to develop numerical algorithms. To date the emphasis has been on a perturbational approach developed from well-established linear methodologies. We have written a MATLAB based set of algorithms which accomplish feedback linearization, input-output injection linearization and nonlinear regulation. These are incorporated into a Nonlinear-System-Toolbox which is available via teletext.

DESCRIPTORS: (U) \*ALGORITHMS, \*COMPUTATIONS, \*NONLINEAR SYSTEMS, AIRCRAFT, APPROACH, COMPENSATORS, CONTROL, FEEDBACK, INJECTION, INPUT, INSTRUCTIONS, OUTPUT, REGULATIONS, ROBOTS, THEORY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304AS.

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ABSTRACT: (U) In stochastic control, a major focus of this research was numerical methods for finding approximately optimal control laws. Dynamic programming and Monte Carlo optimization algorithms were followed. Both probabilistic methods, based on weak convergence ideas, and analytical methods were used to prove convergence of algorithms. The latter were based on viscosity solution methods for nonlinear partial differential equations. In nonlinear estimation, low dimensional approximate nonlinear filters were found for cases when a piecewise one-to-one function of a system state plus low intensity observation noise was observed.

DESCRIPTORS: (U) \*STOCHASTIC CONTROL, \*ESTIMATES, \*NONLINEAR ANALYSIS, ALGORITHMS, CONTROL, CONVERGENCE, DIFFERENTIAL EQUATIONS, DYNAMIC PROGRAMMING, DYNAMICS, EQUATIONS, FILTERS, FUNCTIONS, INTENSITY, LOW INTENSITY, NOISE, OBSERVATION, OPTIMIZATION, PARTIAL DIFFERENTIAL EQUATIONS, VISCOSITY, WEAK CONVERGENCE, MONTE CARLO METHOD.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

AD-A253 484 CONTINUED

IDENTIFIERS: (U) PEG1102F, WJAFOSR2308B1, Metallic film.

AD-A253 484 20/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS  
SCIENCE AND ENGINEERING

(U) Post-Nucleation Heteroepitaxy in Poorly Lattice  
Matched Systems.

DESCRIPTIVE NOTE: Final rept. 16 Oct 88-15 Oct 91.

MAR 92 21P

PERSONAL AUTHORS: Thompson, Carl V.

CONTRACT NO. AFOSR-88-0154

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0689, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) We have investigated the evolution of thin film structures in the earlier stages of film growth. We have also investigated epitaxial grain growth as a new method for obtaining epitaxial films in poorly lattice-matched systems. We have shown that the As 4 to Ga flux ratio can greatly affect the growth morphology of epitaxial GaAs islands on silicon, and that lower than conventionally used ratios can lead to initial layers and thicker films with greatly improved electronic properties. We have also demonstrated that grain growth in polycrystalline films on single crystal substrates can lead to very thin epitaxial films of higher quality than can be obtained by other techniques. We have also shown that epitaxial grain growth can be used to establish the true low energy configuration of a continuous thin film, which can differ from the orientation obtained in conventional epitaxy.

**DESCRIPTORS:** (U) \*GRAIN GROWTH, \*MORPHOLOGY, \*EPITAXIAL GROWTH, \*SEMICONDUCTING FILMS, ELECTRONICS, LOW ENERGY, POLYCRYSTALLINE, QUALITY, RATIOS, SILICON, SINGLE CRYSTALS, STRUCTURES, SUBSTRATES, THIN FILMS, ARSENIC, GALLIUM, GALLIUM ARSENIDES, CRYSTAL GROWTH, ANNEALING, CALCIUM FLUORIDES.

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AD-A253 480 CONTINUED

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IDAHO UNIV MOSCOW

(U) Preparation of New Phosphoranes (C<sub>6</sub>H<sub>5</sub>)<sub>2</sub>P(O)(NHC<sub>6</sub>H<sub>5</sub>) and C<sub>6</sub>H<sub>5</sub>P(O)(NHC<sub>6</sub>H<sub>5</sub>)<sub>2</sub>, 1,3-Bis(pentafluorophenyl)-2,4-diphenyl-1,3,2,4-diazadiphosphatidine (C<sub>6</sub>H<sub>5</sub>PN(C<sub>6</sub>F<sub>5</sub>)<sub>2</sub> and 1,3-Bis (2-fluorophenyl)-2,4-diphenyl-2,4-dioxo-1,3,2,4-diazadiphosphatidine (C<sub>6</sub>H<sub>5</sub>P(O)(NC<sub>6</sub>H<sub>4</sub>F)<sub>2</sub>).

81 SP

PERSONAL AUTHORS: Alam, Kohrshed; Scott, Brian; Kirchmeyer, Robert L.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-81-0188, SAFOSR-87-0067

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XF  
TR-92-0579, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in European Jnl. of Solid State and Inorganic Chemistry, v28 p847-854 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Reactions of (C<sub>6</sub>H<sub>5</sub>)<sub>2</sub>P(O)Cl and C<sub>6</sub>H<sub>5</sub>P(O)Cl<sub>2</sub> with C<sub>6</sub>F<sub>5</sub>NH<sub>2</sub> yielded the new phosphoranes (C<sub>6</sub>H<sub>5</sub>)<sub>2</sub>P(O)(NHC<sub>6</sub>F<sub>5</sub>), 1, and C<sub>6</sub>H<sub>5</sub>P(O)(NHC<sub>6</sub>F<sub>5</sub>)<sub>2</sub>, 2. When C<sub>6</sub>H<sub>5</sub>P(O)Cl<sub>2</sub> was reacted with 2-fluoroaniline, the 1,3,2,4-diazadiphosphatidine C<sub>6</sub>H<sub>5</sub>P(O)(NC<sub>6</sub>H<sub>4</sub>F)<sub>2</sub>, 3, formed, while with C<sub>6</sub>H<sub>5</sub>PCl<sub>2</sub>, C<sub>6</sub>F<sub>5</sub>NH<sub>2</sub> give the new cis-1,3,2,4-diazadiphosphatidine C<sub>6</sub>H<sub>5</sub>PN(C<sub>6</sub>F<sub>5</sub>)<sub>2</sub>, 4. Compounds 1, 2, 3, and 4 have been characterized by spectral data (1H, 19F and 31P NMR, IR and MS) and elemental analysis. In addition, 1 has been characterized by single crystal X-ray crystallographic analysis. Lattice parameters and space group information are as follows: a = 8.958(2) Å, b = 5.201(2) Å, c = 31.803(8) Å, β = 94.82(2)°, monoclinic, P21/n, Z = 4. The structure was solved and refined by direct methods to R = 0.0789 and Rw = 0.0936 for 2577 independent reflections. The molecule has both P and N with distorted tetrahedral coordination and has an approximate C2 symmetry axis. Phosphoranes, cyclic phosphorus-nitrogen compounds, cis-dialkylidiazadiphosphatidines; x-ray crystal structure of fluoroaromatic

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DESCRIPTORS: (U) \*CRYSTAL STRUCTURE, \*ORGANIC PHOSPHORUS COMPOUNDS, \*SYNTHESIS(CHEMISTRY), \*CHEMICAL REACTIONS, MOLECULES, REPRINTS, ISOMERS, NITROGEN COMPOUNDS, REFLECTION, SINGLE CRYSTALS, SYMMETRY, X RAYS, STEREOCHEMISTRY, HETEROCYCLIC COMPOUNDS, CHEMICAL SHIFTS, NUCLEAR MAGNETIC RESONANCE.

IDENTIFIERS: (U) PEG1102F, WUAFOSR230382, \*Phosphoranes, Phosphetidines/cis-dialkylidiaz, Fluorocycromatic phosphorane..

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 479 CONTINUED

CORNELL UNIV ITHACA NY BAKER LAB

(U) Dissociation Dynamics of C302 Excited at 157.6 nm.

FEB 91 15P

PERSONAL AUTHORS: Strauss, C. E.; Kable, S. H.; Chawla, G. K.; Houston, P. L.

CONTRACT NO. AFDSR-89-0162

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR, XF  
TR-92-0688, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v94 n3 p1837-1849, 1 Feb 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The dissociation of carbon suboxide by single photon absorption at 157 nm has been studied under the collisionless environment of a molecular beam. The primary products are  $2\text{CO} + \text{C}$  ( $3p(87\%)$  or  $1D(3\%)$ ). The ml levels of the  $3p$  carbon were statistically distributed. The CO rotational populations in the first three vibrational levels are found to be well described by Boltzmann distributions with temperatures 3430 K, 4120 K, 4674 K, and 2339 K for  $v=0, 1, 2, 3$  respectively. A second low temperature component in the  $v=0$  rotational distribution was attributed CO produced in coincidence with C( $1D$ ). Significant population was found in the first four vibrational levels, as shown in Figure 2, with less than 3% estimated in the higher levels; a vibrational temperature of 3700 K fit the distribution. The Doppler profiles were nearly Gaussian with evidence of slightly anisotropic recoil directions in the CO ( $\beta > 0$ ) but not the carbon fragments. The mean CO fragment speeds were nearly constant for all rotational levels, though slightly faster for  $v=1$  than  $v=0$ . From the transitional energetics of the CO at least a small amount of stable C20 is inferred to exist at an energy below that of the c state. The overall energetics place the stable C20 quantum yield under 2% assuming that

excited C20 is not radiatively stabilized. We were unable to detect C20 directly in any electronic state. The dissociation of C302 into C( $3p$ ) + 2 CO appears to be best described as a stepwise reaction that produces a nearly statistical partitioning into all fragment degrees of freedom. The best agreement is obtained for a intermediate C20 electronic state in the vicinity of the b (e.g. b, a or A); a ground state C20 intermediate is unlikely.

DESCRIPTORS: (U) \*ABSORPTION, \*DISSOCIATION, \*MOLECULAR BEAMS, \*PHOTONS, \*DYNAMICS, \*EXCITATION, AGREEMENTS, CARBON, CHANNELS, CONSTANTS, CROSSINGS, DEGREES OF FREEDOM, DISTRIBUTION, ELECTRONIC STATES, ELECTRONICS, ENERGY, ENVIRONMENTS, EXITS, FRAGMENTS, GROUND STATE, LOW TEMPERATURE, MEAN, PHASE, PICTURES, POPULATION, PROFILES, RECOIL, SCALE, STATISTICAL DISTRIBUTIONS, TEMPERATURE, TIME, VELOCITY, YIELD, REPRINTS, OXYGEN, OXIDES, DOPPLER SYSTEMS, MOLECULAR STATES, CHEMICAL BONDS, PHOTODISSOCIATION, KINETIC ENERGY.

IDENTIFIERS: (U) PES1102F, WJAFDSR2303B1, \*Carbon suboxide, Collisionless environments, Rotational, Vibrational levels, Boltzmann distributions, Gaussian, Transitional energetics, Internal states, Branching ratios.

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UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

(U) Structures of Two Tricyclo(5.2.1.0(2,8))decane Derivatives,

80 5P

PERSONAL AUTHORS: Watson, William H.; Nagl, Ante; Kashyap, Ram P.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0609, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Acta Crystallographica. Section C: Crystal Structure Communications, VC48 p1285-1288 1990. Available to DTIC users only. No copies furnished by NTIS.

Reprint: Structures of Two Tricyclo(5.2.1.0(2,8))decane Derivatives.

DESCRIPTORS: (U) \*ORGANIC COMPOUNDS, \*CRYSTAL STRUCTURE, \*CHEMICAL DERIVATIVES, MECHANICS, MOLECULES, SYNTHESIS(CHEMISTRY), X RAY DIFFRACTION, REPRINTS.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2303A3, \*Decane/Tricyclo, Cyclopentenones.

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CALIFORNIA UNIV IRVINE

(U) Interfacial Behavior in Ni3Al/TiB2 Intermetallic Matrix Composites,

OCT 91 7P

PERSONAL AUTHORS: Liang, X.; Earthman, J. C.; Lavernia, E. J.

CONTRACT NO. AFOSR-90-0388

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0631, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Conference Proceedings of Advanced Matrix Composites for Elevated Temperatures, p115-119, 20-24 Oct 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) A Ni3Al/TiB2 composite was processed utilizing a spray atomization and co-deposition methodology, in order to investigate the interfacial reaction behavior between the Ni3Al matrix and TiB2 particulates. After high temperature annealing, a distinct interfacial reaction zone formed between Ni3Al matrix and TiB2 particulates, in both atomized Ni3Al/TiB2 powders and co-deposited Ni3Al/TiB2 samples. SEM studies, in combination with EDS analyses, indicated that this interfacial reaction product consisted of a Ni3(Al,Ti) phase. After extended exposure at elevated temperatures, the interfacial reaction zone grew and consumed the TiB2 particulate, resulting in the formation of a NiTi phase.

DESCRIPTORS: (U) \*COMPOSITE MATERIALS, \*INTERMETALLIC COMPOUNDS, \*CERAMIC MATERIALS, \*MATRIX MATERIALS, ANNEALING, ATOMIZATION, DEPOSITION, HIGH TEMPERATURE, METHODOLOGY, PARTICULATES, PHASE, POWDERS, SPRAYS, TEMPERATURE, THICKNESS, REPRINTS, TITANIUM BORIDE, INTERFACES, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) PEB1102F, WJAFOSR2308A1, Nickel

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aluminumide.

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OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Osa Topical Meeting Proceedings (4th) on Picosecond Electronics and Optoelectronics Held in Salt Lake City, Utah on 13-15 March 1991. Volume 9.

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

MAY 92 287P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. AFOSR-91-0176

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0520, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual items, see AD-P008 630 thru AD-P007 681.

ABSTRACT: (U) Contents: Terahertz Sources and Spectroscopy; Ultrafast Optoelectronics; Electro-Optic Sampling; Ultrafast Photodetectors; High-Speed Transistors and Electronics; Millimeter-Wave Circuits; Ultrafast Lasers; Tunneling; Materials; Picosecond Superconductive Electronics; High-Capacity Lightwave Transmission; Ultra-High Speed or Wavelength Multiplexing; and Photon-Assisted Resonant Tunneling Through a GaAs/AlGaAs Multiple Quantum Well Structure.

DESCRIPTORS: (U) \*ELECTROOPTICS, \*PHOTONICS, \*SYMPOsia, TUNNELING(ELECTRONICS), QUANTUM ELECTRONICS, MILLIMETER WAVE EQUIPMENT, STRIP TRANSMISSION LINES, GALLIUM ARSENIDES, PHOTODETECTORS, PHOTODIODES, MODE LOCKED LASERS.

IDENTIFIERS: (U) PES1102F, WUAFOSR2308A1, Quantum wells, Picosecond time, Terahertz spectroscopy.

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OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) OSA Proceedings of the Topical Meeting on Nonlinear Guided-Wave Phenomena Held in Cambridge, England (United Kingdom) on 2-4 September 1991. Volume 15.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91.

MAY 92 423P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. AFOSR-91-0176

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0510, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual items, see AD-P007 534 thru AD-P007 629.

DESCRIPTORS: (U) \*OPTICS, \*PHOTONICS, \*ELECTROOPTICS, LITHOGRAPHY, SYMPOSIA.

IDENTIFIERS: (U) WJAFOSR2308A1, PE81102F, Photorefractive materials, Optical computing, Optical amplifiers, Nonlinear guided waves.

AD-A253 439 7/4 7/3 20/8 12/1

MEMPHIS STATE UNIV TN DEPT OF CHEMISTRY

(U) Semiempirical Calculation of the Hyperpolarizabilities of Polyenes.

90 9P

PERSONAL AUTHORS: Kurtz, Henry A.

CONTRACT NO. AFOSR-90-0010

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF  
TR-92-0639, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in International Jnl. of Quantum Chemistry: Quantum Chemistry Symposium 24, p791-897 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Semiempirical finite-field methods based on the MNDO, AM1, and PM3 Hamiltonians are employed to study the hyperpolarizability of polyenes (H(C2H2)nH, n=2, 20). These results are compared with ab initio results. Also of interest is the large n behavior and methods to extract a value per subunit are explored. Nonlinear Optics, Hyperpolarizabilities.

DESCRIPTORS: (U) \*NONLINEAR OPTICS, BEHAVIOR, OPTICS, VALUE, REPRINTS, OLIGOMERS, COMPUTATIONS.

IDENTIFIERS: (U) PE81102F, WJAFOSR230383, \*Hyperpolarizabilities, \*Polyene, Conjugated double bonds, \*Semiempirical calculations, Ab initio calculations.

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SEARCH CONTROL NO. T4J19F

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CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Deformation and Damage Mechanisms in High Temperature Composites with Ductile Matrices.

(U) Quantum Well Wires and Boxes Superstructures: Microprocessing and Characterization.

DESCRIPTIVE NOTE: Final rept.,

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

JUN 92 111P

AUG 91 15P

PERSONAL AUTHORS: Dvorak, George J.; Sahel-El-Din, Yeh A.

PERSONAL AUTHORS: Petroff, P. M.

CONTRACT NO. AFOSR-88-0150

CONTRACT NO. AFOSR-88-0334

MONITOR: AFOSR, XF  
TR-92-0674, AFOSR

PROJECT NO. 2308

UNCLASSIFIED REPORT

TASK NO. B1

ABSTRACT: (U) This report presents a summary of the theoretical and experimental work performed in our research program on deformation and damage of high temperature composites. The theoretical part focused on two areas: modeling of fatigue damage in metal matrix composite and laminates by shakedown and nonlinear viscoplasticity theory formulated last year for homogeneous materials, in order to model certain phenomena observed in high temperature experiments of unreinforced metals. Implementation of the new viscoplasticity theory for the phases in the periodic Hexagonal Array model for unidirectional composites was an important part of the research. Progress in these theoretical aspects of the program is summarized. The report also describes achievements in the experimental program. Composite materials, damage accumulation, viscoplasticity theory.

DESCRIPTORS: (U) \*COMPOSITE MATERIALS, \*DEFORMATION, \*METAL MATRIX COMPOSITES, ACCUMULATION, ARRAYS, DAMAGE, FATIGUE, HIGH TEMPERATURE, LAMINATES, MATERIALS, METALS, MODELS, OPTIMIZATION, TEMPERATURE, THEORY, UNIDIRECTIONAL, VISCOPLASTICITY, WORK, DUCTILITY.

IDENTIFIERS: (U) Ductile matrices, Fatigue damage.

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UNCLASSIFIED REPORT

MONITOR: AFOSR, XF  
TR-92-0681, AFOSR

ABSTRACT: (U) The research was aimed at producing quantum wire superlattices with dimensions below 10nm by directly using molecular beam epitaxy. Two(2D) and three dimensional (3D) carrier confinement is achievable relatively easily when the confinement length scale is larger than 100 nm. This is the dimensional range of the so called mesoscopic devices. All the technologies which permit this mesoscopic regime are based on lithography (electrons or ions) processing which will be used for producing a depletion layer or a lateral band gap modulation with a strain field. Unfortunately the interesting effects associated with the presence of a superlattice and quantization are not found until the structure dimensions are well below the 50nm range. There are presently few processing techniques which will permit reaching these dimensions.

DESCRIPTORS: (U) \*SUPERLATTICES, \*QUANTUM THEORY, \*CRYSTAL STRUCTURE, DEPLETION, LAYERS, LENGTH, MODULATION, MOLECULAR BEAMS, QUANTIZATION, SCALE, STRUCTURES, EPITAXIAL GROWTH.

IDENTIFIERS: (U) WJAFOSR2306B1, PE8102F, Quantum wire.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 434 20/12 AD-A253 434 CONTINUED

STEVENS INST OF TECH HOBOKEN NJ DEPT OF PHYSICS AND  
ENGINEERING PHYSICS

oxide.

(U) Surface Production of Ions.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-30 Apr 92.

MAY 92 16

PERSONAL AUTHORS: Seidl, Mitos

CONTRACT NO. AFOSR-90-0019

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XF  
TR-92-0883, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Surface production of negative hydrogen ions by electron transfer from solid surfaces to backscattered hydrogen atoms was investigated. The low-energy hydrogen atoms were produced by thermal dissociation or electron impact dissociation of hydrogen gas and by deceleration of a proton beam. A highly stable cesium oxide converter surface, giving the highest observed yield for surface production of H-ions, was developed. A microwave discharge producing an intense flux of superthermal hydrogen atoms was built and tested. This opens up new approaches to the design of H- ion sources. Resonant charge transfer in hydrogen atom scattering from surfaces was theoretically studied. Several models of solid state cesium ion guns were developed and used for surface studies. Ion Emission; Ion Sources; Atom, Molecule and Ion Impact.

DESCRIPTORS: (U) \*ELECTRON TRANSFER, \*ION SOURCES, APPROACH, ATOMS, CESIUM, CHARGE TRANSFER, CONVERTERS, DECELERATION, DISSOCIATION, ELECTRONS, EMISSION, ENERGY, GUNS, HYDROGEN, IMPACT, IONS, LOW ENERGY, MICROWAVES, MODELS, MOLECULES, OXIDES, PRODUCTION, PROTON BEAMS, PROTONS, SCATTERING, SOLIDS, SURFACES, TRANSFER, YIELD, CESIUM ALLOYS.

IDENTIFIERS: (U) Negative ions, Hydrogen atoms, Cesium

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CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND  
BIOCHEMISTRY

REPRINTS.

(U) Mechanistic Predictions for Fluorine Etching of Si(100)

IDENTIFIERS: (U) WJAFQSR230383, PES1102F, \*Mechanistic  
predictions, Silicon clusters, Dangling bonds.

91

3P

PERSONAL AUTHORS: Wu, C. J.; Carter, E. A.

CONTRACT NO. AFOSR-89-0108

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF  
TR-92-0871, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of American Chemical Society  
v113 n24 p8081-9082 1991. Available only to DTIC users.  
No copies furnished by NTIS.

ABSTRACT: (U) We present results of highly correlated ab initio electronic structure calculations on embedded silicon clusters containing 0-4 fluorine atoms that are designed to mimic the Si(100) surface in the initial stages of the fluorine etching reaction. We predict that fluorine atoms initially saturate all the dangling bonds with no activation barrier and with a large release of heat into the solid (8.1-8.4 eV per Si-F bond formed). Above 0F = 1.0 ML (ML = monolayer), Si-Si bonds start to break, with the reaction still exothermic by 2.9 eV up to 0F = 1.25 ML. Reaching a coverage of 1.5 ML is either downhill or activated, depending on how the F atoms are deposited. Beyond a coverage of 1.5 ML, we predict that adjacent SiF<sub>2</sub> groups are highly destabilized and should be preferentially etched. These results are consistent with recent experiments involving F atom adsorption on Si(100) and offer the first ab initio heats of reaction for elementary steps in silicon etching by atomic fluorine.

DESCRIPTORS: (U) \*ETCHING, \*FLUORINE, \*SILICON,  
\*STRUCTURES, \*ELECTRONIC STATES, ACTIVATION, ADSORPTION,  
ATOMS, BARRIERS, ELECTRONICS, HEAT, RELEASE, SURFACES,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) Constant Temperature Molecular Dynamics Simulations of Si(100 and Ge(100): Equilibrium Structure and Short-Time Behavior.

92 12P

PERSONAL AUTHORS: Weakliem, P. C.; Carter, E. A.

CONTRACT NO. AFOSR-89-0108

PROJECT NO. 2303

TASK NO. 83

MONITOR: AFOSR, XF  
TR-92-0574, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 p3240-3250 1992. Available only to DTIC users. No copies furnished by NTIS.

**ABSTRACT:** (U) The structures of the (100) surfaces of silicon and germanium generally have been interpreted in a static manner in the past. We present molecular dynamics (MD) simulations that show these surfaces to consist of a mixture of rapidly interconverting buckled and unbuckled dimers. Over a time average, the surface is found to have long  $p(2 \times 1)$  rows of symmetrical, unbuckled dimers, as seen in the recent scanning tunneling microscopy images of silicon. However, higher order unit cells are observed in He scattering and low energy electron diffraction experiments at low temperatures. We present a dynamical interpretation of the structure to explain both sets of observations. The simulations have been performed on different size slabs at both constant energy and constant temperature utilizing a new method for effective removal of heat from an exothermic system while retaining the correct dynamics. Several different interaction potentials were analyzed in an attempt to find the most realistic one for simulations of these surfaces. The effect of surface defects and annealing were also investigated. The surface phonon densities of states were calculated and for Si(100) are

In good agreement with experiments and other theoretical treatments. Such simulations and structural analyses are reported for the first time for Ge(100).

**DESCRIPTORS:** (U) \*CONSTANTS, \*DIMERS, \*GERMANIUM, \*SILICON, \*SIMULATION, \*STRUCTURES, \*TEMPERATURE, \*CHEMICAL EQUILIBRIUM, AGREEMENTS, ANNEALING, CELLS, DIFFRACTION, DYNAMICS, ELECTRON DIFFRACTION, ELECTRONS, ENERGY, HEAT, IMAGES, INTERACTIONS, LOW ENERGY, MICROSCOPY, MIXTURES, PHONONS, REMOVAL, SCANNING, SCATTERING, STATICS, SURFACES, TIME, TUNNELING, REPRINTS, CRYSTALS, ATOMS, HELIUM, SURFACE ANALYSIS, CRYSTAL DEFECTS.

**IDENTIFIERS:** (U) WUAFOSR2303B3, PE81102F, \*Molecular dynamics, Dangling bonds, Fermi level.

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GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

PREDICTIONS, SPECTROMETERS, SPLITTING, TIME, TRANSITIONS, REPRINTS, PULSES, LIGANDS, INTERACTIONS, CHEMICAL EQUILIBRIUM, KINETIC ENERGY, CHARGE TRANSFER, VIBRATION, EXCITATION.

(U) Photodissociation Spectroscopy of Mg(+)-CO<sub>2</sub>.

92 7P

IDENTIFIERS: (U) WJAFDSR2303A3, PE81102F, Ion-molecule complexes, Cluster source, \*Electronic spectroscopy, Ab initio calculations, Collision activation, Binding energies.

PERSONAL AUTHORS: Willey, K. F.; Yeh, C. S.; Robbins, D. L.; Duncan, M. A.

CONTRACT NO. AFOSR-91-0001

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XA  
TR-92-0875, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Chemical Physics Letters, v192 n2/3 p179-184 1992. Available only to DTIC Users. No copies furnished by NTIS.

ABSTRACT: (U) Mg + -CO<sub>2</sub> ion-molecule complexes are produced in a pulsed supersonic nozzle cluster source. These weakly bound complexes are mass selected and studied with laser photodissociation spectroscopy in a reflection time-of-flight mass spectrometer system. An electronic transition assigned as 211 - X2 + is observed with an origin at 29,825 cm<sup>-1</sup> (vac). The spectrum is characterized by a six member progression in the metal-CO 2 stretching mode with a frequency (omega e') of 381.8 cm<sup>-1</sup>. An extrapolation of this progression fixes the excited state dissociation energy (Do') at 11,194 cm<sup>-1</sup>. The corresponding ground state value (Do) is 5,150 cm<sup>-1</sup> (14.7 kcal/mole). The 2111/2,3/2 spin-orbit splitting is 56 cm<sup>-1</sup>. These studies were guided by ab initio calculations by Baeschlicher and coworkers, which provide accurate predictions of the electronic transition energy, vibrational constants and dissociation energy. Clusters, Electronic spectroscopy, Photodissociation.

DESCRIPTORS: (U) \*IONS, \*MOLECULES, \*PHOTODISSOCIATION, \*SPECTROSCOPY, \*SUPERSONIC NOZZLES, \*MAGNESIUM, \*CARBON DIOXIDE, CONSTANTS, DISSOCIATION, ELECTRONICS, ENERGY, EXTRAPOLATION, FLIGHT, GROUND STATE, LASERS, MASS, MASS SPECTROMETERS, METALS, NOZZLE CLUSTERS, NOZZLES, ORBITS,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

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CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND BIOCHEMISTRY

MODELS, SCANNING, STRUCTURES, THERMODYNAMICS, TUNNELING, VALENCE, REPRINTS, WAVE FUNCTIONS, CHEMICAL EQUILIBRIUM, HEAT OF REACTION, CHEMICAL REACTIONS.

(U) Adsorption of hydrogen ions on the Si(100)-2 x 1 Surface: Implications for the H<sub>2</sub> Desorption Mechanism,

91 8P

IDENTIFIERS: (U) WUAFOSR230383, PE81102F, Chemical physics, GVB(Generalized Valence Bond), Vibrational frequencies, Dangling bonds, Monohydride phases, Bond dissociation energies.

PERSONAL AUTHORS: WU, C. J.; Carter, E. A.

CONTRACT NO. AFOSR-89-0108

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XA  
TR-92-0572, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Chemical Physics Letters, v185 n1/2 p172-178 1991. Available only to DTIC Users. No copies furnished by NTIS.

ABSTRACT: (U) The adsorption of atomic hydrogen on the reconstructed Si(100)-2 x 1 surface is studied using embedded Si clusters as models of an extended Si surface. Analytic gradients of generalized valence bond (GVB) wavefunctions are used to predict equilibrium structures and harmonic vibrational frequencies; the correlation-consistent configuration interaction (CCCI) method is used to calculate heats of adsorption. We predict that the first Si-H bond strength of a silicon dimer DO(Si-Si-H) is 86.1 kcal/mol, while the second Si-H bond strength DO(HSiSi-H) is 87.8 kcal/mol. Thus, no significant thermodynamic preference exists for either Si-Si-H or H-Si-Si-H surface configurations, consistent with recent infrared and scanning tunneling microscopy experiments. The predicted adsorption energetics have important consequences for H<sub>2</sub> desorption (delta E<sub>des</sub> = 70.7 kcal/mol) with a new mechanism proposed involving H atom diffusion followed by pre-pairing desorption of two H atoms on adjacent silicon dimers in the same dimer row.

