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INTRODUCTION

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

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

PURPOSE

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

AFOSR MISSION

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

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

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


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

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

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

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

Title - The title of the technical report.

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

Date - Date of the technical report.

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

Personal Author - Person or persons who wrote the report.

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

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

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

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

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

Descriptors - Key words describing the research.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.
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numerical quantum studies predicted a series of previously unknown exxonimer molecules in the VUV to soft-X-ray region.

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

IDENTIFIERS: (U) PE82221C, WUAFSR160101, VUV, XUV, X- Ray lasers, X-Exxonimers.
GENERAL ELECTRIC CORPORATE RESEARCH AND DEVELOPMENT
SCHENECTADY NY

(U) Geometric Reasoning for Object Recognition.

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

AUG 91 132P

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

PROJECT NO. 2304

TASK NO. A7

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

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

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

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

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

OCT 91 6P

PERSONAL AUTHORS: Foster, John C.

CONTRACT NO. AFOSR-89-0454

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR, XF

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ABSTRACT: (U) During the second year of this research program, work has continued on multi-instrument experiments investigating the effects of the large-scale convection electric field in the auroral and mid-latitude ionosphere. A radar-satellite study of electric field latitude structure during the February 8-9, 1988 great magnetic storm was completed and has provided an excellent example of the application of multi-instrument techniques to the investigation of magnetosphere-ionosphere coupling problems. Studies of the high-latitude boundary between auroral and polar cap latitudes have emphasized convection and ionospheric plasma structure near the dayside cusp and the transport of ionospheric plasma into the polar cap during storms. Mesoscale resolution electric field structure was addressed in a multi-instrument study involving the Canadian BARS radar facility and the Millstone Hill incoherent scatter radar.

DESCRIPTORS: (U) , AURORAE, BOUNDARIES, CANADA, CONVECTION, ELECTRIC FIELDS, HIGH LATITUDES, INCOHERENT SCATTERING, IONOSPHERE, LATITUDE, PLASMAS(PHYSICS), POLAR CAP, RADAR, RADAR STATIONS, RODS, STORMS, TEMPERATE REGIONS, TRANSPORT.
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STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF APPLIED
MATHEMATICS AND STATISTICS

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

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

CONTRACT NO. AFOSR-86-0136

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

UNCLASSIFIED REPORT

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

Reprint: The Stability of a Characterization of the

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

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A243 230 4/1

WASHINGTON UNIV SEATTLE DEPT OF GEOPHYSICS

(U) Thermospheric Dynamics at the South Pole,

AUG 90 5P

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

CONTRACT NO. AFOSR-89-0316

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

UNCLASSIFIED REPORT

Availability: Pub. in Geophysical Research Letters, v17
n8 p1255-1258, Aug 90.

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

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

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

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

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

WASHINGTON UNIV SEATTLE DEPT OF GEOPHYSICS

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

APR 91 8P

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

CONTRACT NO. AFOSR-89-0316

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

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Geophysical Research, v96 n4, p5777-5783, 1 Apr 91.

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

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


DESCRIPTIVE NOTE: Journal paper 1 Jan-31 Dec 91.
MAY 91 24P

PERSONAL AUTHORS: Zhou, Jianxin; Chen, Goong
PROJECT NO. 2304
TASK NO. A1
MONITOR: AFOSR, XF
TR-91-0898, AFOSR

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


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

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

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

DESCRIPTIVE NOTE: Journal paper 1 Jan-31 Dec 91.
MAR 91 24P

PERSONAL AUTHORS: Wang, Hankun; Chen, Goong

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

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

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A243 144 12/2
TEXAS A AND M UNIV COLLEGE STATION DEPT OF MATHEMATICS
(U) Exponential Decay of Energy of Evolution Equations
with Locally Distributed Damping.
DESCRIPTIVE NOTE: Journal paper 1 Jan-31 Dec 91,
FEB 91 38P
PERSONAL AUTHORS: Chen, G.; Fulling, S. A.; Narcowich, F. J.; Sun, S.
CONTRACT NO. AFOSR-91-0097
PROJECT NO. 2304
TASK NO. A1
MONITOR: AFOSR, XF
TR-91-0800, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in SIAM Jnl. of Applied Mathematics, v51 n1 p268-301 Feb 91. Available only to DTIC users. No copies furnished by NTIS.
Reprint: Exponential Decay of Energy of Evolution Equations with Locally Distributed Damping.
DESCRIPTORS: (U) *DAMPING, *EIGENVALUES, SCHRODINGER EQUATION, REPRINTS.
IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, Exponential stability, Evolution equations.