DESCRIPTORS: (U) \*ADSORPTION, \*ATOMS, \*DESORPTION, \*DIMERS, \*HYDROGEN, \*SILICON, \*SURFACES, CONFIGURATIONS, CORRELATION, DIFFUSION, GRADIENTS, HARMONICS, MICROSCOPY,

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CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND  
BIOCHEMISTRY

AD-A253 426 20/9 7/4 20/10  
FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Subpicosecond Interconversion of Buckled and Symmetric  
Dimers on Si(100).

(U) Structures and Adsorption Energetics for Chemisorbed  
Fluorine Atoms on Si(100)-2 x 1.

90 8P

92 18P

PERSONAL AUTHORS: Weakliem, P. C.; Smith, G. W.; Carter,  
E. A.

PERSONAL AUTHORS: Wu, C. J.; Carter, E. A.

CONTRACT NO. AFOSR-89-0108

CONTRACT NO. AFOSR-89-0108

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B3

TASK NO. B3

MONITOR: AFOSR, XA  
TR-92-0670, AFOSR

MONITOR: AFOSR, XA  
TR-92-0573, AFOSR

UNCLASSIFIED REPORT

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SUPPLEMENTARY NOTE: Availability: Pub. in Surface Science  
Letters, V232 PL219-L223 1990. Available only to DTIC  
Users. No copies furnished by NTIS.

SUPPLEMENTARY NOTE: Availability: Pub. in Physical Review  
B, V45 n16 p9085-9081 1992. Available only to DTIC Users.  
No copies furnished by NTIS.

ABSTRACT: (U) Finite temperature molecular dynamics  
simulations provide the first theoretical evidence for  
subpicosecond dynamical behavior on a defect-free Si(100)  
surface; the instantaneous distribution of buckled and  
symmetric dimers is found to be - 2:3; buckled dimers  
rapidly interconvert with symmetric dimers, with the  
buckling direction alternating along a row; only  
symmetric dimers are observed on a time average; and we  
find that collective motion of > or - 5 Si layers is  
involved in the reconstruction. Thus, the observed  
surface structure should depend on experimental time  
scales.

ABSTRACT: (U) We report first-principles electronic-  
structure calculations related to the initial  
fluorination of the Si(100)-2 x 1 surface. Embedded  
finite silicon clusters are used to model an extended  
Si(100)-2 x 1 surface. Two theoretical approaches,  
including a geometry-mapping procedure and an evaluation  
of lateral interactions via a dimer model, are  
presented. Adsorption of up to 2.0 monolayers of fluorine  
is considered. Heats of adsorption, activation barriers,  
preferred binding sites, equilibrium geometries, charge  
transfer, and vibrational frequencies are predicted for  
this coverage range. Lateral interactions between various  
adspecies are found to be critically important in  
determining their stability. Thermochemical predictions  
derived from these calculations are used to postulate a  
reaction mechanism associated with the initial etching  
steps and with the adsorption kinetics of XeF2 versus F2.

DESCRIPTORS: (U) \*BUCKLING, \*DIMERS, \*LAYERS, \*SURFACES,  
\*SYMMETRY, BEHAVIOR, DISTRIBUTION, DYNAMICS, MOTION,  
SIMULATION, STRUCTURES, TEMPERATURE, TIME, REPRINTS,  
SILICON, CHEMICAL EQUILIBRIUM, ATOMS, SURFACE PROPERTIES.

DESCRIPTORS: (U) \*ADSORPTION, \*ETCHING, \*FLUORINE,  
\*SILICON, \*STRUCTURES, \*ATOMS, \*CHEMISORPTION, ACTIVATION,  
APPROACH, BARRIERS, ELECTRONICS, FLUORINATION, GEOMETRY,  
INTERACTIONS, KINETICS, MAPPING, MODELS, PREDICTIONS,  
SITES, STABILITY, SURFACES, TRANSFER, REPRINTS, CHARGE  
TRANSFER, DIMERS, PLASMAS(PHYSICS), SEMICONDUCTORS, XENON.

IDENTIFIERS: (U) WJAFOSR2303B3, PE81102F, \*Subpicosecond,  
\*Interconversion, Reconstruction, MD(Molecular Dynamics),  
Simulation, Velocity verlet algorithm, Gaussian  
distribution, Time scale.

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## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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## FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

IDENTIFIERS: (U) WJAFOSR230383, PES1102F, \*Energetics,  
Embedded finite, Heats of adsorption, Binding sites,  
Equilibrium geometries, Vibrational frequencies, Chemical  
etching, Clusters, Dangling bonds, Quantum mechanics.

(U) New Algorithm for High-Order Time-Dependent Hartree-  
Fock Theory for Nonlinear Optical Properties.

92 8P

PERSONAL AUTHORS: Sekino, H.; Bartlett, R. J.

CONTRACT NO. AFOSR-89-0207

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XA  
TR-92-0585, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Int. Jnl.  
Quantum Chem, v43 p119-134 1992. Available only to DTIC  
Users. No copies furnished by NTIS.

ABSTRACT: (U) A new formalism and algorithm is developed for solving the general-order time-dependent Hartree-Fock (TDHF) problem. It is shown that for any order  $n$  a generalization of the TDHF equations can be derived where all lower-order solutions constitute a constant term. This makes it very easy to obtain high-order solutions. As the space required for the mapping of density matrices to Fock matrices in a problem of a given order is largely reduced, we can perform the most time-consuming steps within the core memory of the machine and easily manipulate vector products via optimum routines. The second hyperpolarizability gamma is obtained from the second-order TDHF solution via a  $2n$  rule. The formalism also allows for expressing all terms in the equation diagrammatically, which provides additional physical insight and a more systematic evaluation of terms. To illustrate the method, TDHF results are presented for trans-butadiene and carbon monoxide for several optical processes, including correlation corrections to their static hyperpolarizabilities obtained via coupled cluster (CCSD) and many-body perturbation theory. The hybrid TDHF/CCSD method provides excellent agreement with the DC-SHG experiments ( $\chi^{(2)} = 11.4 \times 10^{-32}$ ) esu/mol compared to  $12.9 + or - 1.4 \times 10^{-32}$  esu/mol and  $\chi_1 = 149$  compared to

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144 4 x 10(-38) esu/mol). Algorithm, Formalism, Nonlinear, Hartree-Fock, Properties.

DESCRIPTORS: (U) \*ALGORITHMS, \*HARTREE FOCK APPROXIMATION, \*NONLINEAR OPTICS, AGREEMENTS, BODIES, BUTADIENES, CARBON, CARBON MONOXIDE, CONSTANTS, CORES, CORRELATIONS, CORRELATION, DENSITY, EQUATIONS, MACHINES, MAPPING, MONOXIDES, PERTURBATION THEORY, PERTURBATIONS, STATICS, THEORY, TIME, OPTICAL PROPERTIES, REPRINTS.

IDENTIFIERS: (U) WJAFOSR2303B2, PE01102F.

UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY  
(U) Structures of Two Hydrated Cage Diketones.

90 8P

PERSONAL AUTHORS: Watson, William H.; Nagl, Ante; Kashyap, Ram P.; Marchand, Alan P.; Lu, Shao-Po

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XA  
TR-82-0608, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Acta Cryst., Sect. C: Cryst. Struct. Commun. VC48 p1875-1879, 1980. Available only to DTIC Users. No copies furnished by NTIS.

ABSTRACT: (U) The X-ray crystal structures of 2,3,5,8-tetrachloro-8,11-dihydroxy-4,4-dimethoxy undecane and of 1,9-dibromo-11,11-dihydroxy -5-methylpentacyclo[5.4.0.0.2,8.03,10.05,9] undecane-8-one are presented and discussed. X-ray crystal structures, Hydrate Cage Diketones.

DESCRIPTORS: (U) \*STRUCTURES, \*X RAYS, CRYSTALS, HYDRATES, REPRINTS, KETONES, SINGLE CRYSTALS, CHLORINE COMPOUNDS, HYDROXYL RADICALS, METHYL RADICALS, DECANES, BROMINE COMPOUNDS, CYCLIC COMPOUNDS, HYDROCARBONS.

IDENTIFIERS: (U) WJAFOSR2303A3, PE01102F, \*Hydrated cage diketones, Methoxy.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 423 CONTINUED

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Laser Photodissociation Spectroscopy of Mass-Selected Metal Clusters,

91 10P

IDENTIFIERS: (U) WJAFOSR2303A3, PE81102F, \*Mass selected metal clusters, Pulsed nozzle source, Jet cooled, Reflectron time of flight spectrometer, Vibronic resonances, Binding energetics, Clusters, Curve crossing, Predissociations.

PERSONAL AUTHORS: Willey, K. F.; Robbins, David L.; Yeh, C. S.; Duncan, M. A.

CONTRACT NO. AFOSR-91-0001

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XA  
TR-92-0578, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Faraday Discussions, V92 p269-277 1991. Available only to DTIC Users. No copies furnished by NTIS.

ABSTRACT: (U) Electronic spectra are reported for the metal cluster (Te<sub>2</sub>) and metal cluster complex (Ag<sup>+</sup>-benzene, Mg<sup>+</sup>-CO<sub>2</sub>) cations. These ions are generated by laser vaporization in a pulsed nozzle source, jet-cooled, mass-selected with a reflectron time-of-flight spectrometer, and dissociated on resonance with a tunable dye laser. Electronic excitation spectra are recorded by monitoring the appearance of the fragment-ion channel(s) as the dissociation laser is tuned through electronic and/or vibronic resonances. Analysis of these new spectra yields vibrational constants, binding energetics and evidence for new photochemistry in these novel ion systems. Clusters, Electronic spectra, Photodissociation.

DESCRIPTORS: (U) \*DYE LASERS, \*LASERS, \*VAPORIZATION, \*PHOTODISSOCIATION, \*SPECTROSCOPY, BENZENE, CATIONS, CONSTANTS, DISSOCIATION, DYES, ELECTRONICS, EXCITATION, FLIGHT, FRAGMENTS, IONS, MASS, METALS, MONITORING, NOZZLES, PHOTOCHEMICAL REACTIONS, RESONANCE, SPECTRA, SPECTROMETERS, TIME, REPRINTS, TELLURIUM, SILVER, MAGNESIUM, CARBON DIOXIDE, TUNABLE LASERS, ION MOLECULE INTERACTIONS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

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IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Synthesis and Reactions of Fluoroalkyl Polynitrogen Compounds.

92 5P

PERSONAL AUTHORS: Zheng, Yuan Y.; Patel, Nimesch R.; Kirchmeier, Robert L.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-91-0188

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XA  
TR-92-0583, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Availability: Pub. in Inorg. Chem. v31 n3 p488-491 1992, v112 p169-213 1991. Available only to DTIC Users. No copies furnished by NTIS.

ABSTRACT: (U) The relatively high thermal and hydrolytic stabilities of polyfluoro and perfluoroalkyl amines, diazanes, diazenes, and tetrazanes have tweaked our interest in continuing our studies of highly fluorinated polynitrogen compounds. On the basis of these attractive properties and on the fact that these compounds tend to be more dense on average than simple fluorocarbons, the possible real world applications are rather broad, including use as lubricants, hydraulic fluids and refrigerants and in biological systems. There are a variety of synthetic routes to these materials. In this work, we have taken advantage of the ease of insertion of olefinic or nitrilic groups into the nitrogen-chlorine bonds of N,N-dichloro(fluoroalkyl) amines or N-chlorobis (fluoroalkyl)-amines in order to form the polynitrogen compounds.

DESCRIPTORS: (U) \*FLUORINE COMPOUNDS, \*ALKYL RADICALS, \*NITROGEN COMPOUNDS, \*SYNTHESIS(CHEMISTRY), \*CHEMICAL REACTIONS, REPRINTS, PHOTOLYSIS, ALKENES, ISOMERS, NUCLEAR MAGNETIC RESONANCE, CHLORINATED HYDROCARBONS, NUCLEOPHILIC REACTIONS, SILANES, DENSITY, NITRILES, AMINES.

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IDENTIFIERS: (U) WJAFOSR2303B2, PES1102F, \*Fluoroalkyl compounds, \*Polynitrogen-compounds, Nitrogen-Chlorine bonds, Olefins, Azalkene, Cyano(trimethyl) silane, Hexamethyldisilazane, Diamines, N-Chloroamines, Chlorine fluoride, Perfluoroazapropene, Chlorofluorocarbons, Insertion.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 421 7/3 7/4 7/2 AD-A253 421 CONTINUED

IDAMO UNIV MOSCOW DEPT OF CHEMISTRY

(U) Fluorinated Compounds that Contain Catenated Oxygen,  
Sulfur or Nitrogen Atoms.

92 45P

PERSONAL AUTHORS: Kirchmaier, Robert L.; Shreeve, Jeanne  
M.; Verma, R. D.

CONTRACT NO. AFOSR-89-0189

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XA  
TR-92-0584, AFOSR

UNCLASSIFIED REPORT

NNRf2 (Rf = GCIF2, CF2CF3, CF(CF3)ORf) and the exciting  
more highly substituted species CF3(C2F5)NCF2N(CF3)  
N(C2F5)CF32. oxygen fluorides, dioxygen difluoride,  
polyoxygen difluorides, fluorinated peroxides,  
hydroperoxide peroxide derivatives, fluorinated  
disulfanes and polysulfanes, metal carbonyls, catenated  
nitrogen compounds, hydrazines, triazines, tetrazanes.

DESCRIPTORS: (U) \*CARBON, \*CHALCOGENS, \*NITROGEN  
COMPOUNDS, \*OXYGEN, \*SULFUR, \*FLUORINATED HYDROCARBONS,  
ADDITION, ATOMS, BOILING, CHAINS, FLUORIDES, FLUORINE,  
GLASS, HYDRAZINES, HYDROPEROXIDES, MATERIALS, METAL  
CARBONYLS, METALS, NITROGEN, NUMBERS, OXYGEN COMPOUNDS,  
PEROXIDES, PICTURES, PYROLYSIS, SHOCK, STABILITY, SULFUR  
COMPOUNDS, THERMAL STABILITY, REPRINTS.

IDENTIFIERS: (U) WUAFDSR2303B2, PEB1102F, \*Catenated  
atoms, Fluorinated peroxides, Fluorinated disulfanes,  
Triazines, Tetrazanes.

SUPPLEMENTARY NOTE: Availability: Pub. in Coordination  
Chemistry Reviews, v112 p189-213 1991. Available only to  
DTIC Users. No copies furnished by NTIS.

ABSTRACT: (U) While there is no element that can compete  
with carbon in the number of catenated atoms or in the  
numbers of compounds that contain such chains of atoms,  
it is also possible to prepare stable catenated species  
of other elements especially when fluorine atoms or  
fluorinated groups are present. It is interesting to note  
the surprising thermal stability of catenated nitrogen  
compounds, e.g., pyrolysis of CF3N =NCF3 at 325 deg C or  
at 483 deg C gives 50 or 30 percent yields, respectively,  
of (CF3) 2NN(CF3)2. At first glance this is a truly  
remarkable stability until one considers the thermal  
stabilities of the related chalcogen compounds, i.e.,  
CF3OOCF3 (can be prepared at >325 deg C) and CF3SCF3 (x  
= 1,2,3,4) (stable to at least 300 deg C). The stability  
of the higher oxygen compounds decreases markedly with  
CF3OOCF3 decomposing at ~ 70 deg C and with CF3OOCF3  
not yet synthesized. However, a sharp decrease in thermal  
stability is not observed either for fluoroalkyl  
substituted catenated sulfur compounds as indicated above  
or for the analogous nitrogen compounds. Earlier workers  
had prepared fluorosubstituted triazines which were  
stable at least to their boiling points (~ 70 deg C). In  
addition, we have reported the new tetrazanes, CF3(CF3CF2)

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Complete Description of Two-Photon (1+1') Ionization of NO Deduced from Rotationally Resolved Photoelectron Angular Distributions.

AUG 91 12P

PERSONAL AUTHORS: Leahy, David J.; Reid, Katharine L.; Zare, Richard N.

CONTRACT NO. AFOSR-89-0284

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0612, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v95 n3 p1757-1767, 1 Aug 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Time-of-flight photoelectron spectroscopy has been used to record energy-resolved photoelectron angular distributions (PADs) following (1 + 1) resonance-enhanced multiphoton ionization (REMPI) of NO via the  $v_1 = 1, N_1 = 22$  rovibrational level of the  $A_2 +$  state. The PADs corresponding to single rotational states of the resulting molecular ion show a strong dependence on the change in ion core rotation  $\Delta N(N+ - N_1)$  and also on the angle between the linear polarization vectors of the two light beams. Broken reflection symmetry ( $1 \text{ theta}, \phi$ ) not equal  $1 (\text{theta}, \phi)$  is observed when the polarization vectors of the two light beams form an angle of  $54.7^\circ$ . A fit to the PADs provides a complete description of this molecular photoionization, namely, the magnitudes and phases of the radial dipole matrix elements that connect the intermediate state to the  $1 \text{ lambda} >$  photoelectron partial waves (Refs. 1 and 2). This information is then used to predict unobserved quantities, such as ion angular momentum alignment and the full three-dimensional form of the PADs.

DESCRIPTORS: (U) \*ANGULAR MOMENTUM, \*IONIZATION.

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\*PHOTONS, \*NITROGEN OXIDES, ALIGNMENT, ANGLES, CORES, DIPOLES, ENERGY, FLIGHT, IONS, LIGHT, LINEAR POLARIZATION, MOLECULAR IONS, MOMENTUM, PHOTOELECTRONS, PHOTOIONIZATION, POLARIZATION, QUANTITY, RECORDS, REFLECTION, RESONANCE, ROTATION, SPECTROSCOPY, THREE DIMENSIONAL, TIME, REPRINTS.  
IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1,  
\*PAD(Photoelectron Angular Distribution),  
\*REMPI(Resonance Enhanced Multiphoton Ionization),  
Rovibrational level.

## UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 410 CONTINUED

IDAH0 UNIV MOSCOW

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B2,  
 \*perhaloalkanesulfinyl chlorides, \*perhaloalkanesulfinates  
 esters, Chiral centers, Sulfinyl radicals, Halogenated  
 methane, Ethanesulfinyl chlorides,  
 Sulfinatodehalogenation reactions.

(U) Perhaloalkanesulfinyl Chlorides, R(f)S(O)Cl, and  
 Perhaloalkanesulfinate Esters, R(f)S(O)OR(f)1.

82 4P

PERSONAL AUTHORS: Zhang, Yuan F.; Kirchmeier, Robert L.;  
 Shreeve, Jeanne M.

CONTRACT NO. AFOSR-91-0189

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF  
 TR-92-0581, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Inorganic Chemistry, v31 n3 p492-  
 494 1992. Available to DTIC users only. No copies  
 furnished by NTIS.

ABSTRACT: (U) Five halogenated methane and  
 ethanesulfinyl chlorides, RfS(O)Cl (Rf = CC13, CFC12,  
 CF2Cl, CF3CCl2 and CF3CBrCl) have been prepared by  
 reacting the respective sulfonic acids, RfS(O)OH, with  
 SOCl2. The sulfinyl chlorides have been converted to a  
 series of new stable halogenated sulfinyl esters RfS(O)  
 ORf' (Rf' = CF3CH2, CH3(CF3)CH, C(CF3)2CH3 and C8H5) by  
 treatment with fluoroalcohols or phenol in the presence  
 of pyridine or triethylamine. The tert-butyl sulfinates  
 (Rf CFC12, CF3CC12, Rf' = C(CH3)3) decompose upon  
 distillation to give isobutylene and the parent sulfonic  
 acid. Complex nuclear magnetic resonance spectra are  
 observed for the esters with chiral centers at sulfur and  
 carbon. halogenated methane and ethanesulfinyl chlorides,  
 halogenated alkanesulfonic acids, perhaloalkanesulfinate  
 esters, sulfinatodehalogenation reactions.

DESCRIPTORS: (U) \*CHLORIDES, \*NUCLEAR MAGNETIC RESONANCE,  
 \*SULFINIC ACIDS, \*HALOGENATED HYDROCARBONS, \*ALKANES,  
 ACIDS, BUTENES, CARBON, DISTILLATION, ESTERS, MAGNETIC  
 RESONANCE, METHANE, PHENOLS, PYRIDINES, RESONANCE,  
 SPECTRA, SULFUR, REPRINTS, AMINES.

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UTAH UNIV SALT LAKE CITY DEPT OF METEOROLOGY

(U) A Three-Dimensional Large-Scale Cloud Model: Testing  
the Role of Radiative Heating and Ice Phase Processes,

92

22P

PERSONAL AUTHORS: Lee, J. L.; Liou, K. N.; Ou, S. C.

CONTRACT NO. AFOSR-91-0039

PROJECT NO. 2310

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0648, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Tellus, v44A p197-216 1992.  
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) A time-dependent, three-dimensional, large-scale cloud model has been developed for the prediction of cloud cover, cloud liquid/ice water content (LWC/IWC), precipitation, specific humidity and temperature. Partial cloudiness is allowed to form when large-scale relative humidity is less than 100%. Both liquid and ice phases are included in the model. The liquid phase processes consist of evaporation, condensation, autoconversion and precipitation. The ice phase processes include heterogeneous nucleation to generate ice crystals, depositional growth to simulate Bergeron-Findeisen's process, sublimation to deplete ice crystals, and gravitational settling of ice crystals. The radiative transfer parameterization scheme is based on a broadband method and involves the transfer of infrared and solar radiation in clear and cloudy regions. The broadband infrared emissivity, reflectivity, and transmissivity for cirrus clouds, as well as the broadband solar absorption, reflection, and transmission values for low, middle and high clouds are computed based on the cloud LWC and IWC interactively generated by the cloud model. Large amounts of satellite data, including cloud cover climatology derived from the US' Air

DESCRIPTORS: (U) \*ATMOSPHERE MODELS, \*CLOUD PHYSICS.

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BROADBAND, CIRRUS CLOUDS, CLIMATOLOGY, CLOUD COVER, CLOUDS, CONDENSATION, CRYSTALS, EMISSIVITY, EVAPORATION, HUMIDITY, ICE, LIQUID PHASES, LIQUIDS, MODELS, NUCLEATION, PHASE, PRECIPITATION, PREDICTIONS, RADIATIVE TRANSFER, REFLECTION, REFLECTIVITY, SCALE, SOLAR RADIATION, SUBLIMATION, TEMPERATURE, THREE DIMENSIONAL, TIME, TRANSMISSIVITY, WATER, RADIATION ABSORPTION, REPRINTS.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2310CS.



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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 406 7/2 20/5 AD-A253 408 CONTINUED  
TEXAS CHRISTIAN UNIV FORT WORTH  
(U) A Molecular Dynamics Simulation of Sulphur  
Hexafluoride. IDENTIFIERS: (U) PE81103D, MUAFOSR3484CS, \*Sulfur  
hexafluoride, Collision induced light scattering,  
Transitional motion, Molecular physics.

92 11P

PERSONAL AUTHORS: Brodka, A.; Zerde, T. W.

CONTRACT NO. AFOSR-80-0185

PROJECT NO. 3484

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0513, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Molecular Physics, v78 n1 p103-112  
1982. Available to DTIC users only. No copies furnished  
by NTIS.

ABSTRACT: (U) Molecular dynamics simulations are  
performed for the six-centre Lennard Jones model of SFG  
over a temperature range from 225 to 398 K and density  
from 1 (dot) 3 to 1 (dot) 9 g cm<sup>3</sup>. The results of  
simulations are in good agreement with experimental data  
for the translational diffusion coefficient and  
correlation times for molecular reorientation and angular  
momentum, except for the highest temperature where small  
discrepancies between the simulated and experimental  
values for the diffusion coefficients are observed.  
Theoretical models for time correlation functions of  
molecular reorientations are compared with computer  
simulation results. It is found that the J-diffusion  
model reproduces the rotational correlation function of  
SFG more satisfactorily than other models.

DESCRIPTORS: (U) \*ANGULAR MOMENTUM, \*DIFFUSION  
COEFFICIENT, \*DYNAMICS, \*SIMULATION, \*MOLECULAR STATES,  
AGREEMENTS, COEFFICIENTS, COMPUTERS, CORRELATION, DENSITY,  
DIFFUSION, EXPERIMENTAL DATA, FUNCTIONS, MODELS, MOMENTUM,  
TEMPERATURE, TIME, VALUE, REPRINTS, SULFUR, FLUORIDES,  
MOLECULAR ROTATION, MOLECULES, RAMAN SPECTRA, NUCLEAR  
MAGNETIC RESONANCE, PHASE.

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## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 407 11/2  
TEXAS CHRISTIAN UNIV FORT WORTH  
(U) Porous Silica Glasses Doped With Quantum-Confined Cadmium Selenide.  
92 8P  
PERSONAL AUTHORS: Coffey, Jeffery L.; Beauchamp, Greg; Zerda, T. W.  
CONTRACT NO. AFOSR-80-0165  
PROJECT NO. 3484  
TASK NO. CS  
MONITOR: AFOSR, XF  
TR-92-0615, AFOSR

AD-A253 408 7/3 7/4 20/5  
COLORADO UNIV AT BOULDER DEPT OF CHEMISTRY AND BIOCHEMISTRY  
(U) High Resolution Infrared Flash Kinetic Spectroscopy of OH Radicals.  
91 9P  
PERSONAL AUTHORS: Schiffman, Aram; Nelson, David D., Jr.; Robinson, Martin S.; Nesbitt, David J.  
CONTRACT NO. F49620-88-C-0058  
PROJECT NO. 2303  
TASK NO. B1  
MONITOR: AFOSR, XF  
TR-92-0640, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Non-Crystalline Solids, v142 p208-214 1992. Available to DTIC users only. No copies furnished by NTIS.  
Reprint: Porous Silica Glasses Doped With Quantum-Confined Cadmium Selenide.  
DESCRIPTORS: (U) \*SILICA GLASS, \*CADMIUM SELENIDES, \*DOPING, SEMICONDUCTORS, SPECTROSCOPY, REPRINTS.  
IDENTIFIERS: (U) PE81103D, WUAFOSR3484CS, Sol-Gel process, Pore.

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v95 n7 p2829-2838 1991. Available to DTIC users only. No copies furnished by NTIS.  
Reprint: High Resolution Infrared Flash Kinetic Spectroscopy of OH Radicals.  
DESCRIPTORS: (U) \*FREE RADICALS, \*CHEMICAL REACTIONS, \*INFRARED SPECTROSCOPY, \*HYDROXIDES, ETHANES, PROPANE, BUTANES, FREQUENCY, TIME, REPRINTS.  
IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1, Infrared flash kinetic spectroscopy, Isobutane.

## UNCLASSIFIED

## DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

AD-A253 405

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## OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

- (U) Observation of Kinetic Heterogeneity on Highly Ordered  
Pyrolytic Graphite Using Electrogenerated  
Chemiluminescence.

DEC 89 5P

PERSONAL AUTHORS: Bowling, Robert J.; McCreery, Richard L.  
; Pharr, Christine M.; Engstrom, Royce C.

CONTRACT NO. AFOSR-88-0071

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0632, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Analytical Chemistry, v61 n24 p2783-2786, 15 Dec 89. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Kinetic heterogeneity on highly ordered pyrolytic graphite (HOPG) electrodes was characterized by using electrogenerated chemiluminescence imaging. The reaction of luminol in alkaline peroxide was used with a sensitive microscope-based imaging system to monitor the course of electron transfer at various regions on the HOPG surface. The ability to image with temporal resolution provided for the construction of local voltammograms, so that estimates of kinetic differences between basal plane and defect-rich HOPG could be obtained. Electrochemical pretreatment of basal plane HOPG produced a surface electrochemically similar to a defect-rich surface.

DESCRIPTORS: (U) \*ELECTRODES, \*HETEROGENEITY, \*KINETICS, \*PYROLYTIC GRAPHITE, CHEMILUMINESCENCE, ELECTRON TRANSFER, ESTIMATES, IMAGES, MICROSCOPES, PEROXIDES, REGIONS, RESOLUTION, SURFACES, TRANSFER, REPRINTS, ELECTROCHEMISTRY, CARBON.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A1, Luminol, Alkaline peroxide, Voltammograms.

AD-A253 405

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AD-A253 402 13/1

## ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF PHYSICS

- (U) Studies of Collisional and Nonlinear Radiative  
Processes for Development of Coherent UV and XUV  
Sources.

DESCRIPTIVE NOTE: Final rept. 10 Nov 88-31 Oct 91.

JUN 91 136P

PERSONAL AUTHORS: Rhodes, Charles; Luk, Ting S.

CONTRACT NO. AFOSR-89-0159

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0682, AFOSR

## UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of the interaction of matter with high intensity radiation (greater than or equal to 10(16) W/cm2) are leading to the observation of new physical phenomena and the production of new classes of highly excited matter. These recently factor in the discussions is the ability to generate very high levels of electronic excitation in the manner which enables the system to remain kinetically cold-for the time scale of the interaction. This conventionally paradoxical situation, in alliance with the existence of a new high-field mode of channelled propagation is highly conducive to coherent x-ray generation under a rather wide range of circumstances.

DESCRIPTORS: (U) \*LIGHT SOURCES, \*ULTRAVIOLET RADIATION, \*X RAY APPARATUS, ELECTRONICS, EXCITATION, HIGH INTENSITY, INTENSITY, PRODUCTION, PROPAGATION, X RAYS, FAR ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) WJAFOSR2301A1, PE81102F..

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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TEXAS CHRISTIAN UNIV FORT WORTH

SURFACES, VOLUME, REPRINTS, POROSITY, GEOMETRY, VIBRATION, PRESSURE, TEMPERATURE.

(U) Molecular Dynamics Simulation of Reorientational Motion of SF<sub>6</sub> in Porous Sol-Gel Glass.

IDENTIFIERS: (U) PEG1103D, WUAFDSR3484CS, \*Sulfur hexafluoride, Reorientation, \*Sol-gel glass.

92 8P

PERSONAL AUTHORS: Brodka, A.; Zarda, T. W.