AD-A243 062 11/2
GORDON RESEARCH CONFERENCES INC KINGSTON RI
(U) Ceramics with Superelectrical and Supermechanical Properties.
DESCRIPTIVE NOTE: Final rept. for period ending 15 Jul 91,
OCT 91 11P
PERSONAL AUTHORS: Cruickshank, Alexander A.
CONTRACT NO. AFOSR-91-0311
PROJECT NO. 2306
TASK NO. A2
MONITOR: AFOSR, XF
TR-91-0920, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This conference was held from 29 July to 2 August, 1991, at the Holderness School in Plymouth, New Hampshire. The topics discussed included: how to achieve super-responses in ceramic materials by engineering of structural instabilities, spin-glass models of relaxor ferroelectrics, engineering of super-tough ceramics in zirconias, smart materials and structures, engineering and modelling of ferroelectrics for high strain actuators, small particle size effects in ferroelectrics, ferroelectric thin films for memory and optical applications, processing and properties of nanophase ceramics, microstructure-property relationships in ceramic superconductors and fundamental aspects of phase transformations in ceramics.
DESCRIPTORS: (U) , CERAMIC MATERIALS, FERROELECTRIC MATERIALS, INSTABILITY, NEW HAMPSHIRE, OPTICAL PROPERTIES, PARTICLE SIZE, PHASE TRANSFORMATIONS, STRUCTURAL PROPERTIES, SUPERCONDUCTORS, THIN FILMS.
IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F, *Ceramic materials, Ferroelectric materials, Dielectric films, Symposia.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A243 061  7/6
WASHINGTON UNIV SEATTLE
(U) Processing of Ceramics by Biopolymers. Ultrastructure-
Property Relationships in Biocrystals.

DESCRIPTIVE NOTE:  Rept. no. 2 (Final) 1 Feb 90-31 Jan 91,
OCT 91  307P

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

PROJECT NO.  2303

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

UNCLASSIFIED REPORT

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

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

IDENTIFIERS:  (U)  PE61102F, WUAFOSR2303B2.

OKLAHOMA STATE UNIV STILLWATER DEPT OF ZOOLOGY

AD-A243 058  6/5
(U) Development and Validation of Rapid In Situ Assays of
Environmental Mutagenesis.

DESCRIPTIVE NOTE:  Annual technical rept. 1 Jul 89-30 Sep
90.
OCT 90  32P

PERSONAL AUTHORS:  McBee, Karen

PROJECT NO.  2312

TASK NO.  A5

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

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A243 058 CONTINUED

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

IDENTIFIERS: (U) PE61102F, WJAFOSR2312A85.

SEARCH CONTROL NO. T85001

AD-A243 057 6/3

WELLESLEY COLL MA

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

DESCRIPTIVE NOTE: Annual rept. 1 Nov 89-31 Aug 91, SEP 91 14P

PERSONAL AUTHORS: Darrow, Janet M.

CONTRACT NO. AFOSR-90-0067

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF

TR-91-0911, AFOSR

UNCLASSIFIED REPORT

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

DESCRIPTORS: (U) BIOLOGICAL RHYTHMS, CIRCADIAN RHYTHMS, CLOCKS, CYCLES, DAILY OCCURRENCE, DARKNESS, HAMSTERS, HUMANS, ILLUMINATION, LIGHT, MAMMALS, MODELS, REST.
IDENTIFIERS: (U) WUAFSR2312A3, PE61102F, Jet lag, Melatonin, *Circadian, Clock, Sleep wake cycles.

WASHINGTON UNIV SEATTLE

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

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

CONTRACT NO. AFOSR-89-0316

UNCLASSIFIED REPORT

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

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

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A243 055  20/8  12/6

MICHIGAN UNIV  ANN ARBOR DEPT OF ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

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

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

OCT 91  18P

PERSONAL AUTHORS:  Singh, Jaspreet

PROJECT NO.  2305

MONITOR:  AFOSR, TR-91-0927, AFOSR

UNCLASSIFIED REPORT

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

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

IDENTIFIERS:  (U)  PE61102F, WUAFOSR230382.