CONTRACT NO. AFDSR-90-0165

PROJECT NO. 3484

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0611, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Non-Crystalline Solids, v139 p219-221 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Molecular dynamics of reorientational motion of SF<sub>6</sub> is simulated inside the porous structure representing amorphous sol-gel glass. Simulations are run for different densities of adsorbed SF<sub>6</sub>. By comparing the theoretical results with available experimental data, it is shown that the model well characterizes molecular properties of sulphur hexafluoride in porous silica. It is found that reorientational relaxation of SF<sub>6</sub> inside small pores is dependent on the density of adsorbent. It is concluded that, at elevated pressures, there are less molecules inside the pores than in the same volume on the outside of the sample. The difference in the densities inside the pores and the pure phase may be as high as 30%. Simulations are also run for two different surface potentials, and it is found that reorientational relaxation depends only slightly on potential depth, which can be attributed to the lack of specific interactions between adsorbent and the silica surface. Sol-gel, molecular simulations, SF<sub>6</sub>.

DESCRIPTORS: (U) \*DYNAMICS, \*COMPUTERIZED SIMULATION, ADSORBENTS, DENSITY, DEPTH, EXPERIMENTAL DATA, GELS, GLASS, INTERACTIONS, MODELS, MOLECULAR PROPERTIES, MOLECULES, MOTION, PHASE, RELAXATION, STRUCTURES.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A253 375 7/2 20/2 20/5

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Comparison of Silicon-Atom Diffusion on the Dimer-Adatom-Stacking fault and Binnig et al. Models of the Reconstructed Si(111)-(7x7) Surface.

MAY 91 8P

PERSONAL AUTHORS: Agrawal, Paras M.; Thompson, Donald L.; Raff, Lionel M.

CONTRACT NO. AFOSR-89-0085

PROJECT NO. 2303

TASK NO. 83

MONITOR: AFOSR, XF  
TR-92-0824, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemistry Physics, v94 n9 p6243-6249, 1 May 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The dynamics of silicon-atom diffusion on the dimer-adatom-stacking fault model (DAS) of the reconstructed Si (111) - (7 X 7) surface suggested by Takayanagi et al. have been investigated using variational phase-space theory methods. The site-to-site jump frequency is obtained from the variationally minimized total flux across a right cylindrical dividing surface whose cross section in the surface plane is formed from a straight line and elliptical segments. This minimized flux is corrected for surface recrossings by the computation of trajectories starting from phase-space points in the transition-state region that are obtained in the Markov walk used to evaluate the phase-space integrals in the expression for the total classical flux. The jump frequencies are used as input to the set of differential equations that describes the diffusion rates on the DAS surface. Values of the diffusion coefficient D are computed from the slopes of plots of the time variation of the root-mean-square displacements obtained from the solutions of the rate equations. Arrhenius plots of the results at 300, 600, and 1000 K yield  $D = 0.124 \exp - 2.18 \text{ eV/kT cm}^2/\text{s}$ . These rates are orders of

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magnitude smaller than the corresponding rates we have previously obtained for silicon-adatom diffusion on the Binnig et al. model of the Si (111) - (7 X 7) surface. In addition, it is found that the diffusion pattern on the DAS surface is uniform with no preferential directions for silicon-atom flow.

DESCRIPTORS: (U) \*ADATOMS, \*DIFFUSION, \*DIMERS, \*ATOMIC STRUCTURE, ATOMS, COEFFICIENTS, COMPUTATIONS, CROSS SECTIONS, DIFFERENTIAL EQUATIONS, DIFFUSION COEFFICIENT, DYNAMICS, FAULTS, FLOW, FREQUENCY, INPUT, INTEGRALS, MEAN, MODELS, PATTERNS, PHASE, RATES, REGIONS, SILICON, SLOPE, STACKING, STARTING, SURFACES, THEORY, TIME, TRAJECTORIES, TRANSITIONS, VALUE, VARIATIONS, REPRINTS, LATTICE DYNAMICS.

IDENTIFIERS: (U) PEG1102F, WUAFDSR2303B3, Variational phase space theory, Reconstruction, Metastable surface, Annealed surface.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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EMORY UNIV ATLANTA GA SCHOOL OF DENTISTRY

ELECTRON SPECTROSCOPY.

(U) Electronic Spectroscopy and Fluorescence Decay  
Dynamics of Matrix Isolated IBr.

IDENTIFIERS: (U) PES1102F, WUAFOSR2303ES, Iodine bromide,  
Resolved fluorescence technique, Diatomic halogens.

82

8P

PERSONAL AUTHORS: MacIer, Michel; Erickson, Matthew; Lin,  
Hong-Sun; Heaven, Michael C.

CONTRACT NO. F49620-92-J-0073, SAFOSR-88-0249

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XF  
TR-92-0847, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, V95 n11  
p4301-4308 1992. Available to DTIC users only. No copies  
furnished by NTIS.

ABSTRACT: (U) The spectroscopy and relaxation processes  
of IBr isolated in a solid Ar matrix have been studied  
using laser excitation and resolved fluorescence  
techniques. Excitation wavelengths in the range of 420-  
830 nm yielded fluorescence from the B(0+), A(1), and  
A'(2) states. Vibrational structure was absent from both  
the B(0+)-X(0+) excitation and emission spectra. A11  
levels of B(0+) were subject to rapid nonradiative decay.  
Emission spectra for the A(1)X(0+) and A'(2)-X(0+) systems  
yielded ground-state vibrational constants which were  
virtually identical to the gas-phase values. Electronic  
term energies of Te(A) = 12130 ± or - 30 and Te(A') = 11  
180 ± or - 30 cm-1 were determined. Radiative lifetimes  
of pi(A) = 140 ± or - 10 microseconds and pi(A') = 25 ± or -  
3 ns were obtained from time-resolved fluorescence  
measurements. Excitation of IBr/Ar matrices at 193 nm  
produced an emission feature at 419 nm, which has been  
tentatively assigned to the D'-A' transition.

DESCRIPTORS: (U) \*DECAY, \*RELAXATION, \*PHOTODISSOCIATION,  
\*HALOGENS, CONSTANTS, EMISSION SPECTRA, EXCITATION,  
FLUORESCENCE, GROUND STATE, LASERS, MEASUREMENT, PHASE,  
SOLIDS, SPECTRA, STRUCTURES, TRANSITIONS, ARGON, REPRINTS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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CHICAGO UNIV IL

(U) Phonons of fcc (100), (110), and (111) Surfaces Using Lennard-Jones Potentials. 2. Temperature Dependence of Surface Phonons Studied With Molecular Dynamics.

92 15P

PERSONAL AUTHORS: Koleske, D. D.; Sibener, S. J.

CONTRACT NO. AFOSR-88-0194

PROJECT NO. 2303

TASK NO. BS

MONITOR: AFOSR, XF  
TR-92-0827, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Surface Science, v268 p418-431 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) In this paper we present temperature dependent studies of the surface phonon dispersion relations for fcc (100), (110), and (111) faces using molecular dynamics (MD) simulations and Lennard-Jones potentials. This study was conducted in order to investigate how anharmonic potential terms influence the dynamical properties of the surface. This was accomplished by examining the temperature dependence of the Q-resolved phonon spectral density function. All phonon frequencies were found to decrease linearly in T as the temperature was increased, while at low temperatures the phonon linewidths increased linearly with T. At higher temperatures, some of the phonon linewidths changed from having a linear to a quadratic dependence on T. The temperature at which this T to T change occurs is surface dependent and occurs at the lowest temperature on the (110) surface. The T<sup>2</sup> dependence arises from the increasing importance of higher-order phonon-phonon scattering terms. The phonons which exhibit T<sup>2</sup> dependence tend to be modes which propagate perpendicularly or nearly perpendicularly to the direction of maximum root-mean-squared displacement (RMSD). This is especially true for the linewidth of the S<sub>1</sub> mode at X on the (110) surface where, at T = 15 23%

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of the melting temperature, the RMSD perpendicular to the atomic rows become larger than the RMSD normal to the surface. Our results indicate that the dynamics on the (110) surface may be significantly influenced by anharmonic potential terms at temperatures as low as 15 % of the melting temperature.

DESCRIPTORS: (U) \*PHONONS, \*SURFACE ANALYSIS, \*HEATING, DENSITY, DISPERSION RELATIONS, DYNAMICS, FUNCTIONS, MELTING, SCATTERING, SIMULATION, SURFACES, TEMPERATURE, REPRINTS, SURFACE ROUGHNESS, VIBRATION.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303BS, Face centered cubic, Molecular dynamics, \*Lennard Jones potentials, Anharmonic potential, Spectral density.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 74J19F

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MASSACHUSETTS UNIV AMHERST

UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS

(U) Biological and Theoretical Studies of Adaptive Networks: The Conditioned Response.

(U) Merged Beam Studies of Laser Stimulated Radiative Recombination.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 May 92.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-31 Dec 91.

JUN 92 81P

MAY 92 15P

PERSONAL AUTHORS: Moore, John W.

PERSONAL AUTHORS: Mitchell, J. B.

CONTRACT NO. AFOSR-89-0391

MONITOR: AFOSR, XF  
TR-92-0684, AFOSR

PROJECT NO. 2312

UNCLASSIFIED REPORT

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0678, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our primary experimental approach has been to record from single neurons in awake, behaving animals in order to determine the loci of neurons with conditioning-related activity and to quantitate the relationship of this activity to the expression of the conditioned response. Our theoretical approach has been to extend simple computational models of connectionist learning into physiologically plausible neural networks that describe real-time features of conditioned behavior. These network models, and their possible implementations in the brain, suggest experimental tests and provide direction for physiological studies.

DESCRIPTORS: (U) \*CONDITIONED RESPONSE, \*NEUROBIOLOGY, \*NEURAL NETS, \*MATHEMATICAL ANALYSIS, ANIMALS, BEHAVIOR, BRAIN, LEARNING, MODELS, NERVE CELLS, REAL TIME, RECORDS, RESPONSE, LOCUS, CONDITIONING(LEARNING), ADAPTIVE SYSTEMS, BIOLOGY, THEORY.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2312A1.

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DUKE UNIV DURHAM NC DEPT OF PHYSICS

ARIZONA UNIV TUCSON LUNAR AND PLANETARY LAB

(U) UV/XUV FEL Storage Ring and LINC.

(U) A Search for Low-Luminosity Objects.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-31 Dec 91.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 91.

DEC 9:

6P

OCT 91

6P

PERSONAL AUTHORS: Maday.

PERSONAL AUTHORS: Gehrels, Tom

CONTRACT NO. F49620-88-C-0100

CONTRACT NO. AFDSR-890027

MONITOR: AFOSR, XF  
TR-92-0893, AFDSR

PROJECT NO. 2311

UNCLASSIFIED REPORT

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0899, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The following task was accomplished: (1) Determine the optical strengths and sensitivities of the quadrupole and sextupole magnets of the ring, and review requirements for the software control system. (2) Analyze the design the synchrotron radiation absorbers and vacuum components for the FEL and synchrotron radiation straight sections of the ring. (3) Design and assemble the remaining components and subsystems of the proposed UV/XUV storage ring and linac, and (4) Install and test these components in the new Duke FEL Laboratory.

DESCRIPTORS: (U) \*STORAGE RINGS, \*FREE ELECTRON LASERS, \*ULTRAVIOLET LASERS, CONTROL, REQUIREMENTS, SYNCHROTRON RADIATION, TEST AND EVALUATION, LINEAR ACCELERATORS, QUADRUPOLE MOMENT, FAR ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) Sextupole moment.

ABSTRACT: (U) During this grant, the 2048x2048 Tektronix CCD detector was installed and put into operation on the Spacewatch Telescope at Kitt Peak in Arizona. The CCD was installed in its dewar during the fall of 1988 and tested in January 1989. Scanning for near-Earth asteroids was started in the visual mode awaiting the arrival of the computer system. The first near-Earth asteroid was discovered in the fall of 1989. The Solbourne-Sun computer system was installed and a major effort involved the programming for the computerized discovery of moving objects. The computerize discovery of moving objects was operational in September 1990 and led to the discovery of the asteroid 1990ss. Work has involved the discovery of objects, verification of heliocentric orbit and astrometric determination of orbital parameters. Improvement was made in the observing programs, hardware and software. Refinements were made in the installation of the Guide Star Catalog of the Hubble Space Telescope. Positions can now be determined in real time with an accuracy of about 0.4 arcseconds.

DESCRIPTORS: (U) \*ASTEROIDS, \*CHARGE COUPLED DEVICES, \*SCANNING, \*ASTRONOMICAL OBSERVATORIES, \*POSITION FINDING, \*ASTRONOMICAL INSTRUMENTS, \*INFRARED TELESCOPES, ACCURACY, CATALOGS, DETERMINATION, INSTALLATION, OPERATION, ORBITS, PARAMETERS, REAL TIME, STARS, VERIFICATION, ASTRONOMY, COMPUTER PROGRAMS.

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MEHARRY MEDICAL COLL NASHVILLE TN

IDENTIFIERS: (U) PEG1102F, WJAFOSR2311A1, CCD(Charge  
Coupled Devices), Spacewatch telescope, Kitt Peak(Arizona)  
Hubble space telescope.

(U) Transformation and Precipitation of Toxic Metals by  
Pseudomonas Maltophilia.

DESCRIPTIVE NOTE: Final rept. 1 May 89-31 Apr 92.

MAY 92 9P

PERSONAL AUTHORS: Blake, Robert, II

CONTRACT NO. F49620-89-C-0052

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0691, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aims of this research were to study each of the various molecular mechanisms whereby toxic metal cations and oxyanions were chemically transformed by Pseudomonas maltophilia strain DR02. The research effort focused on the microbial-dependent transformations of mercury, selenium, tellurium, chromium, lead, cadmium, silver, and gold. The NADPH-dependent reduction of Hg(II) was catalyzed by an inducible mercuric reductase. The reduction of selenite and tellurite to their insoluble elemental forms was mediated by an intracellular glutathione reductase that utilized the spontaneously-formed bis(glutathio)Se or bis(glutathio)Te, respectively, as pseudosubstrates. The 3-electron reduction of hexavalent chromium was catalyzed by a membrane-bound chromate reductase. The enzymatic basis for the transformation and immobilization of soluble lead(II), cadmium(II), silver(I), and gold(III) was not immediately apparent. This project could provide useful information toward the eventual exploitation of P. maltophilia and related organisms for the removal of toxic metal wastes from selected, heavily polluted sites. Bioremediation, Mercury, Selenium, Chromium, Chromate Lead.

DESCRIPTORS: (U) \*TRANSFORMATIONS, \*DETOXIFICATION,  
\*TOXIC HAZARDS, \*BIOLOGICAL STAINS, CADMIUM, CATIONS,  
CHROMATES, CHROMIUM, ELECTRONS, GLUTATHIONE, GOLD,

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MEMBRANES, MERCURY, METALS, PSEUDOMONAS, REDUCTION,  
REMOVAL, SELENIUM, SILVER, TELLURIUM, WASTES, MOLECULES,  
MECHANICS, BACTERIA, DECONTAMINATION, ENZYMES.

WISCONSIN UNIV-MADISON

(U) State-Resolved Collisional Energy Transfer in Highly  
Vibrationally Excited Polyatomic Molecules.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312AS, Pollution  
abatement, \*Pseudomonas maltophilia, Oxyanions,  
Bioremediation.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 91,

JUN 92 17P

PERSONAL AUTHORS: Crim, F. F.

CONTRACT NO. AFOSR-89-0028

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0679, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The transfer of energy in isolated or colliding molecules is a fundamental process with practical consequences for complex phenomena occurring in atmospheric chemistry, combustion, molecular lasers, plasmas, and a host of other environments containing energetic species. We have developed a technique that combines vibrational overtone excitation, to prepare highly vibrationally excited initial states, and time-resolved spectroscopic detection, to probe the evolution of the prepared state, for studying energy transfer in vibrationally energized molecules. We have used this approach to determine directly, for the first time, the frequencies of the three ungerade vibrations in the first electronically excited state of acetylene. Using this information we have characterized highly vibrationally excited states of acetylene and directly the frequencies and rotational constants of the perturbing vibrational states at these energies. Combining these spectroscopic insights on the vibrationally and electronically excited states of acetylene has allowed us to determine the energy transfer rates and pathways in the collisional relaxation of a polyatomic molecule containing 10,000 cm<sup>-1</sup> of vibrational energy. Rotational energy transfer is very rapid, occurring on about every other collision, but is essentially unaffected by the identity of the vibrational state in which the rotational relaxation

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occurs. Energy transfer, Molecules, Spectroscopy.

DESCRIPTORS: (U) \*ENERGY TRANSFER, \*ENVIRONMENTS, \*POLYATOMIC MOLECULES, \*SPECTROSCOPY, \*VIBRATIONAL SPECTRA, ACETYLENE, ATMOSPHERIC CHEMISTRY, ATMOSPHERICS, COLLISIONS, COMBUSTION, EXCITATION, IDENTITIES, LASERS, MOLECULAR LASERS, MOLECULES, RELAXATION, TIME, TRANSFER.

IDENTIFIERS: (U) PE61102F, WJAFOSR230381, Vibrational excitation.

PITTSBURGH UNIV PA

(U) Investigations into Swirling Flows of Newtonian and Non-Newtonian Fluids.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-30 Sep 91,

SEP 91 27P

PERSONAL AUTHORS: Rajagopal, Docotr

CONTRACT NO. AFOSR-88-0045

MONITOR: AFOSR, XF  
TR-92-0700, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work carried out under this grant has involved the study of the following problems: (1) Flow on non-Newtonian fluids of the rate type between two parallel plates rotating with different angular speeds about a common axis. (2) Flow of non-Newtonian fluids of the integral type between parallel plates rotating about distinct axes. (3) Flow of non-Newtonian fluids due to torsional and longitudinal oscillations. (4) Flow of non-Newtonian fluids in pipes of varying cross-sections. (5) Flow of shear thinning fluid between intersecting planes.

DESCRIPTORS: (U) \*FLOW, \*VELOCITY, \*AXES, FLUIDS, GRANTS, INTEGRALS, PLATES, RATES, WORK, SHEAR PROPERTIES, CROSS SECTIONS.

IDENTIFIERS: (U) PE61102F, \*Newtonian fluids, \*Non Newtonian fluids, Swirling, Parallel plates, Angular speeds, Torsional oscillations, Longitudinal oscillations.

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PENNSYLVANIA STATE UNIV UNIVERSITY PARK SCHOOL OF FOREST RESOURCES

HUXLEY COLL OF ENVIRONMENTAL STUDIES BELLINGHAM WA INST OF ENVIRONMENTAL TOXI COLOGY AND CHEMISTRY

(U) SETAC/AFOSR New Investigator Program.

(U) Development of Pattern Recognition Techniques for the Evaluation of Toxicant Impacts to Multispecies Systems.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 88-30 Nov 89.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 91-31 May 92.

JUN 91 34P

JUN 92 15P

PERSONAL AUTHORS: Pratt, James R.

PERSONAL AUTHORS: Landis, Wayne G.; Matthews, Robin A.

CONTRACT NO. AFOSR-89-0192

CONTRACT NO. AFOSR-91-0291

PROJECT NO. 2312

PROJECT NO. 3484

TASK NO. A5

TASK NO. RS

MONITOR: AFOSR, XF

MONITOR: AFOSR, XF  
TR-92-0859, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Microbial communities were collected on artificial substrates from Spring Creek and Douglas Lake at different times of the year. Communities were exposed to copper under continuous flow conditions using the artificial substrates - microcosm procedure of Pratt and Bowers (1980). Several endpoints were monitored and included both structural and functional measures. MATC's (maximum allowable toxicant concentrations) were calculated based on significant responses and community sensitivity during different seasons within the same ecosystem and between different ecosystems. Based on these results, the biotic factors which are important in influencing community response to toxic impacts were determined.

DESCRIPTORS: (U) \*ECOLOGY, \*WATER POLLUTION, \*CHEMICALS, HAZARDOUS MATERIALS, MICROBIOLOGICAL TESTS, MICROORGANISMS, COPPER, MICROBIOLOGY, ENVIRONMENTAL IMPACT, TOXICITY, TOXIC HAZARDS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A5, Ecosystems, \*Hazardous wastes, Biomass.

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ABSTRACT: (U) The program has evaluated the toxicity of two complex mixtures, the water soluble fractions (WSF) of the commercial turbine fuel Jet-A and the military fuel JP-4 using single species toxicity tests as well as the Standard Aquatic Microcosm (SAM). The WSF were not particularly toxic to the algal species tested although toxicity was observed when Daphnia magna was used as the test organism. The SAM experiments have been completed using concentrations of 0.0, 1, 5 and 15 percent WSF. Among the more interesting effects were the shifts in time of population peaks and some other variables compared to controls. Regression analysis of control to treatment groups often demonstrated only weak correlations. Multivariate nonmetric clustering (NMC) analysis, however, also demonstrated a marked separation between the 4 treatment groups for the Jet-A experiment. NMC proved to be the most powerful multivariate method of those examined for distinguishing the control and other treatment groups. An additional research effort is focused on applying multivariate methods and other mathematical techniques into the process of ecological risk assessment. Application of multivariate methods coupled with new ways of distinguishing uncertainty have the potential for revolutionizing the risk assessment process. Jet fuel, Non-metric clustering, Microcosms.

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BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

Risk assessment.

DESCRIPTORS: (U) \*JET ENGINE FUELS, \*TOXICITY, CLUSTERING, CONTROL, DAPHNIA, FUELS, MIXTURES, POPULATION, REGRESSION ANALYSIS, RISK, SEPARATION, STANDARDS, TEST AND EVALUATION, TIME, TURBINES, UNCERTAINTY, VARIABLES, WATER, POLLUTION, ENVIRONMENTAL IMPACT.

(U) Visual Perception of Structure from Motion.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-30 Apr 92.

APR 92 7P

PERSONAL AUTHORS: Todd, James T.

CONTRACT NO. AFOSR-89-0016

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0703, AFOSR

UNCLASSIFIED REPORT

IDENTIFIERS: (U) PE61103D, WUAFOSR3484RS, WSF(Water Soluble Fractions), Jet-A, JP-4, SAM(Standard Aquatic Microcosm), Algae, Risk Assessment.

ABSTRACT: (U) The research performed in this project has examined the abilities of human observers to perceive 3D form from different types of optical structure within moving or stationary visual images. The research has been organized into four general problem areas, including the low level detection of coherent motion, the analysis of 3D form from motion, the analysis of image shading and texture, and the identification of image contours. Our basic strategy in all of these areas has been to identify the key assumptions of current computational models; to test the psychological validity of those assumptions using appropriate psychophysical procedures; and, based on the results of those experiments, to develop alternative models that more closely match the perceptual capabilities of actual human observers. In contrast to most common methods of 3D image analysis, which are designed to compute precise metrical descriptions, our results have shown that human perception is primarily concerned with more abstract aspects of object structure, such as affine or ordinal properties, which are easier to computer and are more robust to uncontrolled changes in viewing conditions.

DESCRIPTORS: (U) \*PROJECTIVE TECHNIQUES, CONTOURS, CONTRAST, DETECTION, IDENTIFICATION, IMAGES, LOW LEVEL, MODELS, MOTION, OBSERVERS, PERCEPTION, STATIONARY, STRATEGY, STRUCTURES, TEST AND EVALUATION, TEXTURE.

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VISUAL PERCEPTION, THREE DIMENSIONAL, COMPUTER APPLICATIONS.

AMERICAN COLL OF TOXICOLOGY BETHESDA MD

(U) Carboxylesterases of the Testes: Role in Activation of Toxicants.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 May 90,

MAY 90 4P

PERSONAL AUTHORS: Ventura, Alexandra

CONTRACT NO. AFOSR-89-0190

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0702, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Organ specific distribution of carboxylesterases (Western blotting) was determined to be liver lung = testes = fat pancreas kidney. Carboxylesterase distribution among cell types of the testes was examined by in situ hybridization techniques. Results were inconclusive, as both the probe and the control hybridized to tissues macromolecules. More refinement of this techniques should provide better results. Other accomplishments include examination of the down-regulation of carboxylesterase levels by glucocorticoids. Apparently esterase levels are most dramatically down-regulated (approximately 6-fold) by dexamethasone phosphate (80 mg/kg x 5 days, i.p.) in the testes compared to the other tissues containing this enzyme.

DESCRIPTORS: (U) \*TESTES, \*TOXICOLOGY, CELLS, DISTRIBUTION, ENZYMES, ESTERASES, FATS, HYBRIDIZATION, KIDNEYS, LIVER, LUNG, MACROMOLECULES, PANCREAS, PROBES, CLONES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5,  
\*Carboxylesterase, Glucocorticoids.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Chemical Reactions and Properties of Organosilicon Compounds Related to New Materials.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 88-30 Sep 81.

MAY 92 11P

PERSONAL AUTHORS: West, Robert

CONTRACT NO. AFOSR-88-0004

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF  
TR-92-0698, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) A completely ordered polysilane polymer has been prepared. The surface tension of polysilane, polymers has been investigated, and found to span a large range from 20 to 52 mdyne/cm. The polymer poly(n-butyl-n-hexylsilane) was found to have a hexagonal columnar structure, at all temperatures from -80 to +200 C. Many polysilane copolymers were also observed to have columnar liquid crystalline structures. Several linear polysilane oligomers were synthesized as model compounds for the study of high polymers. New types of alpha-pi conjugated polymers were synthesized and studied, based on alternating polysilane and acetylene groups. New disilenes were synthesized, including the first example of a disilene with a silyl substituent. The oxidation of disilenes by oxygen was investigated and found to produce 1,2-disilaoxetanes which rearrange intramolecularly to 1,3-cyclodisiloxanes. Disilenes were found to react with aldehydes, ketones and thioesters by 2+2 cycloaddition to produce four-membered ring compounds. Reactions of disilenes with ketenes and acid chlorides were also investigated. With white phosphorus, disilenes react to produce noble bicyclobutane molecules which may be further converted to tricyclic asterane structures. The first platinum derivatives of disilenes were synthesized. The first siladimides have been synthesized. These are

salts of anions containing partial double bonds between silicon and each of two nitrogen atoms. The chemical reactions, spectroscopy and structure of siladimides has been investigated.

**DESCRIPTORS:** (U) \*CHEMICAL REACTIONS, \*POLYSILANES, \*SYNTHESIS(CHEMISTRY), \*ORGANIC COMPOUNDS, ACETYLENE, ACIDS, ALDEHYDES, ANIONS, ATOMS, CHLORIDES, COPOLYMERS, KETENES, KETONES, LIQUIDS, MOLECULES, NITROGEN, OLIGOMERS, OXIDATION, OXYGEN, PHOSPHORUS, PLATINUM, POLYMERS, RINGS, SALTS, SILICON, SPECTROSCOPY, STRUCTURES, SURFACE TENSION, TEMPERATURE, WHITE PHOSPHORUS, LIQUID CRYSTALS, ORGANIC CHEMISTRY.

**IDENTIFIERS:** (U) PEG1102F, WUAFOSR2303B2, Hexagonal columnar structure, Disilaoxetanes, Cyclodisiloxanes, Bicyclobutane, Asterane/tricyclic, Siladimides, Organosilicon.

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AD-A253 231 20/8.1

BOSTON UNIV MA COLL OF ENGINEERING

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Self-Consistent Modeling of the Ionosphere-Thermosphere-Magnetosphere System.

(U) Intensity Dependent Refractive Index Effects in Optical Fibers and Thin Films.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-31 Dec 91,

DESCRIPTIVE NOTE: Final rept. 1 Jul 87-30 Sep 90,

MAY 92 5P

NOV 90 15P

PERSONAL AUTHORS: Forbes, Jeffrey M.

PERSONAL AUTHORS: Siegman, G. I.

CONTRACT NO. F49620-88-C-0111

CONTRACT NO. AFOSR-87-0344

PROJECT NO. 2310

PROJECT NO. 2301

TASK NO. A2

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0701, AFOSR

MONITOR: AFOSR, XF  
TR-92-0687, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the most significant results to emerge from this contract is the systems theory approach to thermospheric dynamics which was developed as part of the Dissertation research of Mihail Codrescu, a Ph.D. student supported by AFOSR. The basic components of the computational approach are a piecewise linearization method capable of preserving nonlinear features of a dynamical system (in this case, the NCAR TIGCM), and a response function 'library' consisting of quasi-steady state and sample response functions characteristic of the system. A typical usage would be approximating the dynamical thermospheric response to an arbitrary change in forcing by performing a specialized convolution between the specified forcing and an appropriate set of response functions from the 'library'. This methodology may provide the basis for computationally efficient real-time (operational) predictions without on-line use of a TIGCM.

DESCRIPTORS: (U) \*THERMOSPHERE, \*IONOSPHERE, \*MAGNETOSPHERE, \*INTERACTIONS, CONVOLUTION, DYNAMICS, METHODOLOGY, PREDICTIONS, REAL TIME, RESPONSE, STEADY STATE, THEORY, THESES, TIME, IONOSPHERIC MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2.

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ABSTRACT: (U) This final report presents research into the effects of intensity-dependent refractive indices in optical fibers and thin films. Discussed are photosensitive gratings; second-harmonic generation in fibers and at surfaces; the theoretical investigation of all-optical switching; all-optical switching in fibers; and two-photon absorption and color center dynamics.

DESCRIPTORS: (U) \*FIBER OPTICS, ABSORPTION, COLOR CENTERS, DYNAMICS, HARMONICS, INTENSITY, OPTICAL SWITCHING, PHOTONS, SURFACES, THIN FILMS, TWO PHOTON ABSORPTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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WISCONSIN UNIV-MADISON DEPT OF ELECTRICAL AND COMPUTER  
ENGINEERING

OSCILLATORS, PARAMETERS, PROTOTYPES, STRUCTURES, THIN  
FILMS, TRANSISTOR AMPLIFIERS.

(U) Vortices in Long Josephson Junctions.

IDENTIFIERS: (U) Vortex flow transistors,  
Superconducting films.