UNCLASSIFIED

AND COMPUTER SCIENCE

AD-A243 054  7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

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

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

OCT 91  27P

PERSONAL AUTHORS:  Lagow, Richard J.

PROJECT NO.  AFOSR-88-0084

MONITOR:  AFOSR, XF

TR-91-0926, AFOSR

UNCLASSIFIED REPORT

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

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

IDENTIFIERS:  (U)  PE61102F, WUAFOSR230584.

UNCLASSIFIED
UNCLASSIFIED

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

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A243 052 5/8

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

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

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

MAR 91 36P

PERSONAL AUTHORS: Grossberg, Stephen B.

CONTRACT NO. AFOSR-90-0175

PROJECT NO. 3484

TASK NO. A4

MONITOR: AFOSR, XF

TR-91-0913, AFOSR

UNCLASSIFIED REPORT

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

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


AD-A243 052

UNCLASSIFIED

SEARCH CONTROL NO. T85001

AD-A243 051 6/4

FLORIDA UNIV GAINESVILLE DEPT OF PSYCHOLOGY

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

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

OCT 91 11P

PERSONAL AUTHORS: Sorkin, Robert D.

CONTRACT NO. AFOSR-91-0065

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF

TR-91-0915, AFOSR

UNCLASSIFIED REPORT

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

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


AD-A243 051

UNCLASSIFIED

PAGE 13 T85001
discrimination, Audio tones, Sequences, Time dependence, Delay, Auditory signals, Group signal detection, Temporal pattern perception, Performance(Human).

FLORIDA STATE UNIV TALLAHASSEE GEOPHYSICAL FLUID DYNAMICS INST

(U) Studies of Baroclinic Flow.

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

AUG 91 2OP

PERSONAL AUTHORS: Pfeffer, Richard L.

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

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XF

TR-91-0016, AFOSR

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) Atmosphere models, *Ocean models, *Fluid dynamics, Mathematical prediction, Model tests, Shear properties, Channel flow, Vorticity, Baroclinic flow, Traveling waves, Topography, Nonlinear systems, WUAFOSR2310A1, PEG1102F.

UNCLASSIFIED

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A243 049 CONTINUED

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

IDENTIFIERS: (U) PE61102F, WUAFOSR23GA2, Ceramics, Microstructures, Strength(Mechanics), Grain size, Crystallization, Fracture(Mechanics), Toughness, Advanced composites, Cracking(Fracturing), Aluminum oxides, Scanning electron microscopy, Bridging, Tensile tests, Processing, Micromechanics.

SEARCH CONTROL NO. T85001

AD-A243 036 20/8

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

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

DESCRIPTIVE NOTE: Master's thesis.

APR 91 97P

PERSONAL AUTHORS: Gilbrech, Richard J.

CONTRACT NO. AFOSR-90-0304

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XF

TR-91-0895, AFOSR

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T85001

AD-A243 035  20/4

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS


DESCRIPTIVE NOTE: Annual rept. 16 Apr 90-14 May 91.
SEP 91  197P

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

CONTRACT NO. AFOSR-90-0304

PROJECT NO. 2308

TASK NO. A2

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

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A243 035 CONTINUED

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

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

SEARCH CONTROL NO. T85001

AD-A243 032 12/5

COLORADO UNIV AT BOULDER DEPT OF COMPUTER SCIENCE

(U) Software Issues at the User Interface.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 90-30 Jun 91, MAY 91 19P

PERSONAL AUTHORS: McBryan, Oliver A.

REPORT NO. CU-CS-527-91

CONTRACT NO. AFOSR-89-0422

PROJECT NO. 2304

TASK NO. A3

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

UNCLASSIFIED REPORT

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

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

AD-A243 035

AD-A243 032
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL No. T85001

AD-A243 032 CONTINUED

AD-A243 031 5/8

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

UNCLASSIFIED REPORT

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

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

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

PENNSYLVANIA UNIV PHILADELPHIA


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

OCT 91 5P

PERSONAL AUTHORS: Sternberg, Saul

CONTRACT NO. AFOSR-91-0015

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XF

TR-91-0905, AFOSR
The objectives of the research supported by this AFOSR grant were to create new knowledge concerning the nature and behavior of high energy content materials adsorbed at the liquid-liquid, liquid-solid, and the solid-gas interfaces. The strategy employed was to use photochemical reactions and photophysical parameters as probes to characterize the structure and dynamics of high energy species. The reactions of radical pairs produced by photochemical excitation of ketones and the electron transfer process between a metal complex and an electron acceptor were employed as general photochemical probes of a range of interfacial regions. The techniques used were a battery of time resolved spectroscopic methods including optical absorption, optical emission, nuclear magnetic resonance and electron spin resonance. The objects achieved were the development of a framework which now allows both the chemistry of high energy species adsorbed at interfaces to be controlled and manipulated and the structure and dynamics of the interfacial region to be better understood.
ABSTRACT: (U) Most of the time devoted to project research was spent in Antarctica. A firm core was drilled by hand to a depth of 29 meters at Windless Bight on the Ross Ice Shelf. The main result is that all of the major peaks identified as resulting from ionization caused by SPEs that were found in the 1988-89 core could also be identified in the analytical sequence from the 1990-91 core. Following the Antarctic field season, a set of snow samples were obtained that had been collected by the International Trans-Antarctica Expedition. The analysis of these samples showed nitrate flux that correlates closely with known spatial distribution of electron precipitation in the south polar region. A new apparatus has been built for field analysis on a continuous basis of nitrate and conductivity in a melt derived from the vertical melting of ice cores.

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

IDENTIFIERS: (U) PE611022, WUAFORSR2311A1, Electron precipitation, Polar cap.

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

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

IDENTIFIERS: (U) PE611022, WUAFORSR2311A9, Perceptual stability, Perceptual adaptation, Retinotopic calibration.
COLORADO STATE UNIV  FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

(U) Numerical Simulation of Cirrus Clouds - Fire Case Study and Sensitivity Analysis,
AUG 91  142P

PERSONAL AUTHORS:  Heckman. Scot T.

REPORT NO.  CSU-ATSP-483

CONTRACT NO.  AFOSR-88-0143

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

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A242 901  9/5  12/6

CARNegie-MELLoN UNIV  PITTSBURGH PA CENTER FOR EXCELLENCE IN OPTICAL DATA PROCESSING

(U) Optical Associative Processors and Directed Graphs.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 80-31 Jul 91.

AUG 91  52P

PERSONAL AUTHORS: Casasent, David

CONTRACT NO.  AFOSR-90-0355

PROJECT NO.  2305

TASK NO.  B1

MONITOR: AFOSR, XF

TR-91-0819, AFOSR

UNCLASSIFIED REPORT

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

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

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

SEARCH CONTROL NO. T85001

AD-A242 865  12/5

GEORGE WASHINGTON UNIV  WASHINGTON DC

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

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

SEP 91  6P

PERSONAL AUTHORS: Singpurwalla, Nozer D.

CONTRACT NO.  AFOSR-89-0381

PROJECT NO.  2304

TASK NO.  A5

MONITOR: AFOSR, XF

TR-91-0879, AFOSR

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PE61102, WUAFOSR2304A5, +Computer program reliability, +Quality control, Guarantees.
ABSTRACT: (U) This research focuses on specification languages for multi-processor systems, with particular emphasis on applications to Ada software. The research, however, applies generally to specifying distributed systems containing both software and hardware components, and to software systems implemented in any programming language. The primary goals are: (1) design of a high level specification language for distributed systems, and (2) design and development of prototype tools for applying this language to development of highly reliable multi-processor Ada software.

SENSORS (PHYSIOLOGY), SURFACES, TIME.


90 3P

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

CONTRACT NO. 70SR-88-0084

PROJECT NO. 23C

TASK NO. B2

MONITOR: AFOSR

TR-91-0839

UNCLASSIFIED REPORT

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

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A242 492 CONTINUED

SEARCH CONTROL NO. T85001

AD-A242 488 7/3 7/2

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

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

DESCRIPTION NOTE: Journal article.

89 5P

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

CONTRACT NO. AFOSR-87-0087

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR. XF

TR-91-0860, AFOSR

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

Organometallics, Fluorine compounds, Oxyfluorides, Dimethyltin fluoride, Fluorinated tin derivatives, Chromium difluorid dioxide, Hydrofluoric acid, Cesium compounds, Nitrosyl compounds, Reprints.

AD-A242 488
Carbonyl Difluoride: Reactions with Metal-Phosphine Complexes.

DESCRIPTIVE NOTE: Journal article.