DESCRIPTIVE NOTE: Final technical rept. 15 Nov 88-14 Feb  
82.

JUN 92 9P

PERSONAL AUTHORS: Nordman, James E.; Beyer, James B.

CONTRACT NO. AFOSR-89-0052

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR, XF  
TR-82-0896, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research involved the study of quantized flux lines or vortices in long Josephson junction structures and in superconductive films in the context of electronic device possibilities suggested by these structures. The work encompassed fabrication and low frequency electrical measurement of thin film device configuration coupled with physical device modeling. This was followed by high frequency parameter measurement and creation of circuit models for the devices. In some cases these circuit models were used to model and optimize specific circuits such as amplifiers or oscillators and, when warranted, prototypes were fabricated and tested. The primary structures studied were the long Josephson junction transistors, including the vortex flow transistor (VFT) and the superCIT. In addition, initial success with an exploratory device using a single high Tc superconducting film, the SFET, led to some concentration on circuit realizations with this device. Comparisons were made of these three devices which were fabricated using a variety of thin film superconductors.

DESCRIPTORS: (U) \*JOSEPHSON JUNCTIONS, \*JUNCTION  
TRANSISTORS, CIRCUITS, COMPARISON, CONFIGURATIONS,  
ELECTRICAL MEASUREMENT, ELECTRONICS, FABRICATION, HIGH  
FREQUENCY, LOW FREQUENCY, MEASUREMENT, MODELS,

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF PHYSICS

traps, Cold hydrogen traps.

(U) Optical Metrology of Magnetically Trapped Hydrogen.

DESCRIPTIVE NOTE: Final rept. 1 Feb 91-31 Jan 92,

JAN 92 2P

PERSONAL AUTHORS: Kieppner, Daniel

CONTRACT NO. AFOSR-90-0127

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR, XF  
TR-92-0698, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period of this grant, 2/1/91-1/31/92, we completed the new version of our cold hydrogen trap and brought into operation our highly stabilized 243 nm laser system. The new trap has provisions for passing laser light through it, and reflecting it back by a steerable mirror. The light is brought to a focus on the axis of the trap where the hydrogen density is highest. Servo systems control the frequency of the laser light to within a few kilocycles of the frequency of a reference cavity, and also the position of the light beam in the cell. The excited atoms are detected by quenching them with a small electric field and observing the radiated Lyman-alpha photons with a microchannel plate detector mounted on the bottom of the trap. We had one test run in which we searched for an optical signal from the cold trapped hydrogen, without success. Considering that this represented the first attempt to integrate laser spectroscopy with trapped hydrogen, it is not remarkable that we ran into a problem on our first attempt.

DESCRIPTORS: (U) \*HYDROGEN, \*TRAPS, \*MOLECULAR BEAMS, ATOMS, CAVITIES, CELLS, CONTROL, DENSITY, DETECTORS, ELECTRIC FIELDS, LIGHT, MICROCHANNEL PLATES, MIRRORS, OPERATION, PHOTONS, QUENCHING, SIGNALS, SPECTROSCOPY, TEST AND EVALUATION, LASER BEAMS.

IDENTIFIERS: (U) WUAFOSR2301A4, Hydrogen traps, Cold

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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CONTINUED

WASHINGTON UNIV SEATTLE DEPT OF GEOPHYSICS

(U) Investigations of the Dynamics and Thermodynamics of the Mesosphere Lower Thermosphere and Upper Thermosphere at the Polar Regions with Optical Ground-Based Remote Sensing.

MEASUREMENT, MOISTURE, PROTOTYPES, TEST AND EVALUATION, VACUUM, REFLECTIVITY, REMOTE DETECTION, POLAR REGIONS, SPECTRA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2, Etalons.

DESCRIPTIVE NOTE: Annual rept. 15 Apr 91-14 Apr 92.

APR 92

4P

PERSONAL AUTHORS: Clark, Kenneth C.; Hernandez, G.

CONTRACT NO. AFOSR-89-0318

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0849, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This second year of the grant has been a year of consolidation and staging for the continuing research. The advances made at the end of last year, in particular the proof-of-concept of solid state etalons, are now going through the process of testing and validating the findings made with the prototype devices. Thus far, all of the benchmarks of the electrooptic etalon behavior can be repeated, and we have also found some new characteristics inherent to the device and its operation. For instance, in the non-linearity stage of measurements, it has been found that the reflective coatings are extremely sensitive to the presence of moisture in air. This effect seems to be enhanced by the existence of the electric fields (elres 20 KV/cm) necessary for the operation of the electrooptic etalon. Operation in a vacuum, or in a controlled atmosphere are the obvious solutions, with the latter being the preferred choice since it preserves the ideal of a lightweight field device. Recoating of the test etalon was necessary.

DESCRIPTORS: (U) \*THERMOSPHERE, \*OPTICAL INTERFEROMETERS, \*OPTICAL DETECTION, ATMOSPHERES, COATINGS, CONTROLLED ATMOSPHERES, ELECTROOPTICS, LIGHTWEIGHT, LINEARITY,

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## OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

(U) Assimilation of Selected PAH and PCB Congeners Sorbed to Sediment by Benthic Invertebrates.

(U) Synthesis of a 2-Oxabrendane Derivative via Reaction of endo-5-Acetyl-7,7-dimethoxynorborn-2-ene With N-Bromosuccinimide.

DESCRIPTIVE NOTE: Annual rept. 15 Oct 90-14 Oct 91.

AUG 91 20P

91 4P

PERSONAL AUTHORS: Lydy, Michael J.

PERSONAL AUTHORS: Watson, William H.; Kashyap, Ram P.; Marchand, Alan P.; Vidyasagar, V.

CONTRACT NO. AFOSR-88-0181

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2312

PROJECT NO. 2303

TASK NO. A5

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0954, AFOSRMONITOR: AFOSR, XF  
TR-92-0617, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

ABSTRACT: (U) Methods have been developed for removing and manipulating fecal pellets, and techniques for measuring organic carbon in sediment and fecal pellets and lipid content in Diporeia have been learned. A simple and time efficient extraction procedure has been developed to extract  $^{14}\text{C}$ -B(a)P and  $^{51}\text{Cr}$  from sediment. Diporeia and fecal pellets. In addition, experiments have shown that  $^{51}\text{Cr}$  can be used as a conservative tracer for Diporeia and sediment. Good progress has been made in developing the basic methods involved in determining assimilation efficiencies and preliminary data have been collected for the direct measurement and dual-labeled approaches independent of one another.

DESCRIPTORS: (U) \*ASSIMILATION, \*AROMATIC HYDROCARBONS, \*POLYCHLORINATED BIPHENYLS, \*CARCINOGENS, \*SORPTION, \*INVERTEBRATES, \*AQUATIC BIOLOGY, CARBON, EFFICIENCY, EXTRACTION, LIPIDS, MEASUREMENT, PELLETS, SEDIMENTS, TIME, FECES, PETROLEUM PRODUCTS, BIOLOGICAL CONTAMINATION, CONTAMINANTS, GREAT LAKES, THESES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A5, Diporeia, Stylodrilus heringianus.

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Availability: Pub. in Acta Crystallographica., Section C: Crystal Structure Communications, VC47 p668-668 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The X-ray crystal structure of 9-bromo-3-bromomethylene-2-oxatricyclo(4-2.1.0 4,8)nonan-7-one dimethyl acetal is described. X-ray crystal structure 2-oxabrendane derivative.

DESCRIPTORS: (U) \*SYNTHESIS(CHEMISTRY), \*ORGANIC COMPOUNDS, ACETALS, CRYSTAL STRUCTURE, X RAYS, REPRINTS, SUCCINIMIDES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, Oxabrendane/2-, Bromosuccinimide/N-, Dimethoxynorborn.

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## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A253 193 7/3 7/4 20/2

CHICAGO UNIV IL

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Phonons of fcc (100), (110), and (111) Surfaces Using Lennard-Jones Potentials. 1. Comparison Between Molecular Dynamics Simulations and Slab Technique Calculations.

(U) Synthesis and Photolysis of a 1,2-Disilathietane,

82 13P

81 3P

PERSONAL AUTHORS: Koleske, D. D.; Sibener, S. J.

PERSONAL AUTHORS: Kabeta, Keiji; Powell, Douglas R.; Hanson, John; West, Robert

CONTRACT NO. AFOSR-88-0194

CONTRACT NO. AFOSR-89-0004

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. BS

TASK NO. B2

MONITOR: AFOSR, XF  
TR-92-0826, AFOSR

MONITOR: AFOSR, XF  
TR-92-0825, AFOSR

UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub. in Surface Science, v288 p408-417 1992. Available to DTIC users only. No copies furnished by NTIS.

Availability: Pub. in Organometallics, v10 p827-828 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The surface phonon dispersion curves have been calculated for fcc (100), (110), and (111) surfaces using molecular dynamics (MD) simulations and Lennard-Jones pair potentials. In the low-temperature limit these MD simulations have been compared to the results from slab-technique lattice dynamics calculations of the type pioneered by Allen, Aldredge and de Wette. We compare the dispersion results between these two methods as a prelude to MD studies of the dispersion curves at elevated temperatures. At temperatures where the dynamical behavior is well described within the harmonic approximation, the two techniques should provide equal descriptions of surface phonon spectral densities and phonon frequencies. In this paper we demonstrate this agreement.

DESCRIPTORS: (U) \*LATTICE DYNAMICS, \*CRYSTAL STRUCTURE, DISPERSIONS, HARMONICS, LOW TEMPERATURE, PHONONS, SIMULATION, SURFACES, REPRINTS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303BS, Face center cubes, Lennard Jones potentials, Molecular dynamics.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Research in the Optical Sciences.

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

FEB 92 57P

PERSONAL AUTHORS: Shannon, R. R.

CONTRACT NO. F49620-88-C-0009

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0888, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers special work carried out on the Joint Services Optics Program at the Optical Sciences Center during the period October 1, 1990 Through September 30, 1991. The work summarized in the report, and do in the ices, is responsive to request from two sponsors. In each cue the work required system analysis and technical evaluation of the potential in two areas of optical technology: a high-speed video system; and work on membrane mirrors. Optical sciences.

DESCRIPTORS: (U) \*MEMBRANES, \*MIRRORS, OPTICS, VELOCITY, WORK, VIDEO SIGNALS, IMAGES.

IDENTIFIERS: (U) WJAFOSR2301A1, PE81102F, \*Optical sciences, High speed video systems.

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CALIFORNIA INST OF TECH PASADENA

(U) Theory of Neural Networks.

DESCRIPTIVE NOTE: Final rept. Aug 88-31 Jul 91,

JUL 91 28P

PERSONAL AUTHORS: Abu-Mostafa, Yaser S.

CONTRACT NO. \$AFOSR-88-0213

PROJECT NO. 2305

TASK NO. K5

MONITOR: AFOSR, XF  
TR-92-0897, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A new neural unsupervised learning technique has been proposed in this work. Technique is based on the hierarchical partition of the patterns. Each partition corresponds to one neuron, which is in general a higher-order neuron. The partition is performed by iterating the neuron weights in an attempt to maximize a defined criterion function. The method is implemented on several examples and is found to give good results. In the second implemented example the method obtained a good solution, whereas the traditional adaptive resonance method and self-organizing maps produced unsatisfactory results. The method is fast, as it takes typically from about 2 to 5 iterations to coverage. Although the proposed method is prone to get stuck in local minima, this did happen in the simulations in only very difficult problems and this problem could be solved by using gradient algorithms for searching for the global maximum, like the Tunneling Algorithm.

DESCRIPTORS: (U) \*NEURAL NETS, \*NERVE CELLS, ALGORITHMS, FUNCTIONS, GLOBAL, GRADIENTS, ITERATIONS, LEARNING, MAPS, PATTERNS, RESONANCE, SEARCHING, SIMULATION, TUNNELING, WEIGHT, WORK.

IDENTIFIERS: (U) WJAFOSR2305K5, PE81102F.

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## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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ARIZONA UNIV TUCSON DEPT OF PHYSICS

PRINCETON UNIV NJ

(U) Polarized Light Scattering from Perfect and Perturbed Surfaces and Fundamental Scattering Systems.

(U) Physiological Analyses of the Afferents Controlling Brain Neurochemical Systems.

DESCRIPTIVE NOTE: Final rept. 1 Mar 80-29 Feb 92.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 91-31 May 92.

FEB 92 62P

JUN 92 3P

PERSONAL AUTHORS: Bickel, William S.

PERSONAL AUTHORS: Jacobs, Barry L.

CONTRACT NO. AFOSR-90-0243

CONTRACT NO. AFOSR-90-0294

PROJECT NO. 2306

PROJECT NO. 2312

TASK NO. A3

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0677, AFOSRMONITOR: AFOSR, XF  
TR-92-0734, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

ABSTRACT: (U) CONTENTS: Light scattering from a sphere on or near a surface; Light scattering from a sphere on or near a surface; Errata; Coherent fluorescent emission and scattering from a uniform cylinder; Coherent fluorescent emission and scattering from a uniform sphere; Light scattering mueller matrix from a fiber as a function of MgO contamination; Experimental light-scattering mueller matrix for a fiber on a reflecting optical surface as a function of incident angle; Light scattering resonances in small spheres; Polarized light scattered from rough surfaces; Stokes vectors, mueller matrices and polarized scattered light; Experimental applications to optical surfaces and all other scattered; The light scattering mueller for a surface contaminated by a single particle in the Rayleigh limit; Electromagnetic scattering from a sphere: The near field region; Light Scattering from a sphere on or near an interface; The polarized light scattering matrix elements for rough surfaces.

DESCRIPTORS: (U) \*LIGHT SCATTERING, POLARIZATION, THESES, REPRINTS, SURFACE ROUGHNESS, PERTURBATIONS, RESONANCE, FLUORESCENCE, ELECTROMAGNETIC SCATTERING.

IDENTIFIERS: (U) MUAFOSR2308A3, PE81102F, Mueller matrices.

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ABSTRACT: (U) Two types of experiments are described. The first was directed at the neurochemical systems that control the activity of brain serotonergic (dorsal raphe nucleus) neurons. The second examines the effects of serotonin and norepinephrine on the activity of target neurons carrying out sensory information processing or motor function. Both sets of studies utilize single unit activity in combination with multibarrel microiontophoresis in awake animals. This research program provides critical links for understanding both the control of brain neurochemical systems and the control exerted by them. This will help to elucidate, more broadly, the role of these modulatory brainstem neurochemical systems in processes such as state-dependent changes in physiology and behavior, and arousal and attention. serotonin, norepinephrine, brain, neurochemical afferents, single unit activity, microiontophoresis, glutamate, GABA, attention, arousal, bioactivity, sleep, behavior.

DESCRIPTORS: (U) \*BRAIN, \*CONTROL, \*NEUROCHEMISTRY, ANIMALS, ATTENTION, BEHAVIOR, FUNCTIONS, INFORMATION PROCESSING, NERVE CELLS, NOREPINEPHRINE, PHYSIOLOGY, SEROTONIN, SLEEP, MOTOR NEURONS, NEUROTRANSMITTERS.

IDENTIFIERS: (U) Monoaminergic neurons, Neurochemical

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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Afferents, Serotonergic neurons, Microiontophoresis,  
Glutamate, Bioreactivity.

YALE UNIV NEW HAVEN CT

(U) A Circuit Analysis and Computational Model of Operant  
Conditioning in Aplysia.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 91-30 Jun 92.

JUL 92 5P

PERSONAL AUTHORS: Carew, Thomas J.

CONTRACT NO. AFOSR-89-0382

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0733, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our Primary objective is to carry out a cellular and computational analysis of operant conditioning of the head waving response in Aplysia. During the last twelve month period, progress has been made in five areas: (1) We have carried out a detailed kinematic analysis of the operant response; (2) We have identified the biomechanical principles underlying the operant response; (3) We have identified the precise pattern and timing of muscles and motor neurons during head waving. Advances in areas 1-3 above have allowed us (4) to construct a quantitative computational model of head waving using biological parameters. In addition (5) We have identified a novel form of reinforcement for conditioning of head waving that significantly advances the cellular and computational analysis. Operant Conditioning, Circuit analysis, Neuro computation, Aplysia.

DESCRIPTORS: (U) \*APLYSIA, \*CIRCUIT ANALYSIS, CIRCUITS, HEAD(ANATOMY), KINEMATICS, MODELS, MOTOR NEURONS, MUSCLES, NERVE CELLS, PARAMETERS, PATTERNS, RESPONSE.

IDENTIFIERS: (U) \*Computational models, \*Operant conditioning, \*Head waving response, Biomechanical principles, Neuro computation, WUAFOSR2312A1, PE01102F.

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ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Confined Geometry Effects on Reorientational Dynamics of Molecular Liquids in Porous Silica Glasses.

FLUIDS, FUNCTIONS, GELS, GEOMETRY, HYDROCARBONS, INTERACTIONS, MODELS, NITROBENZENES, PYRIDINES, RELAXATION, SURFACES, TEMPERATURE, TOLUENES, REPRINTS, MOLECULES, SURFACE ANALYSIS, NUCLEAR MAGNETIC RESONANCE.

91 12P

IDENTIFIERS: (U) WJAFQSR2303A3, PE81102F, Confinement, Sol gel process.

PERSONAL AUTHORS: Liu, G.; Li, Y.; Jonas, J.

CONTRACT NO. AFOSR-88-0098

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0590, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Chem. Phys. v85 n8 p6892-6901, 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) This work investigates the relative role of the pure geometrical confinement and the strength of the surface effect on the dynamics of liquids in porous silica glasses prepared by the sol-gel process. The deuteron NMR spin-lattice relaxation times  $T_1$  of several molecular liquids in porous silica glasses are reported as function of pore size in the range from 18 to 143 Å over the temperature range from 280 to 310 K. Molecular liquids studied include strongly interacting polar liquids such as pyridine- $d_5$ , aniline- $d_5$ , and nitrobenzene- $d_5$ , whereas the saturated cyclic hydrocarbon liquids of cyclohexane- $d_{12}$  and cis-decalin- $d_{18}$  represent the weakly interacting liquids. In a first approximation, toluene- $d_1$  and dioxane- $d_8$  are chosen as examples of liquids with intermediate interactions with the silica surface. The experimental relaxation data are analyzed by using the two-state, fast-exchange model which is found to be valid for the strongly interacting liquids and liquids with intermediate interactions. Confined geometry: Porous silica glasses; NMR relaxation; Fluids; Geometrical confinement.

DESCRIPTORS: (U) \*DYNAMICS, \*LIQUIDS, \*SILICA GLASS, ANILINES, CYCLOHEXANES, DEUTERONS, DIOXANES, EXCHANGE.

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ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) A 32-Membered Fluorinated Multifunctional Heterocycle.

(U) High-Pressure NMR Spectroscopy of the Dynamic Processes in Complex Liquids.

91

3P

PERSONAL AUTHORS: Guo, Cai-Yun; Kirchmeier, Robert L.; Shreve, Jeanne M.

90 8P

PERSONAL AUTHORS: Jonas, J.

CONTRACT NO. AFOSR-91-0189

CONTRACT NO. AFOSR-89-0099

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B2

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0582, AFOSRMONITOR: AFOSR, XF  
TR-92-0589, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Am. Chemical Soc v113 p9000-9001, 1991. Available only to DTIC users. No copies furnished by NTIS.

Availability: Pub. in Ber. Bunsenges. Phys. Chem v94 p307-315 1990. Jun 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A unique, polyfluorinated, 32-membered multifunctional heterocycle has been synthesized and its structure determined by x-ray. The ring contains four N-methyl sulfonamide, two -ketone, and four ether alpha, beta functional groups. Work is continuing with respect to the host/guest chemistry of this unusual molecule. Fluorinated heterocycles; Host/guest; Sulfonamide, Crystal structure.

ABSTRACT: (U) This lecture reviews recent applications of the high resolution, high-pressure NMR spectroscopy to the study of the dynamics in complex liquids. After a brief introduction which points out the essential role of pressure as an experimental variable in the studies of the dynamic structure of liquids, three main topics are covered. - First, selected results of the high-resolution natural abundance C NMR relaxation experiments on complex liquids of 2-ethylhexyl cyclohexanecarboxylate and 2-ethylhexyl benzoate are presented. Second, the experimental studies of the dynamical solvent effects on reaction rates in several systems including 1,1-difluorocyclohexane, N,N-dimethyltrichloroacetamide, and rhodium complexes are briefly discussed. Third, the promising future of the high-resolution, high-pressure NMR techniques to investigate the dynamics in biochemical systems is illustrated on several studies currently in progress in our laboratory. High resolution NMR; High pressure; Complex liquids.

DESCRIPTORS: (U) \*CRYSTAL STRUCTURE, \*SULFONAMIDES, \*X RAYS, \*FLUORINATED HYDROCARBONS, \*HETEROCYCLIC COMPOUNDS, CHEMISTRY, CRYSTALS, ETHERS, KETONES, MOLECULES, RINGS, STRUCTURES, WORK, REPRINTS, SYNTHESIS(CHEMISTRY), CHEMICAL BONDS, ATOMS, ZINC.

IDENTIFIERS: (U) WJAFOSR2303B2, PES1102F, \*32-Membered multifunctional heterocycle, Functional groups, Host/guest chemistry, Ring compounds, Bond angles, Bond lengths, Ionophore antibiotics, Enzyme receptors, Complexing agents, Organic picrates..

DESCRIPTORS: (U) \*HIGH PRESSURE, \*LIQUIDS, \*SPECTROSCOPY, \*NUCLEAR MAGNETIC RESONANCE, BENZOATES, DYNAMICS, HIGH RESOLUTION, LABORATORIES, LECTURES, RATES, REACTION KINETICS, RELAXATION, RHODIUM, SOLVENTS, STRUCTURES.

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AD-A253 177 CONTINUED  
VARIABLES, REPRINTS.

IDENTIFIERS: (U) WJAFOSR2303A3, PE61102F, Complex  
liquids.

AD-A253 178 7/4  
OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Semiclassical Demonstration of Mode Specificity in the  
Tunneling Splitting in a Model of the Malonaldehyde  
Molecule.

JUN 92 9P

PERSONAL AUTHORS: Sewell, Thomas D.; Thompson, Donald L.

CONTRACT NO. AFOSR-90-0048

PROJECT NO. 2303

TASK NO. 83

MONITOR: AFOSR, XF  
TR-92-0589, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letter, v193 n5  
p347-354, 5 Jun 92. Available only to DTIC users. No  
copies furnished by NTIS.

ABSTRACT: (U) A semiclassical model is used to calculate  
the tunneling splitting in a mode of the malonaldehyde  
molecule to determine the extent to which mode-specific  
behavior might exist for malonaldehyde and other  
topologically similar systems. Ensembles of 2500  
classical trajectories corresponding to various degrees  
of mode-selective excitation were computed on the model  
potential-energy surface by Hutchinson. Tunneling was  
incorporated by using a combination of the classical-plus-  
tunneling model of Waite and Miller and a newer variant  
by Makri and Miller. The results indicate a sensitive  
dependence of the splitting on the initial conditions.  
Extension of the method to full-dimensional calculations  
is discussed. Chemical dynamics, Tunneling effects, Mode  
Selective Behavior.

DESCRIPTORS: (U) \*CHEMICAL REACTIONS, \*MATHEMATICAL  
ANALYSIS, BEHAVIOR, DYNAMICS, ENERGY, EXCITATION, MODELS,  
MOLECULES, POTENTIAL ENERGY, SPLITTING, SURFACES,  
TRAJECTORIES, TUNNELING, REPRINTS, QUANTUM THEORY.

IDENTIFIERS: (U) WJAFOSR2303B3, PE61102F, Malonaldehyde,  
\*Mode specificity \*Tunneling splitting.

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## UNCLASSIFIED

## DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

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AD-A253 157 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) The Gas-Phase Structure of Difluorodiodomethane, CF<sub>2</sub>I<sub>2</sub>,

(U) Five 8,11-Substituted Pentacyclo 15.4.0.02,6.03,10.05, 9 undecanes,

81 5P

81 6P

PERSONAL AUTHORS: Mack, Hans-George; Oberhammer, Heinz; John, Ernest O.; Kirchmeyer, Robert L.; Shreeve, Jeanne M.

PERSONAL AUTHORS: Flippen-Anderson, Judith L.; George, Clifford; Gillard, Richard; Zajac, Walter W., Jr.; Walters, Thomas R.

CONTRACT NO. AFOSR-91-0189

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B2

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0578, AFOSR

MONITOR: AFOSR, XF  
TR-92-0618, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Molecular Structure, v250 p103-106. Available only to DTIC users. No copies furnished by NTIS.

Availability: Pub. in Acta Crystallography, Section C: Crystal Structure Communication, v47 p813-817, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Difluorodiodomethane was prepared by heating iodine and hexafluoropropylene oxide at 180 deg C for 6 hours. The yield is between 15-20%. An electron diffraction study of CF<sub>2</sub>I<sub>2</sub> was undertaken to obtain information about the impact of the very large iodine atoms on the bond angles at carbon. Surprisingly the angles around carbon do not deviate strongly from the ideal tetrahedral values. electron diffraction; ICI angle (112.5(3) deg); carbon-fluorine and carbon-iodine bond lengths.

ABSTRACT: (U) The X-ray crystal structures of 11-bromo-11-nitropentacyclo(5.4.0.02,6.03,10.05,9)-undecane-8-one (11-bromo-11-nitro-PCU-8-one), 8,11-dibromo-8,11-dinitro-PCU, 8,11-dichloro-8,11-dinitro-PCU, 8,11-dinitro-PCU, and 8,8,11,11-tetranitro-PCU are described. X-ray crystal structures, Substituted Pentacycloundecanes.

DESCRIPTORS: (U) \*MOLECULAR STRUCTURE, \*METHANES, ANGLES, ATOMS, CARBON, ELECTRON DIFFRACTION, FLUORINE, HEATING, IODINE, OXIDES, REPRINTS, MICROWAVE SPECTROSCOPY, SYNTHESIS(CHEMISTRY), GEOMETRY.

DESCRIPTORS: (U) \*STRUCTURES, \*POLYCYCLIC COMPOUNDS, \*MATHEMATICAL MODELS, CRYSTALS, X RAYS, DECANES, REPRINTS, ORGANIC COMPOUNDS, MOLECULES.

IDENTIFIERS: (U) WJAFOSR2303B2, PE81102F, \*Difluorodiodomethane, Hexafluoropropylene oxide, Bond angles, \*Gas phase.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A3, Pentacycloundecanes...

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UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF  
AEROSPACE ENGINEERING

TIME, TRAILING EDGES, VORTEX SHEDDING.

(U) Control of Lift and Drag in Unsteady Flows.

IDENTIFIERS: (U) WJAFOSR2307CS, Lift forces, Leading  
edge vortex shedding...

DESCRIPTIVE NOTE: Final technical rept. 15 May 90-14 May  
92.

JUL 92 75P

PERSONAL AUTHORS: Chih-Ming, Ho

CONTRACT NO. F49620-90-C-0038

PROJECT NO. 2307

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0875, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The response of delta wings with different aspect ratios and a 2-D wing in unsteady free stream was investigated. It was found that the characteristics of the lift forces depend on the existence of leading-edge vortex shedding. For delta wings with attached leading-edge vortex, the time-averaged lift force was found to be independent of reduced frequency since there is no intrinsic vortex convection time scale. With increasing angle of attack or aspect ratio, vortex shedding can occur, and the time required to convect along the chord becomes an intrinsic time scale. The appearance of the intrinsic convection time scale on the delta wing corresponds to increased lift with increasing reduced frequency, just like the 2-D wing. Flow visualizations of vortex breakdown position around the trailing edge does not affect the lift force. For the 2-D wing, the aerodynamic performance in the poststall region shows a maximum at an optimum frequency. Very high lift coefficients exceeding 10 can be observed at this reduced frequency Separated flow/lift enhancement.

DESCRIPTORS: (U) \*AERODYNAMICS, \*DELTA WINGS, \*LIFT,  
ANGLE OF ATTACK, ASPECT RATIO, COEFFICIENTS, CONVECTION,  
DELTAS, EDGES, FLOW, FREE STREAM, FREQUENCY, HIGH LIFT,  
LEADING EDGES, RATIOS, REGIONS, RESPONSE, SCALE, STREAMS.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J18F

AD-A253 132 9/5 20/8

AD-A253 132 CONTINUED

NEW MEXICO UNIV ALBUQUERQUE CENTER FOR HIGH TECHNOLOGY MATERIALS

optoelectronics, device structures, PLZT, III-V materials growth, diode lasers.

(U) Optoelectronics Research Center.

DESCRIPTORS: (U) \*ELECTRONICS, \*OPTICAL PROPERTIES, ARRAYS, CAVITIES, COUPLINGS, DEMONSTRATIONS, DIODES, EFFICIENCY, EXTERNAL, GAIN, INTERNAL, LASERS, LITHOGRAPHY, MATERIALS, MIRRORS, NEW MEXICO, OPERATION, OPTICAL PUMPING, OUTPUT, PHOTOTRANSISTORS, PHYSICS, PROCESSING, PUMPING, RECORDS, RESISTANCE, SIGNALS, SLOPE, STRUCTURES, SURFACES, UNIVERSITIES, WAFERS, ELECTROOPTICS.

DESCRIPTIVE NOTE: Final rept. 1 Feb 81-31 Jan 82.

MAY 82 437P

PERSONAL AUTHORS: Brueck, S. R.

CONTRACT NO. F49620-89-C-0028

IDENTIFIERS: (U) WUAFOSR2301A5, \*Optoelectronics.

PROJECT NO. 2301

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0672, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The AFOSR Optoelectronics Research Center (OERC) at the Center for High Technology Materials of the University of New Mexico has become a leading university optoelectronics program. Novel InGaAs and AlGaAs device structures have been pioneered. Exciting recent results include demonstration of large second-order nonlinearities in SiO<sub>2</sub> and extensive development of PLZT. Processing advances include investigation of III-V regrowth over patterned wafers and the extension of interferometric lithography techniques. External cavity operation of diode lasers has provided a wealth of information about internal device physics and the fundamental limits of laser spectral and temporal characteristics. Single element and array geometries modeling has led to greater understanding and device performance. The OERC has pioneered development of surface-emitting lasers. Since the first demonstration of the resonant-periodic gain concept was reported several years ago, advances have been made in device and mirror design, optical pumping with record output powers, in ultrafast gain switched operation, in record low series resistance, and overall and slope efficiencies for electrical operation. A recent advance in integrated structures is the coupling of phototransistors with surface-emitting lasers to make smart pixels that can operate in parallel on an array of optical signals.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 089 CONTINUED

IAC NO. PL-058724

IAC DOCUMENT TYPE: PLASTC - MICROFICHE --

IAC SUBJECT TERMS: P--(U)THERMOPLASTICS, MATERIALS RESEARCH, SILICONES, POLYURETHANES, POLYVINYL ALCOHOL, PROTECTIVE COATINGS, INTERFACES, LIQUID CRYSTALS, POLYIMIDES, FIBERS, ORGANOMETALLICS, MECHANICAL PROPERTIES, OPTICAL PLASTICS, PHTHALOCYANINES, ELECTROOPTICAL SYSTEMS, DIELECTRIC PROPERTIES, WHISKERS, SEMICONDUCTORS, CERAMICS, THERMOTROPIC PROPERTIES, ZZ CONFERENCE 89, ZZ UNLIMITED.;

AD-A253 089 7/6 11/4 20/6 5/2

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Multifunctional Materials Held in Boston, Massachusetts on November 29 - December 1 1989. Materials Research Proceedings. Volume 175.

DESCRIPTIVE NOTE: Final rept. 14 Sep 88-13 Sep 80.

FEB 91 395P

PERSONAL AUTHORS: Buckley, Alan; Gallagher-Daggitt, George; Karasz, Frank E.; Ulrich, D. R.

CONTRACT NO. AFOSR-89-0522

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-91-0128, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual items, see AD-POO7 452 thru AD-POO7 492.

ABSTRACT: (U) This contract supported the Symposium on Multifunctional Materials which was held as part of the Materials Research Society Fall Meeting, in Boston, Massachusetts, November 27 - December 2, 1989. The work described covers a broad range of interdisciplinary activities relevant to developing functionalities in ceramics and polymers. The proceedings of this conference were published as the following volume: Multifunctional Materials, Materials Research Society

DESCRIPTORS: (U) \*POLYMERS, \*OPTICAL MATERIALS, \*CERAMIC MATERIALS, \*SYMPOSIA, CONTRACTS, MASSACHUSETTS, SOCIETIES, SILICA GLASS, LIQUID CRYSTALS, OPTICS, WHISKER COMPOSITES, NONLINEAR OPTICS, POLYMERS, PHOTONICS, PHTHALOCYANINES, PHOSPHAZENE, PROTECTIVE COATINGS, OPTICAL IMAGES, MATERIALS, VOLUME, WORK.

IDENTIFIERS: (U) PB81102F, WUAFOSR2303A3, Multifunctional materials, Silica optics, Liquid polymers, Sol gel, Polymer fibers, Compilation Reports.

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## DTIC REPORT BIBLIOGRAPHY

AD-A253 083 20/5 7/2 7/4  
TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS  
(U) Fermi Resonance in Ammonia Adsorbed on Silica Surfaces.

JUN 92 7P  
PERSONAL AUTHORS: Zerda, T. W.; Brodka, A.; Hopkins, B. J.

CONTRACT NO. AFOSR-90-0185

PROJECT NO. 3484

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0614, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 n11 p8514-8519, 1 Jun 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Fermi resonance in ammonia adsorbed on silica of derivatized surfaces is investigated using Raman spectroscopy. From experimental band shapes the frequencies of hypothetical uncoupled modes and the Fermi coupling parameter are calculated and discussed in terms of surface coverage. It is shown that the Fermi resonance is strongly perturbed by interactions between ammonia and the silica surface. Surface hydroxyl groups and strained cyclic rings are identified as adsorption sites. Sol-gel, surface interactions, ammonia, strained rings, Fermi resonance.

DESCRIPTORS: (U) \*ADSORPTION, \*AMMONIA, \*SURFACES, COUPLINGS, GELS, INTERACTIONS, PARAMETERS, RAMAN SPECTROSCOPY, RESONANCE, RINGS, SITES, SPECTROSCOPY, REPRINTS, HYDROXYL RADICALS, PERTURBATIONS, SYMMETRY, ENERGY LEVELS, FREQUENCY, ANHARMONIC OSCILLATORS, MOLECULAR VIBRATION, POLYATOMIC MOLECULES.

IDENTIFIERS: (U) PEG1103D, WJAFOSR3484CS, \*Silica, \*Fermi resonance, Vycor glass, Strained cyclic rings, Intra molecular potential, Pores.

AD-A253 083

UNCLASSIFIED

## SEARCH CONTROL NO. T4J19F

AD-A253 082 7/3

IDAMO UNIV MOSCOW DEPT OF CHEMISTRY

(U) An Unusual Relationship between the N-F Bond Lengths and Force Constants in N-Fluoroamines.

91 8P

PERSONAL AUTHORS: Christen, Dines; Gupta, Om D.; Kadel, Johannes; Kirchmeier, Robert L.; Mack, Hans G.

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XF  
1R-92-0580, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the American Chemical Society, v113 n24, p9131-9135, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) There exists no obvious a priori reason for any correlation between the length and the force constant of a certain bond. The length is determined by the position and the force constant by the curvature of the potential minimum. Nevertheless, an inverse relation between these two quantities is widely assumed and several empirical expressions have been proposed on the basis of experimental data.

DESCRIPTORS: (U) \*FLUOROAMINES, GASES, BONDING, ORGANIC MATERIALS, AMINES, REPRINTS.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2303B2.

AD-A253 082

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## UNCLASSIFIED

## DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

AD-A253 081 20/5

AD-A253 078 7/4 20/11

CORNELL UNIV ITHACA NY LAB OF ATOMIC AND SOLID STATE PHYSICS

CHICAGO UNIV IL DEPT OF CHEMISTRY

(U) Local Adsorbate-Induced Effects on Dynamical Charge Transfer in Ion-Surface Interactions,

(U) Measurement of Low Energy Frustrated Vibrational Modes of CO on Ni(111) via Inelastic Electron Scattering,

APR 91 11P

91 8P

PERSONAL AUTHORS: Kimmel, G. A.; Goodstein, D. M.; Levine, Z. H.; Cooper, B. H.

PERSONAL AUTHORS: Ha, Jeong S.; Sibener, S. J.

CONTRACT NO. AFOSR-88-0069

CONTRACT NO. AFOSR-88-0194

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. A2

TASK NO. 85

MONITOR: AFOSR, XF

MONITOR: AFOSR, XF  
TR-92-0628, AFOSR

TR-92-0638, AFOSR

UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub. in Physical Review B, v43 n12 p9403-9412, 15 Apr 91. Available to DTIC users only. No copies furnished by NTIS.

Availability: Pub. in Surface Science, v258 p281-287, 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) We have measured positive-ion survival probabilities for K<sup>+</sup> scattered from clean and alkali-metaladsorbate-covered Cu(100) and Cu(110). As expected from most models of resonant charge transfer, we find that very small coverages of alkali-metal adsorbates on the surface can dramatically decrease the ion survival probability. However, the dependence of the ion survival probability on adsorbate coverage is qualitatively different from that expected on the basis of the adsorbate-induced work-function change. We find that a treatment of the charge transfer based on the spinless Newns-Anderson Hamiltonian explains the data only if the local electrostatic potential of the adsorbate overlayer is included in the calculations.

DESCRIPTORS: (U) \*ALKALI METALS, \*CHARGE TRANSFER, \*SURFACES, ADSORBATES, FUNCTIONS, IONS, METALS, MODELS, PROBABILITY, TRANSFER, WORK, WORK FUNCTIONS, REPRINTS.

IDENTIFIERS: (U) PES1102F, WJAFOSR2303A2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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consistent with those derived from a simple cluster calculation.

HARVARD UNIV CAMBRIDGE MA DEPT OF CHEMISTRY

DESCRIPTORS: (U) \*LOW ENERGY, \*MOLECULAR VIBRATION, \*INELASTIC SCATTERING, BRIDGES, DISPERSIONS, ELECTRON ENERGY, HIGH RESOLUTION, INTERACTIONS, IONS, MOMENTUM, RELAXATION, RESOLUTION, RESONANCE, ROTATION, SCATTERING, STRUCTURES, NICKEL, CARBON MONOXIDE, REPRINTS, INFRARED SPECTROSCOPY.

(U) Weak Pinning and Hexatic Order in a Doped Two-Dimensional Charge-Density-Wave System.

JUN 91 5P

PERSONAL AUTHORS: Dai, Hongjie; Chen, Huifen; Lieber, Charles M.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303BS, HREELS(High Resolution Electron Energy Loss Spectroscopy).

CONTRACT NO. AFOSR-90-0029

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0595, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Physical Review Letters, v88 n24 p3183-3186, 17 Jun 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Scanning-tunneling microscopy has been used to characterize the effects of Nb impurities on the incommensurate charge-density-wave (CDW) phase in 1T-TaS<sub>2</sub>. Real and reciprocal-space data indicate that disorder in the CDW is due to dislocations and small random rotations of the CDW. The dislocations destroy translational order; however, calculations show that the orientational order is long range. These results are consistent with weak pinning and suggest the possibility of a hexatic CDW phase. The similarity of our data to results obtained for other two-dimensional systems is discussed. Charge density wave, weak pinning, scanning tunneling microscopy, metal doped, hexatic order, impurity, melting.

DESCRIPTORS: (U) \*TUNNELING, \*DOPING, CHARGE DENSITY, DENSITY, DISLOCATIONS, IMPURITIES, MELTING, METALS, MICROSCOPY, PHASE, SCANNING, TWO DIMENSIONAL, REPRINTS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A2.

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## UNCLASSIFIED

## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 076 20/5 20/2 7/4 7/2 20/5  
ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF CHEMISTRY  
(U) Atomically Resolved Surface Structure of LaB6(100),  
92 7P  
HARVARD UNIV CAMBRIDGE MA DEPT OF CHEMISTRY  
(U) Variable Temperature Scanning Tunneling Microscopy  
Studies of the Charge Density Wave Phases in Tantalum  
Disulfide,

PERSONAL AUTHORS: Ozcomert, John S.; Trenary, Michael  
CONTRACT NO. AFOSR-88-0111  
PROJECT NO. 2303  
TASK NO. A2  
MONITOR: AFOSR, XF  
TR-92-0623, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Surface Science Letters, v265 pL227-L232, 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) We have used scanning tunneling microscopy to obtain atomically resolved images of the lanthanum terminated LaB6(100) surface. The surface atoms are observed to occupy a square lattice with a La-La separation of 4 Å. A weak corrugation between La atoms is observed which is consistent with the delocalized metal-like nature of the states near the Fermi level. On a larger scale, the surface is composed of (100) terraces with an average width of 125 Å separated by steps one unit cell high. Approximately 10% of the La sites on the terraces are vacant.

DESCRIPTORS: (U) \*ATOMS, \*IMAGES, \*SURFACES, \*STRUCTURES, \*RESOLUTION, CELLS, LANTHANUM, METALS, MICROSCOPY, SCALE, SCANNING, SEPARATION, SITES, TUNNELING, WIDTH, REPRINTS, BORON, FERMI SURFACES, SOLIDS, SEMICONDUCTORS, COVALENT BONDS, CRYSTAL STRUCTURE.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303A2, \*Lanthanum hexaborides, Square lattice, Terraces, Surface science, Theraionic emitters, High melting points, Chemical inertness, Congruent vaporization, Low work functions, Electron deficient.

APR 91 BP  
PERSONAL AUTHORS: Wu, Xian L.; Lieber, Charles M.  
CONTRACT NO. AFOSR-90-0029  
PROJECT NO. 2303  
TASK NO. A2  
MONITOR: AFOSR, XF  
TR-92-0594, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Vac. Sci. Technol. B, v9 n2 p1044-1047, Mar/Apr 91. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Variable temperature scanning tunneling microscopy has been used to elucidate details of the nearly commensurate charge density wave (CDW) phase in 1T-TaS2. Large-area images show that the nearly commensurate phase has a hexagonal domain structure, and that the domain period exhibits a strong temperature dependence. Real-space and two-dimensional Fourier transform analyses of atomic resolution images further demonstrate that within the domains the CDW is approximately commensurate with the atomic lattice, and that between domains the CDW amplitude decreases and the CDW phase changes. In addition, disorder observed in the hexagonal domain structure at low temperatures is suggested scanning tunneling microscopy, tantalum disulfide, charge density wave, variable-temperature, phase transition.

DESCRIPTORS: (U) \*CHARGE DENSITY, \*PHASE TRANSFORMATIONS, \*FOURIER ANALYSIS, AMPLITUDE, IMAGES, MICROSCOPY, RESOLUTION, SCANNING, STRUCTURES, TANTALUM, TEMPERATURE, TRANSITIONS, REPRINTS, SUPERLATTICES, ELECTRON DIFFRACTION, TUNNELING(ELECTRONICS).

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AD-A253 075

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

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AD-A253 083 7/2 7/4

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A2, Scanning tunneling microscopy, Domain structure, Tantalum disulfide, \*Charge density wave.

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) The Reaction of B2O3 with the Beta-Rhombohedral Boron (111) Surface.

92 10P

PERSONAL AUTHORS: Foo, Wei C.; Ozcomert, John C.; Trenary, Michael

CONTRACT NO. AFOSR-88-0111, F49620-92-J-0179

PROJECT NO. 2303

TASK NO. 8S

MONITOR: AFOSR, XF  
TR-92-0593, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Surface Science 262, p88-98 1992.  
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We have studied the reaction of isotropically pure B2O3 with the (111) surface of B-rhombohedral boron using temperature programmed desorption. The 10B2O3 was directly deposited on the boron surface from a Knudsen cell operated at 1200 K. The boron crystal contained the natural abundance ratio of the (11)B:(10)B isotopes of 4:1. The thermal desorption results show a B2O3 peak near 1200 K consisting solely of the 10B2O3 isotope followed by B2O2 and B2O3 peaks in the range 1300-1350 K with a B2O2:B2O3 peak area ratio of about 2:1. The higher temperature B2O2 and B2O3 desorption peaks follow zero-order desorption kinetics, with an activation energy of 554 $\pm$ 41 kJ $\cdot$ mol $^{-1}$ . The higher temperature peaks show substantial incorporation of the 11 B isotope from the substrate. The results are consistent with a reaction mechanism in which boron from the substrate first dissolves in the molten B2O3 layer and then reacts to form a B8O suboxide which then decomposes to yield B2O3 and B2O2. However, we have no direct evidence for the presence of the B8O suboxide on the surface.

DESCRIPTORS: (U) \*DESORPTION, \*CHEMICAL REACTIONS, \*BORON OXIDES, \*ISOTOPE EFFECT, ACTIVATION ENERGY, BORON.

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AD-A253 083

UNCLASSIFIED

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AD-A253 062 7/4

CRYSTALS, ISOTOPIES, KINETICS, LAYERS, RATIOS, SUBSTRATES, SURFACES, TEMPERATURE, YIELD, REPRINTS.

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Structural and Dynamical Properties of the Sol-Gel Transition.

IDENTIFIERS: (U) WUAFOSR2303BS, PE61102F, \*Boron/B-rhombohedral.

90 28P

PERSONAL AUTHORS: Winter, R.; Hua, D. W.; Song, X.; Mantuau, W.; Jonas, J.

CONTRACT NO. AFOSR-88-0089

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0592, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry; v84 n8 p2706-2713 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A variety of experimental techniques (multinuclear NMR, Raman, fluorescence polarization, small-angle neutron scattering, viscosity, turbidity, static and dynamic light scattering experiments) have been employed to investigate the nature of the Sol-gel transition of tetramethoxysilicate,  $\text{Si}(\text{OCH}_3)_4$  (TMOS). These experiments probe changes in structural and dynamical properties at the macroscopic and microscopic levels in the course of the sol-gel transition. The experimental results are compared with recent theories for the gelation process. The experiments show that no drastic change in structure occurs at the gelation threshold of TMOS. The formed silica network exhibits a self-similar structure, and the gross features of the sol-gel transition of TMOS can be described within the framework of percolation theory. The underlying growth process might be classified as reaction-limited cluster-cluster growth. However, the detailed chemical structure and reactivity of the reactants, e.g., the time-dependent functionality of the monomers during the hydrolysis step, also play an important role and have to be taken into account for a more quantitative theoretical description of this gelation process. NMR; Raman; Fluorescence

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AD-A253 081 20/5

polarization; SANS; Shear viscosity; Static and dynamic light scattering; Sol-gel transition; Tetramethoxysilicate.

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) High Pressure NMR Studies of the Dynamics in Liquids and Complex Systems.

DESCRIPTORS: (U) \*GELATION, \*STRUCTURES, ANGLES, CHEMICALS, DYNAMICS, FLUORESCENCE, HYDROLYSIS, LIGHT SCATTERING, MONOMERS, NETWORKS, NEUTRON SCATTERING, PERCOLATION, POLARIZATION, PROBES, REACTIVITIES, SCATTERING, STATICS, THEORY, TRANSITIONS, TURBIDITY, VISCOSITY, SILICA GELS, REPRINTS.

90 29P

PERSONAL AUTHORS: Jonas, J.

CONTRACT NO. AFOSR-89-0099

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0591, AFOSR

UNCLASSIFIED REPORT

IDENTIFIERS: (U) WUAFOSR2303A3, PE81102F,  
\*Tetramethoxysilicate, \*Sol-gel transition.

Availability: Pub. in NMR Basic Principles and Progress, v24 p85-128 1990. Available only to DTIC users. No copies furnished by NTIS.

Reprint: High Pressure NMR studies of the Dynamics in Liquids and Complex Systems.

DESCRIPTORS: (U) \*NUCLEAR MAGNETIC RESONANCE, \*HIGH PRESSURE, \*INSTRUMENTATION, \*SPECTROSCOPY, PROBES, LIQUIDS, SOLVENTS, REPRINTS.

IDENTIFIERS: (U) NMR(Nuclear Magnetic Resonance), NMR Spectroscopy, WUAFOSR2303A3, PE81102F.

IAC NO. NT-48894

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U) NUCLEAR MAGNETIC RESONANCE, HIGH PRESSURE, INSTRUMENTATION, SPECTROSCOPY, PROBES, LIQUIDS, SOLVENTS.;

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 060 20/5

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) NMR and Laser Raman Scattering Studies of Fluids at High Pressure.

91 35P

PERSONAL AUTHORS: Jonas, J.; Lee, Y. T.

CONTRACT NO. AFOSR-89-0099

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0686, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Phys.: Condens. Matter, v3 p306-338 1991. Available only to DTIC users. No copies furnished by NTIS.

Reprint: NMR and Laser Raman Scattering Studies of Fluids at High Pressure.

DESCRIPTORS: (U) \*NUCLEAR MAGNETIC RESONANCE. \*HIGH PRESSURE. \*FLUIDS. \*SPECTROSCOPY, POLYATOMIC MOLECULES, WATER, RAMAN SPECTROSCOPY, COLLISIONS, SCATTERING, REPRINTS.

IDENTIFIERS: (U) Laser raman scattering, Complex liquids, WJAFOSR2303A3, PE81102F.

IAC NO. NT-48893

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N--(U) NUCLEAR MAGNETIC RESONANCE, HIGH PRESSURE, FLUIDS, SPECTROSCOPY, RAMAN SPECTROSCOPY, LASERS.;

AD-A253 056 20/2

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Formation of Methyl 11-Hydroxy-8-oxopentacyclo(5.4.0.0(2.6).0(3.10).0(5.9)) undecanecarboxylate by a Regiospecific and Stereospecific Reduction.

91 4P

PERSONAL AUTHORS: Watson, William H.; Kashyap, Ram P.; Marchand, Alan P.; Reddy, S. P.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0616, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Acta Crystallography, Section C: Cryst. Struct. Commun., VC47, p376-378 1991. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The X-ray crystal structure of methyl 11-hydroxy-8-oxopentacyclo(5.4.0-02 6 -03, 10.05, 9) undecanecarboxylate is described.

DESCRIPTORS: (U) \*AVAILABILITY. \*CRYSTAL STRUCTURE \*CRYSTALLOGRAPHY, CRYSTALS, REDUCTION, RINGS, STRUCTURES, X RAY.

IDENTIFIERS: (U) Stereospecific enedione reduction, X-ray crystal structure, Regiospecific enedione reduction, NaBH4-promoted reduction, Pentacycloundecane ring system, PE81102F, WJAFOSR2303A3..

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A253 053 CONTINUED

CHICAGO UNIV IL JAMES FRANCK INST

DYNAMICS, ENERGY, EXPERIMENTAL DATA, HELIUM, LAYERS,  
MEASUREMENT, MODELS, OBSERVATION, PHASE, RAYLEIGH WAVES,  
SURFACES, VIBRATION, REPRINTS.

(U) Surface Dynamics of Order Cu<sub>3</sub>Au(001) Studied by  
Elastic and Inelastic Helium Atom Scattering.

92 15P

IDENTIFIERS: (U) PE81102F, WUAFOSR23038S.

PERSONAL AUTHORS: Gans, B.; Knipp, P. A.; Koleske, D. D.;  
Sibener, S. J.

CONTRACT NO. AFOSR-88-0194

PROJECT NO. 2303

TASK NO. BS

MONITOR: AFOSR, XF  
TR-92-0629, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Surface Science, v284 p81-94 1992.  
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Inelastic helium atom scattering has been used to measure the surface phonon dispersion curves for the (001) face of the ordered phase of Cu<sub>3</sub>Au along the <100> (i.e., T-M') direction. We report the spectroscopic observation of two surface phonon modes on this fcc alloy, and present a detailed description of the scattering instrument that was used for making these measurements. The lower-energy surface phonon mode, the Rayleigh wave, has an energy of  $7.1 \pm 0.5$  meV at M'. The higher-lying feature is an optical mode with an energy of  $12.5 \pm 1.0$  meV, which shows little dispersion across the surface Brillouin zone. This phonon mode might be interpreted as a folded Rayleigh mode. The experimentally measured dispersion curves do not agree with those generated by a lattice dynamical slab calculation which uses a pair potential force-field that successfully models the bulk vibrations of the ordered alloy. The best fit to our experimental data indicates that the force constant between the first and second layer Cu atoms needs to be stiffened by ~20% with respect to the corresponding bulk value.

DESCRIPTORS: (U) \*ATOMS, \*BRILLOUIN ZONES, \*PHONONS,  
\*SCATTERING, ALLOYS, AVAILABILITY, CONSTANTS, DISPERSIONS,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A253 052 CONTINUED

CALIFORNIA UNIV IRVINE

(U) High Temperature Deformation and Fracture Mechanisms in Monolithic and Particulate Reinforced Nickel Aluminide Processed by Spray Atomization and Co-Deposition.

MAY 92 12P

PERSONAL AUTHORS: Kim, H. K.; Liang, X.; Lavernia, E. J.; Earthman, J. C.

CONTRACT NO. AFOSR-90-0386

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0630, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of International Conference on Creep of Materials (5th), p151-161, 18-21 May 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Intermetallic-matrix composites (IMCS) have the potential of combining matrix properties of oxidation resistance and high temperature stability with reinforcement properties of high specific strength and modulus. The purpose of the present investigation is to develop a better understanding of the nature of creep fracture mechanisms in a Ni3Al composite reinforced with both TiB2 and SiC particulates. In the present study, creep rupture specimens were tested under constant stresses ranging from 180 to 350 MPa in vacuum at 780 deg C. Examinations of tested specimen cross-sections reveal that the high temperature damage in the unreinforced material is comprised of the plastic growth of pre-existing microcracks while damage in the composite is manifested by the nucleation and growth of cavities. The microstructural observations reveal that most of the cavities lie on the grain boundaries of the Ni3Al matrix as opposed to the large TiB2/Ni3Al interfaces, suggesting that cavities nucleate at fine carbides that lie on the Ni3Al grain boundaries as a result of the decomposition

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AD-A253 037 CONTINUED

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF SURGERY

MASKING, MODULATION, NARROWBAND, NOISE, PROCESSING,  
RELEASE, RESOLUTION, SIGNALS, STIMULI.

(U) Auditory Spectro-Temporal Pattern Analysis.

IDENTIFIERS: (U) PE81102F, WUAFOSR2313AS.

DESCRIPTIVE NOTE: Annual rept. Dec 80-30 Nov 81.

MAY 82

8P

PERSONAL AUTHORS: Hall, Joseph W.

CONTRACT NO. AFOSR-80-0108

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0851, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) The long-term aim of this project is a better understanding of auditory processes which use across frequency or across-ear temporal envelope difference cues to aid performance. Specific areas of investigation include comodulation masking release (CMR), the masking-level difference (MLD), temporal resolution, and the processing of amplitude and frequency modulation. The goal of the first proposed experiment is to examine the possible relation between CMR and auditory phenomena related to auditory scene analysis; the goal of the second experiment is to examine the possible relation between CMR and the MLD for narrowband noise maskers; the goal of the third experiment is to determine the extent to which across-frequency correlation of temporal envelope may influence gap detection for wideband stimuli; the goal of the fourth experiment is to determine whether masking release can be derived from cues based upon across-frequency coherence of frequency modulation; the goal of the fifth experiment is to examine a modulation masking phenomenon related to frequency modulation. The tasks will be signal detection in masking noise, temporal gap detection, and the detection of frequency modulation. Testing will be performed in a sound-treated room, using a 3AFC adaptive procedure.

**DESCRIPTORS:** (U) \*EAR, \*FREQUENCY MODULATION, \*SOUND, AMPLITUDE, COHERENCE, CORRELATION, DETECTION, FREQUENCY,

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## DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

AD-A253 036 20/1

AD-A253 032 21/2

WRIGHT STATE UNIV DAYTON OH DEPT OF PSYCHOLOGY

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Pattern Analysis Based Models of Masking by Spatially Separated Sound Sources.

(U) Theories of Turbulent Combustion in High Speed Flows.

DESCRIPTIVE NOTE: Annual rept. 15 May 91-14 May 92.

DESCRIPTIVE NOTE: Final rept. Apr 89-Apr 92.

JUN 92 11P

APR 92 10P

PERSONAL AUTHORS: Gilkey, Robert H.

PERSONAL AUTHORS: Libby, P. A.; Williams, F. A.

CONTRACT NO. AFOSR-91-0289

CONTRACT NO. AFOSR-89-0310

PROJECT NO. 2313

PROJECT NO. 2308

TASK NO. CS

TASK NO. BS

MONITOR: AFOSR, XF

MONITOR: AFOSR, XF

TR-92-0850, AFOSR

TR-92-0873, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

ABSTRACT: (U) ONE GOAL OF THIS PROGRAM OF RESEARCH IS TO EXAMINE MASKING AMONG SPATIALLY SEPARATED SOUND SOURCES. The results indicate that masking release on the order of 8-20 dB can be observed in free-field masking situations when the signal and the masker are spatially separated by 900. This magnitude of masking release is comparable to that observed in traditional binaural masking level difference experiments, where the stimuli are presented through headphones. However, while masking release observed in headphone studies is typically assumed to be based on interaural differences in phase or on interaural differences in intensity, we observed substantial masking release in the median plane where interaural differences are minimal. Our own headphone masking research is also questioning traditional models of binaural masking. Work is underway to develop a neural network based model of sound localization. The results of these studies will have implications for the development of virtual environments and auditory displays.

DESCRIPTORS: (U) \*EARPHONES, \*SOUND, ENVIRONMENTS, FREE FIELD, INTENSITY, MASKING, MODELS, NETWORKS, PHASE, RELEASE, SIGNALS, STIMULI, WORK.

IDENTIFIERS: (U) PE61102F, WJAFOSR2313CS.

AD-A253 036

ABSTRACT: (U) Since Damkohler and Reynolds numbers over the range of conditions relevant to supersonic hydrogen-air combustion were found to be consistent with the combustion occurring in the reaction-sheet regime, detailed numerical integrations were performed on the structures of counterflow hydrogen-air diffusion flames, for pressures from 0.5 to 10 atm and air temperatures from 300 K to 1200 K, at a hydrogen temperature of 300 K. The results showed extinction to occur at high enough rates of strain in most cases, but no extinction for air temperatures above about 1000 K. Reduced chemical-kinetic mechanisms were developed for simplifying the computations. The computed extinction strain rates were found to be in excellent agreement with experiments. Compressibility effects were taken into account, and the results are being worked into methods for describing turbulent combustion in high-speed flows. Turbulent Flames, Diffusion Flames, Supersonic Combustion.

DESCRIPTORS: (U) \*HYDROGEN, \*NUMBERS, \*SUPERSONIC COMBUSTION, \*TURBULENCE, AIR, COMPRESSIVE PROPERTIES, COMPUTATIONS, DIFFUSION, EXTINCTION, FLAMES, KINETICS, RATES, SHEETS, STRAIN RATE, TEMPERATURE, VELOCITY, REYNOLDS NUMBER.

IDENTIFIERS: (U) PE61102F, WJAFOSR2308BS, Damkohler number, Turbulent combustion, Turbulent flames.

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CITY UNIV OF NEW YORK GRADUATE SCHOOL AND UNIV CENTER

(U) Temporal and Qualitative Decomposition of Plausible Reasoning.

DESCRIPTIVE NOTE: Annual rept. 15 Mar 91-14 Mar 92.

MAY 92

13P

PERSONAL AUTHORS: Swinney, David A.; Smith, Edward E.

CONTRACT NO. AFOSR-91-0225

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XF  
TR-92-0858, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this work is to detail the temporal course of information integration during plausible reasoning, with a focus on: (1) the component processes in terms of their time-courses and information content; (2) the degree to which reasoning consists of modular (autonomous, independent, informationally encapsulated) stages of processing; and (3) how components of reasoning are drawn together to eventuate in a single answer to a reasoning problem. The first year of this work has involved three relevant lines of inquiry: (1) Conceptual Combination. The set of studies in this area demonstrated that claims by Springer and Murphy (1992) to the effect that conceptual combination takes place such that initial components of the combination are not activated and processed separately, are not supported. (2) Reasoning and Categorization. These studies have demonstrated that evidence from Rips (1989) that categorization can take place based on reasoning as well as on similarity, seems to be true, but only under conditions where the informational basis for categorization is quite sparse and when the subject is aware that his/her basis for the categorization must be defended. (3) Modularity and Discourse. Finally, a claim by Marslen-Wilson and Tyler (1987) purporting to demonstrate an important lack of modularity of processing during discourse/sentence comprehension was examined in

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detail utilizing a more sensitive task than they employed. With the use of this technique, it was demonstrated that modularity between semantic and syntactic information was maintained during this (particularly critical) stage of language processing.

DESCRIPTORS: (U) \*REASONING, \*DECOMPOSITION, COMPREHENSION, INTEGRATION, LANGUAGE, PROCESSING, SEMANTICS, TIME, WORK, INFORMATION PROCESSING.

IDENTIFIERS: (U) PE81102F, WJAFOSR2313BS.

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AD-A253 026 9/5

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OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) OSA Proceedings of the International Topical Meeting  
on Photonic Switching, Held in Salt Lake City, Utah on  
8 - 8 March, 1992. Volume 8.

IDENTIFIERS: (U) WUAFOSR2305A1, PE81102F, Compilation  
Reports.

DESCRIPTIVE NOTE: Final rept..

MAY 92 292P

PERSONAL AUTHORS: Hinton, H. S.; Goodman, Joseph W.

CONTRACT NO. AFOSR-91-0176

PROJECT NO. 2305

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0518, AFOSR.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual  
items, see AD-POOT 368 thru AD-POOT 425.

ABSTRACT: (U) The papers in this book stem from the  
Third Topical Meeting on Photonic Switching organized by  
the Optical Society of America and held in Salt Lake City  
in March of 1991. The papers in this book consist of  
extended and enhanced submissions from authors who  
participated at the meeting. The papers have been grouped  
into eight sections: Space-Division Switching (guided-  
wave), Space-Division Switching (freespace), Time-  
Division Switching, Wavelength-Division Switching, Multi-  
Divisional Switching, Logic and Control, Optical  
Interconnection, and Novel Devices. Finally, the papers  
contained within this volume represent the leading edge  
of research in photonic switching, therefore, the reader  
should gain a reasonably balanced overview of the current  
state of photonic switching.

DESCRIPTORS: (U) BOOKS, CONTROL, DIVISION, EDGES, GAIN,  
LAKES, LEADING EDGES, LOGIC, PHOTONICS, SALTS, SOCIETIES,  
SWITCHING, SWITCHING LOGIC, TIME, URBAN AREAS, VOLUME,  
OPTICAL SWITCHING, SWITCHING CIRCUITS, MULTIPLEXING,  
LOGIC CIRCUITS, CONTROL SYSTEMS, BISTABLE DEVICES,  
SYMPOSIA.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 015 6/3

HARVARD UNIV CAMBRIDGE MA

(U) Cooperativity and 3-D Representation.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 81-1 Jan 92.

MAY 92 5P

PERSONAL AUTHORS: Cavanagh, Patrick

CONTRACT NO. AFOSR-81-0169

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFOSR, XF  
TR-92-0652, AFOSR

UNCLASSIFIED REPORT

**ABSTRACT:** (U) Recent evidence indicates that the early stages in visual processing may be broken into several parallel streams that are specialized for the analysis of different visual attributes. A contour localization task showed that all attributes can contribute equally to border localization - no particular attribute dominated position decisions. The position decision appeared to be determined by a common representation. In contrast to this common analysis, a study of visual persistence showed that motion-defined shapes have a visual persistence which lasts longer than, and appears to be independent of, the persistence for luminance-defined shapes. Because of the involvement of motion, the site of the persistence phenomenon must be cortical. A series of experiments on transparency perception showed that transparency is analyzed rapidly (within 80 msec) and influences early levels of visual processing. We have also investigated the early stages that lead from the initial 2-D representation to object recognition. Visual priming studies have been completed which suggest that object recognition begins, not with the construction of a 3-D model, but with a crude match of 2-D views to internal prototypes. The prototype that has the best match then guides the construction of an internal 3-D model.

DESCRIPTORS: (U) \*PERCEPTION, \*RECOGNITION.

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\*TRANSPARENCIES, CONSTRUCTION, CONTOURS, CONTRAST, INTERNAL, LUMINANCE, MODELS, MOTION, PROCESSING, PROTOTYPES, SITES, STREAMS.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2313AS.

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## OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A253 014 15/8.3 24/7

AD-A253 013 24/4

## CALIFORNIA UNIV DAVIS DEPT OF ENVIRONMENTAL TOXICOLOGY

## WYOMING UNIV LARAMIE

(U) Biomarkers of Exposure: Molecules to Ecosystem.

(U) A New Approach to the Determination of Bioavailable Metals in Surface Waters.

DESCRIPTIVE NOTE: Annual rept. 1 May 91-30 Apr 92.

DESCRIPTIVE NOTE: Annual rept. 1 May 91-30 Apr 92.

APR 92 8P

MAY 92 17P

PERSONAL AUTHORS: Wilson, Barry W.

PERSONAL AUTHORS: Bergman, Harold L.; Svoboda-Colberg, Norbert; Smith, Darren E.; MacRae, Russell K.

CONTRACT NO. AFOSR-91-0226

PROJECT NO. 3484

CONTRACT NO. AFOSR-91-0258

TASK NO. RS

PROJECT NO. 3484

MONITOR: AFOSR, XF

TASK NO. RS

TR-92-0663, AFOSR

MONITOR: AFOSR, XF  
TR-92-0653, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

**ABSTRACT:** (U) Laboratory, model chamber and field studies are underway to establish sensitive biomarkers of exposure to toxic chemicals found at Air Force study sites. In the first year of the grant a protein important to the toxicity of TOCP a neurotoxic chemical found at Air Force study site s) was highly purified, longterm inhibitors of blood enzymes in birds were studied, and a model chamber was designed and constructed. In the coming year, chemical distribution and stress proteins in bacteria and other organisms will be studied in the model chamber and compared to findings at field sites.

**DESCRIPTORS:** (U) \*BACTERIA, \*CHEMICALS, \*ENZYMES, \*LABORATORIES, \*TOXICITY, \*ENVIRONMENTAL IMPACT, AIR, AIR FORCE, BIRDS, BLOOD, CHAMBERS, DISTRIBUTION, GRANTS, INHIBITORS, MODELS, PROTEINS, SITES, CHEMICAL AGENTS.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484RS.

AD-A253 014

AD-A253 013

**DESCRIPTORS:** (U) \*AQUATIC ANIMALS, \*ORGANIC ACIDS, \*WATER QUALITY, ACIDS, ANIMALS, APPROACH, ATMOSPHERIC REFRACTION, BIOASSAY, CALCIUM, CATIONS, CHROMATOGRAPHY,

**ABSTRACT:** (U) The goal of this research project is to develop a biologically relevant method for fractionating aqueous metals into toxic (bioavailable) and non-toxic forms. The overall approach is: (1) to determine the binding affinity of the gills of fish and other aquatic animals for specific metals using a novel competition bioassay technique; (2) to operationally modify the performance characteristics of cation exchange chromatography to match the metal binding affinity for gill tissue; and (3) to validate and, as necessary, calibrate the cation exchange chromatography method so as to match the toxicity of the metal(s) to aquatic biota under differing water quality conditions. Progress to date includes compiling a library of copper-organic acid stability constants, and completing experiments designed to establish experimental conditions for copper-fish-organic acid competition bioassays. The ILL (incipient lethal level) of copper for rainbow trout was estimated, and the effect of calcium exposure and calcium acclimation concentration on copper toxicity was evaluated. Water quality, Metals, Copper, Fish.

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COMPETITION, CONSTANTS, COPPER, EXCHANGE, FISHES,  
LIBRARIES, METALS, QUALITY, STABILITY, TOXICITY, TROUT,  
WATER.

CHICAGO UNIV IL DEPT OF MEDICINE

(U) Phase-Shifting Effect of Light and Exercise on the  
Human Circadian Clock.

IDENTIFIERS: (U) PE61103D, WJAFOSR3484RS.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 91-29 Feb 92.

FEB 92 12P

PERSONAL AUTHORS: Van Cauter, Eve

CONTRACT NO. AFOSR-90-0222

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XF  
TR-92-0885, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In animals, the major environmental signal responsible for the entrainment of circadian rhythmicity to external time is the light-dark cycle. While for many years, it was thought that light did not play an important role in synchronizing human rhythms, and that social cues were the primary entraining agent, extensive evidence obtained during the past decade using light of greater intensity than in earlier studies has indicated that the light-dark cycle is also a major zeitgeber for human circadian rhythmicity. The evolution of concepts regarding zeitgebers for non-human mammalian rhythms ran in many ways opposite to that occurring in the field of human rhythms. Indeed, social and/or behavioral cues were long thought to be ineffective as zeitgebers in rodents and other mammals, but evidence has accumulated over the past few years to indicate that behavioral changes are indeed capable of inducing shifts in circadian rhythms. Specifically, stimuli which cause an alteration of the rest activity cycle, either by eliciting activity (i.e. locomotor activity in rodent studies) during the normal active period or by preventing activity during the normal active period, result in phase shifts of circadian rhythms. These findings implied that physical activity during the usual rest period (i.e. nighttime) as well as sleep occurring during the normal active period (i.e. daytime) could alter the phase of human rhythms.

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AD-A253 012

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J18F

AD-A253 012 CONTINUED

AD-A253 011 9/1

LEHIGH UNIV BETHLEHEM PA PACKARD LAB

DESCRIPTORS: (U) \*CIRCADIAN RHYTHMS, ANIMALS, CYCLES, ENTRAINMENT, EXTERNAL, HUMANS, INTENSITY, LIGHT, MAMMALS, PHASE, RECREATION, REST, RODENTS, SIGNALS, SLEEP, STIMULI, TIME.

(U) Large Signal Characterization and Modeling of Heterojunction-Bipolar Transistors.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 81-31 May 92.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2312CS.

MAY 92 12P

PERSONAL AUTHORS: Whitefield, D. S.; Wei, C. J.; Hwang, J. C.

CONTRACT NO. AFOSR-90-0302

PROJECT NO. 2305

TASK NO. R1

MONITOR: AFOSR, XF  
TR-92-0862, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The high power operation of the heterojunction bipolar transistor (HBT) has been analyzed by experimentally determining the junction temperature and separating temperature effects from other high power effects. In addition, an HBT large signal model has been developed that is valid for the linear, saturation, and cutoff regions, with temperature effects included. This model has been implemented in a commercial harmonic balance simulator LIGRA from EEsof, making it particularly suitable for the design and simulation of HBT microwave power integrated circuits. Heterojunction Bipolar Transistor Large Signal Modeling; Thermal Effects.

DESCRIPTORS: (U) \*BIPOLAR TRANSISTORS, BALANCE, CIRCUITS, HARMONICS, HETEROJUNCTIONS, HIGH POWER, INTEGRATED CIRCUITS, MODELS, OPERATION, REGIONS, SATURATION, SIGNALS, SIMULATION, SIMULATORS, TEMPERATURE, POWER AMPLIFIERS, MICROWAVE EQUIPMENT.

IDENTIFIERS: (U) WJAFOSR2305R1.

AD-A253 012

AD-A253 011

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## DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

AD-A253 010

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20/2

UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

(U) Two Iron(0) Tricarbonyl Complexes with Substituted Norbornadienes.

90

5P

PERSONAL AUTHORS: Watson, William H.; Negl, Ante; Kashyap, Ram P.; Marchand, Alan P.; Dave, Paritosh R.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0803, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Acta Crystallographica, Section C, VC48, p24-27 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The X-ray crystal structures of tricarbonyl (2-3:508-n-(dimethyl 8,9,10-trinorborna-2,5-diene diene-2,3-dicarboxylate))iron(0) and of tricarbonyl (2-3:5-8-n-(dimethyl 7-trimethylsilyl-8,9,10-trinorborna-2,5-diene-2,3-dicarboxylate)) iron(0) are reported and described. X-ray crystal structure (norbornadiene)iron(0) tricarbonyl complexes.

DESCRIPTORS: (U) \*CRYSTAL STRUCTURE, \*X RAYS, \*IRON, CRYSTALS, DIENES, STRUCTURES, REPRINTS, CARBONYL COMPOUNDS, CHEMICAL BONDS, THERMAL ANALYSIS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A3, \*Tricarbonyl complexes, \*Norbornadienes, Distorted trigonal bipyramidal, Diels-Alder cycloadditions.

AD-A253 010

AD-A253 009

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AD-A253 009

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UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

(U) Mild and Highly Selective Ultrasound-Promoted Zinc/Acetic Acid Reduction of C = C Bonds in alpha, Beta-Unsaturated gamma-Dicarbonyl Compounds,

90

5P

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, Madhusudhan

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0808, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Synthesis, n3 p198-200 Mar 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Sonication of various, alpha, Beta-unsaturated Gamma-diketones, quinones, alpha-Beta-unsaturated Gamma-diacids or Gamma-diester with powdered zinc and acetic acid at room temperature results in selective reduction of the C=C bond in each case within ca. 5 minutes to 2.5 h and affords the corresponding nonconjugated C=C bonds in yields of 94-100%. Isolated (i.e., acid under these conditions. Zinc-acetic acid reduction, Reduction of C=C, Beta-Unsaturated Gamma-dicarbonyl compounds, Ultrasound.

DESCRIPTORS: (U) \*ACETIC ACID, \*REDUCTION, \*ZINC, \*CARBONYL COMPOUNDS, ACIDS, QUINONES, ROOM TEMPERATURE, TEMPERATURE, REPRINTS, KETONES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A3, \*Ultrasound promoted, \*Carbon carbon double bonds, Diacids, Diesters, Ultrasoundic cleaner.

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AD-A253 008

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AD-A253 008 CONTINUED

UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

(U) Polycyclic Cage Compounds as Intermediates in Organic Synthesis.

FEB 91 9P

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303A3, \*Cage compounds, \*Intermediates, Polyquinane products, Carbocyclic cage systems, Ring expansion processes, Molecular clefts, Aromatization processes, Photothermal metathesis sequence, PCUD..

PERSONAL AUTHORS: Marchand, Alan P.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0807, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in SYNLETT, n3 p73-79 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The utility of polycyclic cage molecules as intermediates in organic synthesis and as templates for constructing more complex cage and noncage polycyclic molecules is reviewed and evaluated via examination of the following examples: (1) Cage molecules have served as starting materials for the synthesis of polyquinane natural products. (2) In some cases, base- or acid-promoted fragmentation of readily available, appropriately substituted carbocyclic cage systems leads to the formation of unusual aromatic products. (3) New cage systems have been accessed from simple, readily available polycyclic cage ketones and diketones by employing a variety of ring expansion processes. (4) New crown ethers and molecular clefts have been prepared by straightforward synthetic elaboration of a number of readily available cage systems and their immediate (non-cage) precursors Polycyclic Cage Molecules, Novel Crown Ethers and Molecular Polyquinane Synthesis, Clefts, Ring Expansion Processes, Unusual Aromatization Processes.

DESCRIPTORS: (U) \*SYNTHESIS, \*POLYCYC : COMPOUNDS, \*ORGANIC COMPOUNDS, ACIDS, ETHERS, EXP :SION, FRAGMENTATION, KETONES, MATERIALS, MOLECULES, NUMBERS, PRECURSORS, RINGS, TEMPLATES, REPRINTS, SINGLE CRYSTALS, X RAYS, STRUCTURAL ANALYSIS.

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OPTICAL SOCIETY OF AMERICA WASHINGTON DC

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Organization of the Optical Society of America  
 Photonic Science Topical Meeting Series. Volume 14.  
 Photorefractive Materials Effects, and Devices Held in  
 Beverly, Massachusetts on 29-31 July 1991.

(U) OSA Proceedings of the Topical Meeting on Soft-X-Ray  
 Projection Lithography Held in Monterey, California on  
 10-12 April 1991. Volume 12.

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

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

MAY 92 484P

MAY 92 158P

PERSONAL AUTHORS: Quinn, Jarus W.

PERSONAL AUTHORS: Bokor, Jeffrey; Quinn, Jarus W.

CONTRACT NO. AFOSR-91-0176

CONTRACT NO. AFOSR-91-0176

PROJECT NO. 2308

PROJECT NO. 2305

TASK NO. A1

TASK NO. A1

MONITOR: AFOSR, XF

MONITOR: AFOSR, XF

TR-92-0511, AFOSR

TR-92-0156, AFOSR

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SUPPLEMENTARY NOTE: For sales information of individual  
 items, see AD-PO08 895 thru AD-PO08 807.

SUPPLEMENTARY NOTE: For sales information of individual  
 items, see AD-PO07 228 thru AD-PO07 259.

ABSTRACT: (U) Attach list of reports supported by  
 Optical Society of America-Photorefractive Materials,  
 Effects, and Devices; Integrated Photonics Research;  
 Nonlinear Guided Wave Phenomena; Optical Amplifiers and  
 Their Applications; Optical computing; Picosecond  
 Electronics and optoelectronics; Quantum Optoelectronics;  
 Photonic Switching; Microphysics of Surfaces; Beam  
 Induced Processes; Soft X-ray Projection Lithography;  
 Short Wavelength Coherent Radiation, Generation and  
 Applications; and, Persistent Spectral Hole-Burning:  
 Science and Applications.

ABSTRACT: (U) The OSA Topical Meeting on Soft-X-Ray  
 Projection Lithography was organized to bring together  
 researchers working on these diverse issues. The meeting  
 was held April 10-12, 1991, at the Monterey Conference  
 Center in Monterey, California. As these proceedings show,  
 significant progress is being made in all of the research  
 fronts, but much remains to be done in order to overcome  
 the difficult, yet exciting, challenges that lie ahead. A  
 new approach to lithography targeted for the 258-Mb  
 generation and beyond is now being explored. The idea is  
 to attempt to realize an all-reflective, demagnifying,  
 projection optical system suitable for soft-x-ray  
 wavelengths in the 5-50-nm wavelength range. A patterned  
 reflecting mask on a thick, robust, thermally stable  
 substrate is under consideration as a way around the  
 difficulties of the membrane mask. This approach was  
 inspired by the recent advances in the technology of  
 producing and manipulating x rays in this wavelength  
 region. The realization of a practical soft-x-ray  
 projection lithography system will, however, require  
 aggressive development of a number critical component  
 technologies....

DESCRIPTORS: (U) \*COHERENT OPTICAL RADIATION,  
 \*REFRACTION, AMPLIFIERS, COHERENT RADIATION, ELECTRONICS,  
 LITHOGRAPHY, MATERIALS, PHOTONICS, RADIATION, SHORT  
 WAVELENGTHS, SOFT X RAYS, SURFACES, SWITCHING, X RAYS,  
 NONLINEAR OPTICS, ELECTROOPTICS, NONLINEAR SYSTEMS,  
 SYMPOSIA.

IDENTIFIERS: (U) WUAFOSR2308A1, PE8102F, Compilation  
 Reports, \*Photorefractive materials.

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AD-A252 988

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SEARCH CONTROL NO. T4J19F

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AD-A252 997 7/3 20/2 7/4

UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

DESCRIPTORS: (U) \*PHOTOLITHOGRAPHY, \*IMAGE PROJECTORS, \*SOFT X RAYS, \*X RAY APPARATUS, \*MASKING, X RAY SCATTERING, PHOTORESIST COATINGS, TUNGSTEN, HIGH RESOLUTION, MIRRORS, SPUTTERING, FILMS, STEEL, FOCUSING, LAYERS, GRAZING MEMBRANES, WAFERS, SYMPOSIA, FABRICATION, RADIATION ABSORPTION, PLASMA GENERATORS, ULTRAVIOLET EQUIPMENT, CONTRAST, DISPERSION RELATIONS, SILICON, X RAY DIFFRACTION, CHIPS(ELECTRONICS), PHASE CONTROL, DIAMONDS, SHORT WAVELENGTHS.

(U) Pinacol Condensation of Homocubane. Synthesis and Chemistry of Homocubylidenehomocubane.

84 6P

PERSONAL AUTHORS: Marchand, Alan P.; Vidyasagar, V.; Watson, William H.; Nagl, Ante; Kashyap, Ram P.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-82-0802, AFOSR

IDENTIFIERS: (U) Compilation Reports, WUAFOSR2305A1, X Ray lithography, 25b Megabytes, Soft X-Ray projection, X Ray Sources, Nanolithography....

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Organic Chemistry, v58 n1 p282-286 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Reductive coupling of homocubane (1) with TiCl<sub>4</sub>-Zn afforded the corresponding pinacol (3, 21%) and homocubanol (4, 40%). Reaction of 3 with HCl(OEt)<sub>3</sub> in the presence of benzoic acid afforded cyclic orthoformate 5 (95%), which when heated with benzoic acid at 200 deg C gave homocubylidenehomocubane (2, 85%). When treated with AgNO<sub>3</sub>-impregnated silica gel at 25 deg C for 8 days, 2 gradually underwent homocubane-norsnoutane rearrangement, thereby affording 7. Acid-promoted pinacol rearrangement of 3 gave the corresponding pinacolone 8 (61 %). Electrophilic addition of trifluoroacetic acid and of bromine to the C=C double bond in 2 proceeded in both cases via simple 1,2-addition (i.e., without accompanying Wagner-Meerwein rearrangement), thereby affording 8 (64%) and 9 (24%), respectively. The structures of 2, 6, 7, and 9 were elucidated via X-ray crystallographic methods. The results of MM2 calculations suggest that there is insufficient driving force provided by relief of steric strain to promote Wagner-Meerwein rearrangement of the carbocation that is produced upon protonation of the C=C double bond in 2. Electrophilic Addition to C=C, Pinacol Condensation, Pinacol Rearrangement, Homocubane, Strain Energy Calculations (MM2), Homocubylidenehomocubane.

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UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

DESCRIPTORS: (U) \*CONDENSATION, \*X RAYS, ACIDS, ADDITION,  
BENZOIC ACIDS, BROMINE, COUPLINGS, ENERGY, GELS, SILICA  
GELS, STRUCTURES, REPRINTS, SYNTHESIS(CHEMISTRY),  
POLYCYCLIC COMPOUNDS, SINGLE CRYSTALS.

(U) Endo-Tricyclo(8.2.1.0(2,7))undec-9-ene-3,8-dione: A  
Versatile Synthetic Intermediate.

91 14P

IDENTIFIERS: (U) PE81102F, WUAFDSR2303A3, \*Pinacol,  
\*Homocubane, \*Homocubylidenehomocubane, Reductive  
coupling, Norsnoutane, Cage compounds, Carbocation.

PERSONAL AUTHORS: Marchand, Alan P.; Ngool, Teng-Ko;  
Watson, William H.; Kashyap, Ram P.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0805, AFOSR

## UNCLASSIFIED REPORT

Availability: Pub. in Tetrahedron, v47 n8 p881-974 1981.  
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Low-temperature ozonolyses of acetone,  
methylene chloride, or methylene chloride-methanol  
solutions of the title compound (1) were studied. Five  
different reaction workup procedures were employed, each  
of which afforded a different major product. The  
structures of five of the reaction products (or solid  
derivatives prepared therefrom), i.e., compounds 3, 5, 8,  
8, and 10, were established unequivocally via single  
crystal X-ray structural analysis. Polycyclic Compounds,  
X-ray structural analysis, Synthetic Intermediates,  
Mechanism, Low-temperature Ozonolysis.

DESCRIPTORS: (U) \*LOW TEMPERATURE, \*SINGLE CRYSTALS,  
\*STRUCTURAL ANALYSIS, \*X RAYS, ACETONES, CHLORIDES,  
CRYSTALS, METHANOLS, METHYLENES, POLYCYCLIC COMPOUNDS,  
SOLIDS, STRUCTURES, TEMPERATURE, REPRINTS, OXYGEN, OZONE.

IDENTIFIERS: (U) PE81102F, WUAFDSR2303A3, \*ENDO-  
tricyclo(8.2.1.0(2,7))undec-9-ene-3,8-dione,  
\*Synthetic Intermediates, \*Ozonolysis, Norbornenes, Diels-  
Alder cycloadditions, Cyclopentadienes, Olefinic  
dienophiles, Pentacyclic cage compounds.

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## DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A252 994 7/3 20/1

## UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

## UNIVERSITY OF NORTH TEXAS DENTON DEPT OF CHEMISTRY

(U) Unusual Behavior of 3,4:10,11-bis(2',3'-quinolino) Tricyclo-(6.3.0.0(2,6))undecane upon Attempted Monoprotonation with Triflic Acid.

(U) Ultrasound-Promoted Sodium Borohydride Reduction of Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-Dione (PCUD-8,11-Dione) and of 4,4-Dimethoxy-2,3,5,8-Tetrachloro-PCUD-8,11-Dione,

80 9P

80 5P

PERSONAL AUTHORS: Marchand, Alan P.; Annapurna, Pendri; Taylor, Richard W.; Simmons, Don L.; Watson, William H.

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, G. M.

CONTRACT NO. AFOSR-88-O132

CONTRACT NO. AFOSR-88-O132

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. A3

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0801, AFOSR

MONITOR: AFOSR, XF  
TR-92-0804, AFOSR

## UNCLASSIFIED REPORT

## UNCLASSIFIED REPORT

Availability: Pub. in Tetrahedron, v48 n15 p5077-5084 1990. Available only to DTIC users. No copies furnished by NTIS.

Availability: Pub. in OPPI Briefs, v22 n4 p528-531 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The title compound (5, 73%) and the corresponding bis(8'-methoxy) derivative 1a (6, 82%) were synthesized via base promoted Friedlander condensations of tricyclo(6.3.0.0(2,6))undecane-3,11-dione (3) with excess ortho-aminobenzaldehyde and with 2-amine-3-methoxybenzaldehyde, respectively. Only diprotonated 5 could be isolated via reaction of the title compound with triflic acid. X-ray crystal structures of 5 and of two polymorphic forms of diprotonated 5 (i.e., 7a and 7b) are reported. Novel-molecular clefts, Mono- vs. Diprotonation of an amine, X-ray crystal structure, Friedlander Condensation.

DESCRIPTORS: (U) \*X RAYS, \*BEHAVIOR, ACIDS, AMINES, CONDENSATION, CRYSTAL STRUCTURE, CRYSTALS, STRUCTURES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A3, \*Friedlander condensations, \*Pentacyclic bis(ketoester), \*Ortho-aminobenzaldehyde, \*Monoprotonation, \*Triflic acid, 3,4:10,11-Bis(2-3-Quinolino)tricyclo-6.3.0.0(2),(6) undecane.

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DUKE UNIV DURHAM NC DEPT OF PHYSICS

AD-A252 994 CONTINUED

cage diketones, Cage dials, PCVD, Sonication, Ultrasonic  
cleaners..

(U) Annual Technical Report: 1 February 1989-30 June 1990  
(Center for Ultraviolet/Extreme Ultraviolet (UV/XUV)  
Research).

JUN 90 2P

PERSONAL AUTHORS: Madey, John M.

CONTRACT NO. F49820-88-C-0040

PROJECT NO. 3484

TASK NO. A8

MONITOR: AFOSR, XF  
TR-92-0881, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during this period has resulted  
in (1) the development of an active magnetic shielding  
system to reduce the non-linear interactions between  
adjacent dipole and sextupole magnets in the Duke FEL  
storage ring, and (2) the development of an  
electromagnetic undulator with variable period to provide  
extended tuning range.

DESCRIPTORS: (U) \*STORAGE RINGS, \*ELECTROMAGNETIC  
SHIELDING, DIPOLES, INTERACTIONS, TUNING, VARIABLES,  
WIGGLER MAGNETS.

IDENTIFIERS: (U) WUAFOSR3484A8, Dipole magnets,  
Sextupole magnets.

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DTIC REPORT BIBLIOGRAPHY

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DUKE UNIV DURHAM NC DEPT OF PHYSICS

OKLAHOMA STATE UNIV STILLWATER DEPT OF ZOOLOGY

(U) Final Technical Report: 1 February 1989-30 June 1990  
(Center for Ultraviolet /Extreme Ultraviolet (UV/XUV)  
Research).

(U) Wild Mammalian Biomonitoring for Assessing Impacts of  
Environmental Contamination on Population and  
Community Ecology.

JUN 90 3P

DESCRIPTIVE NOTE: Annual rept. 1 Jun 91-31 May 92.

PERSONAL AUTHORS: Madey, John M.

MAY 92 23P

CONTRACT NO. F49620-88-C-0040

PERSONAL AUTHORS: Lochmiller, Robert L., III

PROJECT NO. 3484

CONTRACT NO. AFOSR-91-0316

TASK NO. A6

PROJECT NO. 3484

MONITOR: AFOSR, XF  
TR-92-0660, AFOSR

TASK NO. RS

MONITOR: AFOSR, XF  
TR-92-0664, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during this period has concluded  
in (1) the revision of the lattice of the Duke FEL ring  
to suppress magnetic saturation effects, (2) the  
installation of the major magnetic components for the  
ring, and (3) the development of a new concept for the  
production of coherent 40-50 A light using phase-  
displacement deceleration.

DESCRIPTORS: (U) \*FREE ELECTRON LASERS, PRODUCTION;  
RINGS, SATURATION, WIGGLER MAGNETS, SYNCHROTRONS,  
CYCLOTRON RESONANCE, MAGNETIC FIELDS.

IDENTIFIERS: (U) WJAFOSR3484A6, Dipole magnets,  
Sextupole magnets.

AD-A252 992

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UNCLASSIFIED

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ABSTRACT: (U) Much of the first year (01 Jun 91- 31 May 92) of this project was devoted to developing and refining laboratory techniques for assessing alterations in immune system function, cytogenetics or cytochrome P-450 activity in our principal in situ biomonitor, the cotton rat (*Sigmodon hispidus*). Small mammal communities were monitored on three uncontaminated control and three heavy metal-petrochemical contaminated sites from January 1991 to March 1992 on the Refinery Waste Site in Cyril, Oklahoma. Seasonal assessments of in situ toxicity were made by returning 10 animals per study site to the laboratory for detailed postmortem examination, including immunotoxic, metabolic, and genotoxic evaluations. Postmortem examinations have revealed significant gross dental lesions in 80% of the rats removed from study sites 3 and 4 (both contaminated). Hepatic total P-450 activity and P-450 O-dealkylation of resorufin ethers have been performed on the first collection of rats from the Cyril site but have not been statistically analyzed. Chromosomes were extracted from bone marrow for flow metaphase aberrations, spleen samples were fixed for flow cytometric analysis, and liver biopsies were quick-frozen for later DNA single strand lesion analysis using the alkaline unwinding-assay. Preliminary examination of these data suggests that spleen cells from animals on

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DTIC REPORT BIBLIOGRAPHY

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petrochemical-contaminated study sites have less nuclear DNA and greater variation in nuclear DNA content within individuals than those from control sites.

DESCRIPTORS: (U) \*HEAVY METALS, \*MAMMALS, \*TOXICITY, \*MONITORS, ANIMALS, BONE MARROW, TISSUE EXTRACTS, CHROMOSOMES, ETHERS, LABORATORIES, LESIONS, LIVER, RATS, REFINERIES, SPLEEN, ENVIRONMENTAL IMPACT, CONTAMINATION, IMMUNOLOGY.

IDENTIFIERS: (U) PE81103D, WJAFOSR3484RS, \*Biomonitors, Cotton rats, Sigmodon hispidus.

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Comparisons of Statistical and Nonstatistical Behavior for Bond Fission Reactions in 1,2-Difluoroethane, Disilane, and the 2-Chloroethyl Radical.

91 20P

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

CONTRACT NO. F49620-92-J-0011, AFOSR-89-0085

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XF  
TR-92-0600, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v85 n11 p8089-8107, 1 Dec 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The unimolecular dissociation reactions of the 2-chloroethyl radical involving C-H and C-Cl bond fissions are investigated using classical trajectories and two variational transition-state theory methods on the same potential-energy surface. The transition-state theory methods employed are the efficient microcanonical sampling-transition state theory method, previously used to study the decomposition dynamics of disilane and 1,2-difluoroethane, and a J-conserving variant of this method that introduces constraining equations in the efficient microcanonical sampling procedure, such that the sampling is restricted to phase-space points associated with both a constant value of the system energy and total angular momentum. The results demonstrate that the unimolecular dissociation of the 2-chloroethyl radical is well described by statistical theories that assume an equal weight for all energetically accessible phase-space points. The results obtained from the statistical calculations form upper bounds to the trajectory-computed rate coefficients as expected for a statistical system. In addition, there is no evidence of mode-specific dynamics present in the trajectory results. The

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statistical behavior of the 2-chloroethyl radical stands in sharp contrast to the dissociation dynamics of disilane and 1,2-difluoroethane which have previously been shown to exhibit pronounced nonstatistical effects. It is shown that the existence of nonstatistical behavior cannot, in general, be qualitatively predicted from energy considerations alone.

DESCRIPTORS: (U) \*STATISTICAL ANALYSIS, \*CHEMICAL BONDS, \*FISSION, ADDITION, ANGULAR MOMENTUM, BEHAVIOR, COEFFICIENTS, CONSTANTS, CONTRAST, DECOMPOSITION, DISSOCIATION, DYNAMICS, ENERGY, EQUATIONS, MOMENTUM, PHASE, POTENTIAL ENERGY, RATES, SAMPLING, SURFACES, THEORY, TRAJECTORIES, TRANSITIONS, VALUE, WEIGHT, REPRINTS, SILANES, ENERGY TRANSFER, ETHANES, FLUORINE COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303FS, \*1,2-difluoroethanes, \*Disilanes, \*2-Chloroethyl radicals.

CORNELL UNIV ITHACA NY BAKER LAB

(U) Collisional Excitation of CO by 2.3 eV H Atoms,

JAN 91 10P

PERSONAL AUTHORS: McBane, George C.; Kable, Scott H.; Houston, Paul L.; Schatz, George C.

CONTRACT NO. AFOSR-89-0182

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0597, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v84 n20 p1141-1149, 15 Jan 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Vibrational and rotational distributions of CO excited by collisions with 2.3 eV H atoms have been obtained by monitoring the products with VUV laser induced fluorescence. Translational-to-vibrational (T-V) transfer is dominated by the dynamics of collisions occurring in the two wells on the H+CO potential energy surface, one characterizing the HCO radical and the other characterizing COH. The measured vibrational distributions agree well with the results of trajectory calculations performed on the ab initio potential energy surface of Bowman, Bittman, and Harding (BBH). The measured rotational distributions show two significant differences from the calculated ones, as shown in Figure 1. First, for v=0 the experiments find more population in J<15 than predicted. This discrepancy is likely to be due to the neglect of long-range attractive contributions in the BBH surface. Second, for v=1, the experimental distribution is flat from J=0 to J=10, whereas the calculated one rises from near zero at J=0 to a peak at J=12. This discrepancy appears to be the result of placing the barrier to the COH metastable well about 0.2 eV too high.

DESCRIPTORS: (U) \*ATOMS, \*COLLISIONS, \*EXCITATION,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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\*CARBON MONOXIDE, \*HYDROGEN, BARRIERS, DISTRIBUTION, DYNAMICS, ENERGY, FLUORESCENCE, LASER INDUCED FLUORESCENCE, LASERS, MONITORING, POPULATION, POTENTIAL ENERGY, SURFACES, TRAJECTORIES, TRANSFER, REPRINTS, MOLECULES, INTERACTIONS.

CORNELL UNIV ITHACA NY BAKER LAB

(U) The 157 nm Photodissociation of OCS,

MAY 89 10P

IDENTIFIERS: (U) PE61102F, WJAFOSR230381, CAR3(Coherent Anti-Stokes Raman Spectroscopy), Time of flight mass spectroscopy, Ab initio calculations, Wells gas phase scattering, VUV(Vacuum Ultraviolet), Chemical physics.

PERSONAL AUTHORS: Strauss, C. E.; McBane, G. C.; Houston, P. L.; Burak, I.; Hepburn, J. W.

CONTRACT NO. AFOSR-89-0162

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0599, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v80 n10 p5364-5372, 15 May 89. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The photodissociation of OCS at 157 nm has been investigated by using tunable vacuum ultraviolet radiation to probe the CO and S photoproducts. Sulfur is produced almost entirely in the 1S state, while CO is produced in its ground electronic state and in vibrational levels from  $v = 0-3$  in the approximate ratio ( $v = 0$ ): ( $v = 1$ ): ( $v = 2$ ): ( $v = 3$ ) = (1.0): (1.0): (0.5): (0.3). The rotational distribution for each vibrational level is found to be near Boltzmann, with temperatures that decrease from 1350 K for  $v = 0$  to 780 K for  $v = 3$ . Measurements of the CO Doppler profiles demonstrate that the dissociation takes place from a transition of predominantly parallel character ( $13 \pm 1.8 + 0.2$ ) and that the CO velocity and angular momentum vectors are perpendicular to one another.

DESCRIPTORS: (U) \*PHOTODISSOCIATION, \*SULFUR, \*CARBON, \*OXYGEN, ANGULAR MOMENTUM, DISSOCIATION, DISTRIBUTION, ELECTRONIC STATES, ELECTRONICS, MEASUREMENT, MOMENTUM, PROBES, PROFILES, RADIATION, TEMPERATURE, TRANSITIONS, ULTRAVIOLET RADIATION, VACUUM, VACUUM ULTRAVIOLET RADIATION, VELOCITY, REPRINTS, GROUND STATE, BOLTZMANN EQUATION, MOLECULES, COLLISIONS, SPECTROSCOPY, DOPPLER SYSTEMS.

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DTIC REPORT BIBLIOGRAPHY

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IDENTIFIERS: (U) PE61102F, WJAFOSR230381, Vibrational states, Rotational distribution, Isoelectronic molecules.

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Quantitative Correlations of Heterogeneous Electron-Transfer Kinetics with Surface Properties of Glassy Carbon Electrodes.

90 7P

PERSONAL AUTHORS: Rice, Ronald J.; Pontikos, Nicholas M.; McCreery, Richard L.

CONTRACT NO. AFOSR-88-0071

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0035, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the American Chemical Society, v112 n12 p4817-4822 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Raman spectra, capacitance (C deg), phenanthrenequinone (PQ) adsorption, and heterogeneous electron-transfer rates for ferri/ferrocyanide, dopamine, and ascorbic acid were monitored after fracturing, polishing, and laser activating glassy carbon electrodes (GC-30). Alterations in the Raman spectrum indicate changes in carbon microstructure, while PQ adsorption and C deg provide measures of microscopic surface area. It was observed that polishing caused minor changes in carbon disorder and microscopic surface area, but the polished surface had poor electron-transfer kinetics. Laser activation increased k deg for Fe(CN)6(3)- by at least a factor of 200 but increased PQ adsorption and C deg by less than 50% and had negligible effects on the Raman spectrum. A k deg of above 0.5 cm s-1 was observed for Fe(CN)6 for the first time. A clean, fractured GC surface exhibited a k deg of 0.5 cm s-1 and was very active toward ascorbic acid and dopamine oxidation. The results are consistent with a surface-cleaning mechanism for laser activation, accompanied by little or no observable surface restructuring or roughening. The results on GC are in contrast to those on laser

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activation of HOPG, where the mechanism involved formation of active sites. The conclusions reached here permit evaluation of the main variables affecting electron-transfer rate for  $\text{Fe}(\text{CN})_6$ , ascorbic acid, and dopamine on GC. We conclude that the active sites for electron transfer are on graphite edges inherent in the GC structure, and the principal function of the laser is exposure of these sites by removal of chemi- and physisorbed impurities.

DESCRIPTORS: (U) \*ELECTRON TRANSFER, \*GLASSY CARBON, \*KINETICS, \*SURFACES, \*ELECTRODES, ACIDS, ACTIVATION, ADSORPTION, ASCORBIC ACID, CARBON, CLEANING, CONTRAST, DOPAMINE, EDGES, ELECTRONS, FUNCTIONS, GRAPHITE, IMPURITIES, LASERS, MICROSTRUCTURE, OXIDATION, POLISHING, RAMAN SPECTRA, RATES, REMOVAL, SITES, SPECTRA, STRUCTURES, TIME, TRANSFER, VARIABLES, REPRINTS, IRON COMPOUNDS, CAPACITANCE, ELECTROCHEMISTRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1, \*Quantitative correlation, Heterogeneity, Phenanthrenequinone, Roughening, Electrosynthesis, Ferrocyanides.

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Laser Activation of Carbon Electrodes. Relationship between Laser-Induced Surface Effects and Electron Transfer Activation.

SEP 88

7P

PERSONAL AUTHORS: Poon, Melanie; McCreery, Richard L.; Engstrom, Royce

CONTRACT NO. AFOSR-88-0071

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0837, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Analytical Chemistry, v80 p1725-1730 1988. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Several effects of intense laser pulses, including ablation, desorption, and structural changes are correlated with electron transfer activation of glassy carbon (GC) electrodes. By use of ferri-/ferrocyanide, ascorbic acid, and dopamine as test systems, it was found that ablation of bulk GC is a sufficient but not necessary process for activation. In addition, no correlation was found between increases in background current and activation, and several arguments are made against the promotion of electron transfer by oxygen-containing functional groups. Furthermore, adsorption of ascorbic acid and dopamine occurred with several pretreatment procedures but was unnecessary to achieve electron transfer activation. Fast electron transfer for ferri-/ferrocyanide, dopamine, and ascorbic acid is uncorrelated with background current, and adsorption, ablation, surface oxygen content, and microscopic surface area. The most likely laser effects that promote electron transfer are desorption of impurities and formation or exposure of active regions on the GC surface.

DESCRIPTORS: (U) \*ACTIVATION, \*ELECTRON TRANSFER.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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\*GLASSY CARBON, ABLATION, ADSORPTION, ASCORBIC ACID, CORRELATION, DESORPTION, DOPAMINE, ELECTRODES, IMPURITIES, LASERS, PULSES, TEST AND EVALUATION, TRANSFER, REPRINTS.

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Laser Microfabrication and Activation of Graphite and Glassy Carbon Electrodes.

IDENTIFIERS: (U) PEN102F, WJAFOSR2303A1, Carbon electrodes, \*Surfaces properties.

90 7P

PERSONAL AUTHORS: Sternitzke, Kent D.; McCreery, Richard L.

CONTRACT NO. AFOSR-88-0071

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0838, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Analytical Chemistry, v82 p1339-1344 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A small N2 laser was used to activate glassy carbon (GC) electrodes and to microfabricate microelectrodes on highly ordered pyrolytic graphite (HOPG) and GC coated with a thin organic film. With either manual or electromechanical rastering of the laser spot on the GC electrode, large areas could be activated to exhibit fast electron transfer for common redox systems. An array of laser spots formed on HOPG showed mixed kinetics and mass transport, with the small laser spots exhibiting fast kinetics and radial diffusion, while the unmodified HOPG showed slow kinetics and planar diffusion. In order to microfabricate electrodes on glassy carbon, a passivating organic film was applied and then removed with computer-positioned laser pulses. Microelectrode arrays were prepared that exhibited planar diffusion at fast scan rates, radial diffusion at intermediate scan rates, and planar diffusion at slow scan rates due to overlap of the hemispherical diffusion fields. Signal to noise benefits of the microelectrode arrays were demonstrated, and the background current appeared to be limited by solution impurities rather than by surface redox processes.

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DESCRIPTORS: (U) \*ELECTRODES, \*GLASSY CARBON, ARRAYS, BACKGROUND, BENEFITS, CARBON, COMPUTERS, DIFFUSION, ELECTRON TRANSFER, ELECTRONS, FILMS, IMPURITIES, KINETICS, LASER SPOTS, LASERS, MASS, NOISE, OVERLAP, PULSES, RATES, SIGNALS, SURFACES, TRANSFER, TRANSPORT.

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Quantitative Relationship between Electron Transfer Rate and Surface Microstructure of Laser-Modified Graphite Electrodes.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1.

89 8P

PERSONAL AUTHORS: Rice, Ronald J.; McCreery, Richard L.

CONTRACT NO. AFOSR-88-0071

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF

TR-92-0834, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Analytical Chemistry, v61 p1837-1841 1989. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Previous Investigations demonstrate that increases in electron transfer rate constant,  $k$  deg, on highly ordered pyrolytic graphite (HOPG) basal plane correlate with the appearance of edge plane defects and that such defects may be created with laser or electrochemical pretreatment. In the current work both capacitance (C deg obs) and  $k$  deg obs for Fe(CN)<sub>6</sub><sup>3-/4on</sup> HOPG were measured as functions of power density of the activating laser. Over a power density range from 0 to 130 MW CM<sup>-2</sup>,  $k$  deg, obs increased by more than 5 orders of magnitude while C deg obs. increased by a factor of 8. Both  $k$  deg obs and C deg obs may be expressed as linear combinations of the basal and edge plane  $k$  deg and C deg values, weighted by the fractional coverage of edge plane on the electrode surface ( $\theta$ ). Determinations of  $\theta$  from both  $k$  deg obs and C deg obs are quantitatively consistent and in both cases increase with power density above a threshold of 45 MW CM<sup>-2</sup>. Although effects of surface roughness may also be involved, the results indicate that the electron transfer actively of laser-modified HOPG is predominantly dependent on edge plane density.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A252 983 14/2

DESCRIPTORS: (U) \*ELECTRODES, \*ELECTRON TRANSFER, \*LASERS, CONSTANTS, DENSITY, EDGES, ELECTRONS, FUNCTIONS, POWER, RATES, ROUGHNESS, SURFACE ROUGHNESS, SURFACES, TRANSFER, VALUE, WORK.

IDENTIFIERS: (U) PE01102F, WJAFDSR2303A1.

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) In Situ Laser Activation of Glassy Carbon Electrochemical Detectors for Liquid Chromatography: Demonstration of Improved Reversibility and Detection Limits.

89 6P

PERSONAL AUTHORS: Sternitzke, Kent; McCreery, Richard L.; Bruntlett, Craig S.; Kissinger, Peter T.

CONTRACT NO. AFOSR-88-0071

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0833, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Analytical Chemistry, v81 p1990-1993 1989. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The development of liquid chromatography/electrochemistry (LCEC) provided a very sensitive technique for a variety of redox compounds, many of which are biologically important. The marriage of the separation ability of LC and the selectivity and low detection limits of amperometric flow detectors has made LCEC the method of choice for many neurotransmitters, vitamins, pharmaceuticals, and a variety of other systems (1, 2). With the advent of capillary zone electrophoresis, electrochemical detectors have extended detections limits to femtomole levels, with analytical volumes in the subnanoliter range (3). In addition to the high sensitivity resulting from Faraday's law, LCEC has an additional advantage of variable applied potential. Selectivity beyond that already provided by the chromatographic process may be realized for analytes having different redox potentials. Several technological approaches for exploiting these advantages have been discussed.

DESCRIPTORS: (U) \*HIGH SENSITIVITY, \*LIQUID

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CHROMATOGRAPHY, \*SEPARATION, ADDITION, APPROACH,  
CHROMATOGRAPHY, DETECTION, DETECTORS, ELECTROPHORESIS,  
FLOW, LIQUIDS, MARRIAGE, NEUROTRANSMITTERS, REGIONS,  
SELECTION, SENSITIVITY, VARIABLES, VITAMINS, VOLUME.

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) OSA Proceedings of the Topical Meeting on Optical  
Amplifiers and Their Applications, Held in Snowmass  
Village, Colorado on 24 - 28 July 1991. Volume 13.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91.

MAY 92 309P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. AFOSR-91-0178

PROJECT NO. 2305

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0521, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual  
items, see AD-PO08 973 thru AD-PO07 038.

DESCRIPTORS: (U) \*OPTICAL EQUIPMENT, \*AMPLIFIERS, LASER  
APPLICATIONS, SYMPOSIA.

IDENTIFIERS: (U) WUAFOSR2305A1, PE81102F, Optical  
amplifiers.

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OPTICAL SOCIETY OF AMERICA WASHINGTON DC

IDENTIFIERS: (U) Compilation Reports, PE61102F,  
WUAFOSR2308A1.

(U) OSA Proceedings of the Topical Meeting (5th) on Short-  
Wave Length Coherent Radiation: Generation and  
Applications Held in Monterey, California on 8-10  
April 1991. Volume 11.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91.

MAY 92 317P

PERSONAL AUTHORS: Quinn, Jarus W.; Bucksbaum, Philip H.;  
Caglio, Natale M.

REPORT NO. ISBN-1-55752-185-9

CONTRACT NO. AFOSR-91-0176

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0512, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual  
items, see AD-PO07 038 thru AD-PO07 085.

ABSTRACT: (U) The Fifth Topical Meeting on Short-  
Wavelength Coherent Radiation: Generation and  
Applications was held in Monterey, California, April 8-10,  
1991. This volume contains the papers delivered at the  
conference, which chronicle the major advances in short-  
wavelength laser physics and technology. Short-wavelength  
coherent radiation generation is inextricably linked to  
high-intensity laser-matter physics, and this meeting had  
more emphasis on the basic high-field light-matter  
interaction than ever before. There were three sessions  
devoted entirely to this subject, with additional papers  
on high-field technology and physics scattered throughout  
the meeting.

DESCRIPTORS: (U) \*HARMONIC GENERATORS, \*RARE GASES,  
\*VACUUM ULTRAVIOLET RADIATION, COHERENT RADIATION, SHORT  
WAVELENGTHS, PHOTONS, IONIZATION, STARK EFFECT, RESONANCE,  
LASERS, HARMONICS, COHERENT OPTICAL RADIATION, SYMPOSIA.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Effect of Various Amide Additives on the Tetramethoxysilane Sol-Gel Process.

90 9P

PERSONAL AUTHORS: Chan, J. B.; Jonas, J.

CONTRACT NO. AFOSR-89-0089

MONITOR: AFOSR, XF  
TR-92-0587, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl of Non-Crystalline Solids, v128 p79-86 1990. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The effects of various amides, including formamide, N-methylformamide, N,N-dimethylformamide, acetamide, N-methylacetamide and N,N-dimethylacetamide, on the pore morphology of resulting xerogels prepared from tetramethoxysilane are studied by the BET pore analysis method. Shear viscosity and NMR line width measurements provide additional information about the effects of additives on the sol-gel process.

DESCRIPTORS: (U) \*COLLOIDS, \*GELS, \*AMIDES, \*ADDITIVES, \*REPRINTS, \*FRACTURE(MECHANICS), \*CRACKS, \*GELATION, \*HYDROLYSIS, \*CONDENSATION REACTIONS, \*NUCLEAR MAGNETIC RESONANCE.

IDENTIFIERS: (U) \*Tetramethoxy silane, \*Sol-Gel process, \*DCCA(Drying Control Chemical Additives), Pore sizes, BET Analysis, WUAFOSR2303A3, PE61102F.

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AD-A252 948 7/4 7/3 20/5

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) High Pressure 29Si-NMR Study of the Sol-Gel Process, 81 20P

PERSONAL AUTHORS: Hja, D. W.; Masuda, Y.; Jonas, J.

CONTRACT NO. AFOSR-89-0089

MONITOR: AFOSR, XF  
TR-92-0588, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl of Molecular Liquids v48 p233-251 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) 29 Si-NMR spectroscopy is used to investigate the role of pressure on the hydrolysis and condensation kinetics of the tetramethoxysilane (TMOS) the concentration of the various functional groups in a neutral solution has been monitored as a function of pressure from 40 bar to 460 bar. The concentration changes of TMOS and both the hydrolysis and condensation products are accelerated by pressure. The features of the time evolution of each species are very similar to each other between 480 bar by using t/t as the time scale. Quantitative reaction rate constants for hydrolysis and gel condensation reactions are found for the early stage of the process. The sol-gel process for preparing highly homogeneous oxide glasses has continued to attract widespread attention in the last few years.

DESCRIPTORS: (U) \*COLLOIDS, \*GELS, \*HIGH PRESSURE, \*SILICON, \*NUCLEAR MAGNETIC RESONANCE, \*REPRINTS, \*SPECTROSCOPY, \*CONDENSATION REACTIONS, \*KINETICS, \*CONCENTRATION(CHEMISTRY), \*HYDROLYSIS, \*GELATION.

IDENTIFIERS: (U) \*Sol-gel process, TMOS(Tetra Meth Oxysilane), Time evolution, Functional groups, Oxide glasses, Transformations, WUAFOSR2303A3, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

SPECTRA, RELAXATION TIME.

(U) Raman Noncoincidence Effect of the Carbonyl Stretching Mode in Compressed Liquid Cyclic Carbonates.

IDENTIFIERS: (U) WUAF0SR2303A3, PE61102F, \*Raman noncoincidence effect, \*Stretching modes, propylene carbonate, Chloroethylene carbonate, Dichloroethylene carbonate.

91 10P

PERSONAL AUTHORS: Sun, T. F.; Chen, J. B.; Wallen, S. L.; Jonas, J.

CONTRACT NO. AFOSR-89-0099

MONITOR: AFOSR, XF  
TR-92-0577, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in J. Chem. Phys. v94 n11 p7486-7493, 1991. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The Raman noncoincidence effect and line width of the symmetric CO stretching band have been measured in liquid propylene carbonate (PC), Chloroethylene carbonate (CC), and dichloroethylene carbonate (DC) as a function of pressure up to 3 kbar and over the temperature range from -20 C to 40 C. The transition dipole moments of the CO mode for these liquids have also been determined by means of infrared spectroscopy at ambient conditions. The temperature, density, and transition dipole moment dependencies of the experimental noncoincidence effect for the liquids are quantitatively interpreted in terms of Logan theory. An excellent agreement between the experimental results and theoretical predictions indicates that the observed noncoincidence effect is due to transition dipole moment coupling and permanent dipole moment coupling. For the study of isotropic bandwidths, the band narrowing with increasing density is found for liquid CC and DC and quantitatively explained by means of intermolecular interactions, whereas band broadening is observed for PC. The latter broadening is unexpected since PC possesses the largest permanent dipole moment of these three liquids. A probable reason for difficulty in the interpretation of this result is given.

DESCRIPTORS: (U) \*CARBONYL COMPOUNDS, \*RAMAN SPECTRA, \*MOLECULAR VIBRATION, TRANSITIONS, DIPOLE MOMENTS, BAND

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ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) High-Pressure Nuclear-Magnetic-Resonance Study of Carbon-13 Relaxation in 2-Ethylhexyl Benzoate and 2-Ethylhexyl Cyclohexanecarboxylate.

IDENTIFIERS: (U) WJAFOSR2303A3, PE61102F, \*Carbon 13, NDE(Nuclear Overhauser Enhancement), 2-Ethylhexyl benzoate, 2-Ethylhexyl cyclohexanecarboxylate.

MAR 91 10P

PERSONAL AUTHORS: Edamy, S. T.; Gradnineti, P. J.; Masuda, Y.; Campbell, D.; Jonas, J.

CONTRACT NO. AFOSR-89-0099

MONITOR: AFOSR, XF  
TR-92-0586, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in J. Chem. Phys. v94 n5 p3568-3578, 1 Mar 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Natural abundance carbon-13 spin-lattice relaxation times and 13G-1H nuclear Overhauser enhancement (NOE) times of 2-ethylbenzoate (EHB) and 2-ethyl hexylcyclohexanecarboxylate (EHC) have been measured along isotherms of -20, 0, 20, 40, and 80 deg C at pressures of 1-5000 bars using high pressure, high resolution NMR techniques. The ability to use pressure as an experimental variable has allowed us to study a wide range of molecular motions from extreme narrowing into the slow motional regime. In addition, the high resolution capability even at high pressure permits the measurement of 13 C and NOE for each individual carbon in the molecules studied. Relaxation in both molecules is successfully analyzed in terms of a model assuming a Cole-Davidson distribution of correlation times. The comparison of parameters used in the model demonstrates the increased flexibility of the EHC ring over the EHB ring and also shows how the presence of the flexible ring contributes to the increased over-all mobility of the EHC molecule. The analysis of molecular reorientations in terms of activation volumes also indicates that EHB motion is highly restricted at low temperature.

DESCRIPTORS: (U) \*NUCLEAR MAGNETIC RESONANCE, \*LUBRICANTS, CARBON, RELAXATION TIME, HYDROCARBONS, POLYMERS, REPRINTS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A252 928 12/3

TEXAS A AND M UNIV COLLEGE STATION DEPT OF STATISTICS

(U) Research in Statistical Inference.

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

AUG 91 3P

PERSONAL AUTHORS: Carroll, Raymond J.

CONTRACT NO. AFOSR-89-0240

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF  
TR-92-0680, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During this period of research a substantial research program continued in statistical inference, one that has seen the publication of nearly 100 papers and a book since the initiation of support. The papers written or revised in 1991-1992 are: (1) An Asymptotic Theory for Sliced Inverse Regression; T. Hsing and R.J. Carroll (2) Measurement Error Regression with Unknown Link: Dimension Reduction and Data Visualization; Raymond Carroll and Ker-Chau Li (3) Further Remarks on Robustness in the Logistic Regression Model; R.J. Carroll and Shane Pederson (4) Semiparametric Comparison of Regression Curves Via Normal Likelihoods; R.J. Carroll and Peter Hall (5) Theoretical Aspects of Ill-Posed Problems in Statistics; A.C.M. Van Rooij, F.H. Ruymgaart and R.J. Carroll.

DESCRIPTORS: (U) \*STATISTICAL INFERENCE, \*RESEARCH MANAGEMENT, BOOKS, COMPARISON, DOCUMENTS, ERRORS, LOGISTICS, REDUCTION, THEORY, VANS, BIBLIOGRAPHIES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A5.

AD-A252 890 20/8

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Research With Scanning Tip Microscopy.

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

DEC 91 8P

PERSONAL AUTHORS: Sarid, Dror

CONTRACT NO. AFOSR-89-0498

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0894, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work, prior to the current AFOSR support, resulted in the following publications where scanning tunneling microscopy and atomic force microscopy have been used to investigate (a) forces and (b) surfaces.

DESCRIPTORS: (U) \*MICROSCOPY, \*OPTICAL SCANNING, DOCUMENTS, SCANNING, SURFACES, TUNNELING, WORK, BIBLIOGRAPHIES.

IDENTIFIERS: (U) WJAFOSR2301A1, PE81102F, \*Scanning tip microscopy.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A252 832 20/8

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Effect of Breaking Cylindrical Symmetry on  
Photoelectron Angular Distribution Resulting from  
Resonance-Enhanced Two-Photon Ionization.

DESCRIPTIVE NOTE: Interim rept..

AUG 91 12P

PERSONAL AUTHORS: Reid, Katharine L.; Leahy, David J.;  
Zare, Richard N.

CONTRACT NO. AFOSR-88-0284

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF  
TR-92-0820, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Chem. Phys.. v95 n3 p1748-1756,  
1 Aug 91. Available to DTIC users only. No copies  
furnished by NTIS.

ABSTRACT: (U) An expression is derived for the  
photoelectron angular distribution (PAD) following (1 +  
1') resonance-enhanced multiphoton ionization (REMPI) of  
a molecule with linearly polarized light beams. When the  
two polarization vectors are parallel, cylindrical  
symmetry exists, and the PAD depends only on  $\theta$ , the angle  
between the linear polarization vector of the ionizing  
radiation and the electron ejection direction. When the  
polarization vectors are perpendicular cylindrical  
symmetry is broken, and the PAD shows  $\phi$  and  $\theta$   
dependence. For an arbitrary angle between the two  
polarization vectors, the angular distribution ceases to  
have reflection symmetry. This breaking of cylindrical  
symmetry causes interference effects in the REMPI process  
that are readily described using a density matrix  
formalism. As an example, the (1 + 1') REMPI of NO via  
its A 11 + state is considered.

DESCRIPTORS: (U) \*PHOTOELECTRONS, \*SYMMETRY, \*IONIZATION,  
\*PHOTONS, ANGLES, DENSITY, DISTRIBUTION, EJECTION,

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AD-A252 832 CONTINUED

ELECTRONS, INTERFERENCE, LIGHT, LINEAR POLARIZATION,  
MOLECULES, POLARIZATION, RADIATION, REFLECTION, RESONANCE,  
REPRINTS, LASERS, GEOMETRY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1,  
PAD(Photoelectron Angular Distributions).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A252 831

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AD-A252 831 CONTINUED

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

link the two cages are asymmetric and pyramidal.

(U) AB Initio Studies of Structural Features not Easily Accessible to Experiment. Part 67. The 4-21G Optimized Structure of a Novel Cage Dimer, C22H24, and Comparison with its Crystal Structure.

DESCRIPTORS: (U) \*CRYSTAL STRUCTURE, \*DIMERS, \*GEOMETRY, \*CHEMICAL BONDS, ANGLES, DIPOLE MOMENTS, ESTIMATES, GRADIENTS, INTEGRALS, INTERACTIONS, MOLECULES, OPTIMIZATION, PARAMETERS, PATTERNS, RESOLUTION, STRUCTURES, TIME, MATHEMATICAL ANALYSIS, CARBON, ASYMMETRY, PYRAMIDS(GEOMETRY), CRYSTALLOGRAPHY, REPRINTS.

90

11P

PERSONAL AUTHORS: Siam, Khamis; van Alsenoy, Christian; Wolinski, Krzysztof; Schaefer, Lothar; Marchand, Alan P.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, Ab Initio calculations, Cage dimers, Gradient optimization, MIA(Multiplicative Integral Approximation).

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF  
TR-92-0619, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Molecular Structure (Theochem), v204 p209-218, 1990. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The geometry of the cage dimer, C22H22 (1), was determined by ab initio gradient optimization on the 4-2 IG level. A previously described multiplicative integral approximation (MIA) was used together with the direct SCF approach. MIA is effective in determining the geometries of large molecules, at the same time achieving the accuracy of conventional SCF methods. The calculations determine the unperturbed bond distance and angle patterns of 1 with a resolution which is currently not afforded by any experimental method. The relative C'-C bond distances show the expected correlations with C-C'-C - -C torsions and are in good agreement with X-ray crystallographic parameters, but crystal-packing effects are noticeable at the 0.01 -A level; this is less than the packing effects on structures previously found for molecules with higher dipole moments. Thus, comparisons of this kind may provide estimates of the extent to which stronger intermolecular interactions in the crystal lead to larger deviations of the crystal structure from the isolated equilibrium structure. It is a special feature of 1 that the local geometry of the sp2 carbons which

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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HARVARD UNIV CAMBRIDGE MA DEPT OF CHEMISTRY PITTSBURGH UNIV PA DEPT OF MECHANICAL ENGINEERING

(U) Scanning Tunneling Microscopy Studies of Low-Dimensional Materials: Probing the Effects of Chemical Substitution at the Atomic Level.

91 9P

PERSONAL AUTHORS: Lieber, Charles M.; Wu, Xian L.

CONTRACT NO. AFOSR-90-0029

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0588, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Research, v24 n8, 1991.  
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The application scanning tunneling microscopy (STM) to investigations of the atomic level structure and electronic states of low-dimensional materials is reviewed with an emphasis on new results obtained in the author's laboratory. STM has been used to characterize temperature dependent charge density wave (CDW) phase transitions, and to elucidate the interaction of metal impurities with a CDW. The future prospects for STM applications to this field of research is discussed. scanning tunneling microscopy, materials, chemical substitution, low-dimensional, atomic scale.

DESCRIPTORS: (U) \*MICROSCOPY, \*SCANNING, \*TUNNELING, \*SUBSTITUTION REACTIONS, \*ATOMIC STRUCTURE, CHARGE DENSITY, CHEMICALS, DENSITY, ELECTRONIC STATES, ELECTRONICS, IMPURITIES, INTERACTIONS, LABORATORIES, MATERIALS, METALS, PHASE, PHASE TRANSFORMATIONS, SCALE, STRUCTURES, TEMPERATURE, TRANSITIONS, REPRINTS, CHEMICAL PROPERTIES, DOPING, PROBES.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303A2, \*Low dimensional materials, Layered solids, Tantalum disulfide, Van der Waals interactions, Tantalum dichalcogenide materials.

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ABSTRACT: (U) This report provides a brief summary of the principal results obtained in a research program on the mechanics of progressive cracking in ceramic matrix composites and laminates. The report concentrates on (1) progressive transverse matrix cracking in cross-ply laminates, (2) the effect of transverse matrix cracks on the axial response of unidirectional ceramic matrix composites, (3) thermal conductivities of hot pressed SiC/BN composites, (4) microcracking in polycrystalline ceramics, and (5) the effect of matrix cracking and fiber-matrix interfacial debonding on the response of unidirectional ceramic matrix composites.

DESCRIPTORS: (U) \*CERAMIC MATRIX COMPOSITES, \*LAMINATES, \*MECHANICS, CRACKS, MICROCRACKING, POLYCRYSTALLINE, RESPONSE, TRANSVERSE, UNIDIRECTIONAL, COMPOSITE MATERIALS, DAMAGE, BRITTLENESS, THERMAL CONDUCTIVITY, SILICON CARBIDES, BORON NITRIDES, VOIDS, EPOXY COMPOSITES.

IDENTIFIERS: (U) PEB1102F, WUAFOSR230285, \*Progressive cracking, Fiber matrix interfacial, Debonding, Axial responses.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A252 826 CONTINUED

AD-A252 826 4/1

LOCKHEED MISSILES AND SPACE CO INC PALO ALTO CA PALO  
ALTO RESEARCH LAB

(U) Comprehensive Mappings of Electron Precipitation and  
its Effects on the Atmosphere.

DESCRIPTIVE NOTE: Annual technical rept. Jul 88-Jun 92.

JUN 92 52P

PERSONAL AUTHORS: Imhof, W. L.; Voss, H. D.; Mobilie, J.;  
Vondrak, R. R.; Gaines, E. E.

REPORT NO. LMSC/F247098

CONTRACT NO. F49620-88-C-0072

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF  
TR-92-0731, AFOSR

UNCLASSIFIED REPORT

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

ABSTRACT: (U) Precipitation of energetic electrons is an  
important energy input to the earth's upper atmosphere  
and can alter the chemistry and dynamics of that region.  
The precipitation can be studied on a global basis using  
a satellite X-ray imager to make maps of the X-rays  
produced when the electrons stop in the atmosphere. We  
have used 4-40 keV X-ray data from the S81-1 SEEP  
satellite instrument to classify the patterns of  
precipitation at high latitudes; the three principal  
types are strong auroral arcs on the night side, extended  
downside arcs, and isolated patches of high energy  
(relativistic) electron precipitation with data from  
instruments that directly detect the electrons. This very  
penetrating radiation is important because the electrons  
deposit their energy down to altitudes as low as - 85 km.  
This study found that the precipitation was confined to  
narrow latitude bands, often at the outer boundary of the  
belt of trapped electrons, and that it occurs more often

at midnight local time than at noontime. X-ray mappings,  
relativistic electrons, electron precipitation, effects  
on the atmosphere.

DESCRIPTORS: (U) \*RELATIVISTIC ELECTRONS, \*UPPER  
ATMOSPHERE, \*ATMOSPHERIC PRECIPITATION, ALTITUDE,  
ATMOSPHERES, BELTS, BOUNDARIES, DEPOSITS, DYNAMICS,  
ELECTRONS, ENERGY, GLOBAL, HIGH LATITUDES, INPUT, MAPS,  
NIGHT, PATTERNS, POLAR CAP, PRECIPITATION, RADIATION,  
REGIONS, X RAYS, ATMOSPHERIC CHEMISTRY.

IDENTIFIERS: (U) PE61102F, WJAFOSR2310A2, Electron  
precipitation, SEEP(Stimulated Emission of Energetic  
Particles).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

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AD-A252 458 CONTINUED

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) Low-Energy Electron Induced Decomposition of Fe(CO)<sub>5</sub>  
Adsorbed on Ag(111).

91

11P

PERSONAL AUTHORS: Henderson, M. A.; Ramsier, R. D.; Yates,  
J. T., Jr

CONTRACT NO. AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XF  
TR-82-0955, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Surface Science, v259 p173-182 1991.  
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The low-energy electron induced decomposition of monolayer and multilayer Fe(CO)<sub>5</sub> on a Ag(111) surface was examined with temperature programmed desorption (TPD), Auger electron spectroscopy (AES), and low-energy electron diffraction (LEED). In the absence of electron bombardment, Fe(CO)<sub>5</sub> thermally desorbs from Ag(111) in monolayer (181 K) and multilayer (170 K) desorption states with minimal decomposition. Low-energy (3-132 eV) electron bombardment converts adsorbed Fe(CO)<sub>5</sub> into Fe(CO)<sub>4</sub> clusters. These new species are much less susceptible to electron induced decomposition than adsorbed molecular Fe(CO)<sub>5</sub>. Fe(CO)<sub>4</sub> clusters thermally decompose near 330 K, liberating gas phase CO and depositing Fe particles on the Ag(111) surface. Little C or O is present on these Fe<sub>n</sub> clusters. The Fe<sub>n</sub> species do not exhibit metallic character, based on their inability to subsequently adsorb CO. The total cross section for the electron induced decomposition of Fe(CO)<sub>5</sub> adsorbed on Ag(111) is (1-14) x 10<sup>-16</sup> cm<sup>2</sup> for electrons in the energy range 3-132 eV, comparable to the gas phase Fe(CO)<sub>5</sub> cross section for electron-induced processes. Iron Carbonyl, Electron Stimulated, Iron Films, Desorption.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A252 401 CONTINUED

AD-A252 401 20/3 20/12

ZYTRON LTD ST PAUL MN

(U) Optimization of Resonant Interband Tunnel Devices.

DESCRIPTIVE NOTE: Final rept. 1 Jun 81-19 May 82.

MAY 82 48P

PERSONAL AUTHORS: Sweeny, Mark F.

CONTRACT NO. F48620-81-C-0043

PROJECT NO. 3008

TASK NO. A1

MONITOR: AFOSR, XF  
TR-92-0528, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have carried out analytical and numerical studies of resonant interband tunneling. The numerical methods implement a 2 band model, consisting of the conduction band and a single valence band. The valence band can be considered to be the light holes. The numerical methods are described in detail, and can be applied to multiband models too. Analytic estimates are made of the thermal currents, the effect of stress, and other physical effects not included in the numerical models. The devices simulated are closely modeled after a set of Resonant Interband Tunnel Diodes fabricated at the Varian Research Center in Palo Alto California. Comparison of the measured and computed results show that our simulator predicts the maximal currents to within a factor of two, for devices with maximal currents varying by a factor of 1000. There are systematic differences which are likely to be due to the very high doping used in the devices. Finally, we describe a graphic user interface, implemented for our device simulator, and a Mathematica package for carrying out symbolic computations upon the operators of the Luttinger model and related multiband models of semiconductors. Semiconductor, Tunneling, Device Modeling, Resonant Interband Tunneling.

DESCRIPTORS: (U) \*TUNNEL DIODES, \*TUNNELING(ELECTRONICS), \*BAND THEORY OF SOLIDS, A BAND, COMPARISON, COMPUTATIONS.

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CONDUCTION BANDS, DOPING, ESTIMATES, GRAPHICS, INTERFACES, MODELS, SEMICONDUCTORS, VALENCE, VALENCE BANDS, HOLES(ELECTRON DEFICIENCIES).

IDENTIFIERS: (U) WJAFOSR3005A1.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4J19F

AD-A252 349 12/8 9/1 5/2  
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS

AD-A252 342 12/7  
JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

(U) VLSI Design, Parallel Computation and Distributed Computing.

(U) Random Design and Probabilistic Analysis of Interconnection Networks.

DESCRIPTIVE NOTE: Final rept. 1 Feb-30 Sep 81.

DESCRIPTIVE NOTE: Final rept. 1 Aug 89-31 Oct 81.

SEP 81 14P

OCT 91 4P

PERSONAL AUTHORS: Leighton, Tom

PERSONAL AUTHORS: Mason, Gerald M.

CONTRACT NO. AFOSR-89-0271

CONTRACT NO. AFOSR-89-0471

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A8

TASK NO. 8A

MONITOR: AFOSR, XF  
TR-92-0540, AFOSR

MONITOR: AFOSR, XF  
TR-92-0544, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Research efforts have centered in the areas of parallel and distributed computing, network architecture, combinatorial algorithms, and complexity theory. Significant progress has been made on the development of efficient sorting circuits, network management protocols for high speed networks, distributed graph algorithms and data structured, improved algorithms for packet routing and sorting in parallel machines, algorithms for reconfiguring networks around faults, improved approximation algorithms for a variety of NP-hard optimization problems, VLSI design, and algorithms for combinatorial problems such as multicommodity flow.

ABSTRACT: (U) New designs for both nonblocking and rearrangeable broadcast switching networks have been developed. Analysis to determine/evaluation of broadcast networks based on the trade-off between rearrangeability and cost has been performed.

DESCRIPTORS: (U) \*VERY LARGE SCALE INTEGRATION, \*PARALLEL PROCESSING, \*COMPUTATIONS, \*DISTRIBUTED DATA PROCESSING, \*BIBLIOGRAPHIES, ALGORITHMS, ARCHITECTURE, CIRCUITS, FAULTS, FLOW, GRAPHS, MACHINES, MANAGEMENT, NETWORKS, OPTIMIZATION, PACKETS, ROUTING, SORTING, THEORY, VELOCITY, COMPUTER NETWORKS.

DESCRIPTORS: (U) \*SWITCHING, \*NETWORK ANALYSIS(MANAGEMENT), \*SYSTEMS ENGINEERING, COMMERCE, COSTS, NETWORKS, TRADE OFF ANALYSIS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A8.

IDENTIFIERS: (U) PE81102F, WJAFOSR23048A.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4J19F

AD-A252 333 12/1  
CALIFORNIA UNIV BERKELEY  
(U) Dynamics of Deformable Bodies.  
DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91.  
DEC 91 2P  
PERSONAL AUTHORS: Marsden, Jerrold E.  
CONTRACT NO. AFOSR-91-0133  
PROJECT NO. 2304  
TASK NO. A3  
MONITOR: AFOSR, XF  
TR-92-0541, AFOSR

AD-A252 296 9/1  
CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PHYSICS  
(U) Sources of Anisotropy in Amorphous Magnetic Thin Film.  
DESCRIPTIVE NOTE: Final rept. 1 Jul 89-31 Dec 91.  
APR 92 11P  
PERSONAL AUTHORS: Hellman, Frances  
CONTRACT NO. AFOSR-89-0432  
PROJECT NO. 2306  
TASK NO. C1  
MONITOR: AFOSR, XF  
TR-92-0523, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main achievement in this grant were developing a scientific understanding of the role of variational principles in symplectic and energy - momentum integrators, and using this structure to study the energy oscillation properties of symplectic integrators. The role of locking phenomena that comes up in the numerical solution of structural dynamics problems has also been investigated.

DESCRIPTORS: (U) \*INTEGRATORS, \*VARIATIONAL PRINCIPLES, DYNAMICS, ENERGY, GRANTS, OSCILLATION, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3, Symplectic integrators, Energy momentum Integrators.

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UNCLASSIFIED REPORT

ABSTRACT: (U) Macroscopic magnetic anisotropy is induced in the amorphous rare earth-transition metal alloys such as Tb-Fe when they are prepared by vapor deposition processes. The role of the vapor deposition process in producing the structural anisotropy which underlies the magnetic anisotropy has been explored and results compared with proposed models. It was shown that the anisotropy is independent of the state of stress in the film during the growth, and does not depend on film thickness, results inconsistent with recently-proposed models. Most significantly, the anisotropy was shown to be induced by a thermally-activated growth process. This process was hypothesized to involve rearrangement of local adatom configurations into energetically-favorable orientations which minimize surface energy during growth, a process analogous to the frequently-observed crystallographic texturing of polycrystalline thin film. The anisotropy vanishes upon subsequent annealing of the films, emphasizing the critical role of the surface during growth.

DESCRIPTORS: (U) \*ANISOTROPY, \*POLYCRYSTALLINE, \*THIN FILMS, ADATOMS, ALLOYS, ANNEALING, CONFIGURATIONS, DEPOSITION, ENERGY, FILMS, METALS, SURFACE ENERGY, SURFACES, THICKNESS, VAPOR DEPOSITION, VAPORS.

IDENTIFIERS: (U) WUAFOSR2306C1, PE61102F.

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CALIFORNIA INST OF TECH PASADENA DEPT OF ELECTRICAL  
ENGINEERING

WRIGHT STATE UNIV DAYTON OH DEPT OF CHEMISTRY

(U) Dense Modifiable Interconnections Utilizing  
Photorefractive Volume Holograms.

(U) A Study of the Effect of hydrocarbon Structure on the  
Induction of Male Rat Nephropathy and Metabolite  
Structure.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-28 Feb 92,

DESCRIPTIVE NOTE: Annual rept. 1 Jun 91-31 May 92,

MAY 92 10P

MAY 92 5P

PERSONAL AUTHORS: PSALTIS, Demetri

PERSONAL AUTHORS: Serve, M. P.

REPORT NO. CIT-81430

CONTRACT NO. AFOSR-89-0398

CONTRACT NO. AFOSR-89-0045

PROJECT NO. 2312

PROJECT NO. 2305

TASK NO. A5

TASK NO. B4

MONITOR: AFOSR, XF  
TR-92-0539, AFOSR

TR-92-0539, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes research efforts on  
(1) the demonstration of holographic degeneracies in  
associative memories, (2) the procedure for designing  
fractal grids for planar holograms, (3) the experimental  
demonstration of one and two layer neural networks that  
are designed with such fractal sampling grids, (4) the  
experimental demonstration of dynamic holographic  
memories that are capable of an arbitrarily long sequence  
of adaptations, (5) the optical implementation of the  
Kanerva's network for hand-written character recognition,  
(6) the development of an anti-Hebbian local learning  
algorithm for training multi-layer neural networks, (7)  
the experimental demonstration of optical radial basis  
function network, and (8) the demonstration of a two-  
layer local-representation optical network for real-time  
face recognition.

DESCRIPTORS: (U) \*FRACTALS, \*HOLOGRAPHY, \*OPTICAL  
STORAGE, ADAPTATION, ALGORITHMS, DEMONSTRATIONS, DYNAMICS,  
FUNCTIONS, GRIDS, LAYERS, LEARNING, REAL TIME, SAMPLING,  
SEQUENCES, TIME, TRAINING, NEURAL NETS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230584.

AD-A252 193

ABSTRACT: (U) Male Fischer 344 rats were dosed with the  
saturated branched chain hydrocarbon 3-methylheptane.  
Pathological examination of the kidneys of the dosed  
animals compared to the kidneys of control rats dosed  
with water indicated that there was a noticeable  
difference in the ability of the hydrocarbon to induce  
the classic nephrotoxicity produced by 2,2,4-  
trimethylpentane and other branched chain hydrocarbons.  
Hyaline droplet formation was used as the principal  
indicator of kidney damage. There was little indication  
of any cast formation in the corticomedullary junction  
area of the kidney. Identification of the rat urinary  
metabolites of 3methylheptane yielded 3,5-diethyl-2,3-  
dihydrofuran, 3-ethyl-8-methyl-2,3-dihydrofuran, 3-methyl-  
2-heptanol, 5-methyl-2-heptanol, 2-n-butyl-1,3-butanediol,  
2-ethyl-1,3-hexanediol, 8-methyl-8-enantholactone, 3-  
methyl-3,4-heptanediol, 3-methyl-2,3-heptanediol, 3-methyl-  
3,5-heptanediol, 2-ethyl-1,4-hexanediol, 8-methyl-  
8-enantholactone, 5-methyl-2,5-heptanediol, 2-ethyl-1,5-  
hexanediol and 2-ethyl-1-hexanoic acid.

DESCRIPTORS: (U) \*HYDROCARBONS, \*PATHOLOGY, \*KIDNEYS,  
ANIMALS, DAMAGE, TOXICITY, IDENTIFICATION, JUNCTIONS,  
METABOLITES, RATS.

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IDENTIFIERS: (U) PEG1102F, WUAFOSR2312A5, 3-Methylheptane, Trimethylpentane, \*Nephrotoxicity.

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS  
(U) Geometric Theory of Infinite Dimensional Dynamical Systems.

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

MAY 92 8P

PERSONAL AUTHORS: Dafermos, Mallet-Paret; Souganidis, Strauss

CONTRACT NO. F49620-88-C-0129

PROJECT NO. 6611

TASK NO. 00

MONITOR: AFOSR, XF  
TR-82-0545, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A subject of investigation was the extent to which an entropy inequality (i.e., the Second Law of Thermodynamics) induces stabilization of solutions of hyperbolic systems of conservation laws. It was shown that the entropy inequality guarantees uniqueness of Lipschitz solutions within the class of BV solutions. Provided that the entropy is convex just in certain directions compatible with the natural invariance of the system expressed in terms of involutions. It was proven that BV solutions of strictly hyperbolic systems with shocks of moderate strength, which satisfy the Liu admissibility condition, minimize the rate of total entropy production. The theory of generalized characteristics for a single conservation law, developed earlier by the author, was applied to conservation laws with inhomogeneity and fading memory. The theory of generalized characteristics was developed for systems of conservation laws and was used to obtain information on the large time behavior of solutions. This theory was employed to establish uniqueness of solutions for special systems of conservation laws in which shock and rarefaction wave curves coincide.

DESCRIPTORS: (U) \*ENTROPY, \*THERMODYNAMICS, \*APPLIED MATHEMATICS, \*INEQUALITIES, BEHAVIOR, CONSERVATION,

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Temperature; Velocities; Instabilities.

HCC SCIENCE AND TECHNOLOGY CO INC SUMMIT NJ

DESCRIPTORS: (U) \*RADAR, \*RAY TRACING, \*IONOSPHERIC MODELS, \*OVER THE HORIZON RADAR, \*RADIO LINKS, \*CHEMICALS, CIRCULATION, CLOUDS, COMPARISON, COUPLINGS, ELECTRODYNAMICS, ENVIRONMENTS, EXPANSION, GEOPHYSICS, HIGH LATITUDES, INTERACTIONS, IONOSPHERE, MAGNETOSPHERE, MODELS, OUTGASSING, PLASMASPHERE, POWER, SCIENTISTS, SPACECRAFT, SPACECRAFT CHARGING, STRUCTURES, TEMPERATURE, THEORY, THERMOSPHERE, VELOCITY.

(U) Polymer Blends. Volume 1.

DESCRIPTIVE NOTE: Final rept.

MAY 92 119P

PERSONAL AUTHORS: Jaffe, Michael

CONTRACT NO. F49620-88-C-0014

PROJECT NO. 2303, 8045

TASK NO. A3, 00

MONITOR: AFOSR, XF  
TR-92-0415, AFOSR

UNCLASSIFIED REPORT

IDENTIFIERS: (U) PEG1103D, WUAFOSR3484HS.

ABSTRACT: (U) Three generations of PBI and polyamide blends have been evaluated for use as high temperature matrix resins for carbon fiber composites in aerospace applications. To enable property testing, a neat resin molding cycle was developed to produce plaques with less than 2% void volume. Phthalic anhydride end-capping of the PBI was shown to significantly reduce crosslinking as measured by the change in Tg after high temperature exposure. This reduction in end-group chemistry provided for maximum thermoplasticity of the blend during molding. Thermo-oxidative stability studies indicated that at 60 deg F and above, the weight loss of the blend was approximately proportional to its PBI content. Attempts to mitigate this effect by incorporating 8F moiety into the PBI backbone were unsuccessful. Phosphoric acid treatment of 85/15 molded blend samples was shown to provide a four-fold increase in weight retention. However this effect was due to surface oxidation barrier effect. A series of nine copolymer polyimides were synthesized and evaluated. The blend of 10/90 eCPBI/8FCPI-2 was chosen to be moved forward for aerospace evaluations. The blend with end capped chemistry was scaled up in steps from gram quantities to 50 kilograms. Prepregging of the neat resin onto plain weave AS-4 carbon fabric and onto AS-4 unidirectional tape was successfully demonstrated by YLA Incorporated. Three prepregging trials produced a total of 1450 linear feet of fabric and over 450 feet of

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GUARANTEES, INEQUALITIES, INVARIANCE, PRODUCTION,  
RAREFACTION, RATES, SHOCK, STABILIZATION, THEORY, TIME,  
GEOMETRY, DIFFERENTIAL EQUATIONS.

UTAH STATE UNIV LOGAN CENTER FOR ATMOSPHERIC AND SPACE  
SCIENCES

(U) USU Center of Excellence in Theory and Analysis of the  
Geo-Plasma Environment.

IDENTIFIERS: (U) PE62301E, WJAFOSR681100.

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

MAY 92 26P

PERSONAL AUTHORS: Schunk, Robert W.

CONTRACT NO. AFOSR-90-0028

PROJECT NO. 3484

TASK NO. HS

MONITOR: AFOSR, XF  
TR-92-0547, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A team of ten Ph.D. scientists and several graduate students has been assembled at USU to work in close collaboration with scientists at the Air Force Geophysics Laboratory on a number of problems that are relevant to Air Force systems, including OTH radars, communications, and orbiting space structures. The overall goal of the research is to obtain a better understanding of the basic chemical and physical processes operating in the geoplasmic environment, including the ionosphere, thermosphere, and magnetosphere. Some of our specific tasks include the following: (1) Studies of ionospheric structure and irregularities; (2) Study the feasibility of developing better operational ionospheric models; (3) Conduct model/data comparisons in order to validate the ionospheric models; (4) Study plasma electrodynamics in the high latitude ionosphere; (5) Study magnetosphere-ionosphere coupling problems; (6) Continue the development of our thermospheric circulation model; (7) Study plasmasphere refilling problems; (8) Study OTH ray tracing problems at high latitudes; and (9) Study certain spacecraft-environment interaction problems, including those related to high-voltage power sources, spacecraft outgassing, artificial plasma cloud expansion, and spacecraft charging at Modelling, Theory; Analysis. Ionosphere; Magnetosphere; Thermosphere; Densities;

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unidirectional prepregs. Composite laminate fabrication was demonstrated by both Lockheed and Hoechst Celanese. Composite properties were demonstrated which either approached or exceeded GE Aircraft Engines specifications for PMR-15 composites.

DESCRIPTORS: (U) \*MIXTURES, \*POLYMERS, ACIDS, AIRCRAFT, AIRCRAFT ENGINES, ANHYDRIDES, BARRIERS, CAPPING, CARBON, CARBON FIBERS, CHEMISTRY, COPOLYMERS, CYCLES, ENGINES, FABRICATION, FABRICS, FEET, FIBERS, HIGH TEMPERATURE, LAMINATES, MOLDINGS, OXIDATION, PHOSPHORIC ACIDS, PLAQUES, PLASTICS, PREPREGS, QUANTITY, REDUCTION, SPECIFICATIONS, STABILITY, SURFACES, TAPES, TEMPERATURE, UNIDIRECTIONAL, VOIDS, VOLUME, WEIGHT, POLYIMIDE RESINS, COMPOSITE MATERIALS, CROSSLINKING(CHEMISTRY), THERMOPLASTIC RESINS, LAMINATES.

IDENTIFIERS: (U) PE81102F, PE81101F, WUAFOSR2303A3, WUAFOSR804500, Matrix resins, Phthalic anhydride, End capping, PBI.

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JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) A Theoretical Treatment of the  $\alpha^3\epsilon$  Yields  $X^1\epsilon$  Spin-Forbidden Dipole-Allowed Radiative Transition in  $NO^+$ .

NOV 91 8P

PERSONAL AUTHORS: Manaa, M. R.; Yarkony, David R.

CONTRACT NO. AFOSR-90-0051

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF  
TR-92-0487, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v95 n9 p6582-6588, 1 Nov 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The radiative lifetime of the spin-forbidden dipole-allowed transition determined using ab initio electronic structure techniques. This transition acquires intensity as a result of the spin-orbit induced perturbations, where the notation is meant to imply that the states are perturbed by all the states of the indicated symmetry in a given configuration state function(CSF) space. A near degeneracy of the and potential energy curves necessitates the use of quasidegenerate perturbation theory when treating the interaction. The nonrelativistic (zeroth order - CI), and relativistic (first order perturbed), wavefunctions are, expanded in CSF spaces of dimension  $0.5 - 1.4 \times 10^6$ . To our knowledge, this represents the first treatment of the spin-orbit interaction within the full microscopic Breit-Pauli approximation in a CSF space of greater than 1 million CSFs.

DESCRIPTORS: (U) \*DIPOLES, \*PERTURBATION THEORY, CONFIGURATIONS, ELECTRONICS, ENERGY, INTENSITY, INTERACTIONS, ORBITS, PERTURBATIONS, POTENTIAL ENERGY, STRUCTURES, SYMMETRY, THEORY, TRANSITIONS, REPRINTS.

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IDENTIFIERS: (U) PES1102F, WJAFOSR2303B3.

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