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

CONTRACT NO.: AFOSR-87-0067

PROJECT NO.: 2303

TASK NO.: B2

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

ABSTRACT: Carbonyl difluoride (COF2) is a versatile and nondestructive fluorine-transfer reagent as demonstrated by the ready introduction of fluorine into a variety of P-H, N-H or C-H containing compounds. Furthermore, metal oxides may be converted into metal fluorides of high purity using COF2. Christie et al have shown that FC1O3 can be prepared by using COF2 with alkali metal chlorates, MC1O3. While we have observed that some phosphines are easily oxidatively fluorinated with COF2, attempts to oxidatively fluorinate PF3, PC13, and PC12 with COF2 failed. This was attributed to the high electronegativity of the atoms groups bound to phosphorus. In this study we report the oxidative fluorination of phosphines via decomposition of a selected group of nickel phosphine complexes.

DESCRIPTORS: ALKALI METALS, ATOMS, CARBONYL COMPOUNDS, CHLORATES, DECOMPOSITION, FLUORIDES, FLUORINATION, FLUORINE, HIGH RATE, METAL COMPOUNDS, METALS, NICKEL, OXIDATION, OXIDES, PHOSPHINE, PHOSPHORUS, PURITY.
Fluorinated Three- and Four-Nitrogen Compounds and Their Reactions.

Journal article.

90 5P

Sarwar, Ghulam; Kirchmeier, Robert L.; Shreeve, Jeanne M.

AFOSR-87-0067

2303

AFOSR, XF

TR-91-0858, AFOSR

At first glance, with the exception of compounds of carbon, it would appear that molecules containing catenated atoms of other elements are relatively unstable. While there is no element that can compete with carbon in numbers of catenated atoms, it should be noted that it is possible to prepare stable catenated species of other elements, especially if fluorine atoms or fluorinated groups or other electronegative species are present in the molecule. Thus, it is expected that stable catenated nitrogen compounds should exist, since (CP3)3N and CF3N2CF3 are both extremely stable molecules. We and others have been able to synthesize highly stable perfluoroalkyl substituted tetrazanes (RF)2NN(RF)1(NF)1(RF)2.

ATOMS, CARBON, FLUORINATION, FLUORINE, MOLECULES, STABILITY.

PE61102F, WUAFOSR230382.

*Perfluoroalkyl tetrazanes, *Poly-fluorodiazanes,
Trifluoroacetonitrile, Nitrogen-chlorine bond insertion,
Polyfluoroolefin insertion into nitrogen-nitrogen bonds;
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A242 485  7/3

IDAHO UNIV  MOSCOW DEPT OF CHEMISTRY

(U) Synthesis of Fluorinated Tertiary Diamines and Diazanes.

DESCRIPTIVE NOTE: Journal article,

90  12P

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

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR

TR-91-0857

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluorine chemistry, v48
p385-405 1980. Available only to DTIC users. No copies
furnished by NTIS.

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A242 484  6/1
TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

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

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

CONTRACT NO. AFOSR-88-0084
PROJECT NO. 2303
TASK NO. B2

UNCLASSIFIED REPORT

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

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

DESCRIPTORS: (U) BLOOD SUBSTITUTEs, CYCLIC COMpOUNDS,
EMULSIONS, FLUORINATION, HOLES/OPENINGS, LIQUIDS, LONG
RANGE/TIME, MOLECULE/MOLECULE INTERACTIONS, MOLECULEs,
OXYGEN, STABILITY, STRUCTURES, SYNTHESIS, WATER.

IDENTIFIERS: (U) PE61102F, WUA0S8230382, Fluorination,
*Alkylcyclclohexanes, *Oxygen carriers, Fluorocarbons,
*Blood substitues, Reprints.

IDaho Univ Moscow Dept of Chemistry

(U) Some Highly Fluorinated Acyclic, Cyclic, and
Polycyclic Derivatives of C12NCF2CF2NC12 and
C12C-NCC12C12N=CC12.

DESCRIPTIVE NOTE: Journal article.

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

CONTRACT NO. AFOSR-87-0067
PROJECT NO. 2303
TASK NO. B2

UNCLASSIFIED REPORT

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

ABSTRACT: (U) The chemistry of the nitrogen halogen bond
has long attracted interest because of the ease with
which reactions occur and the range of compounds of
varying properties that can be prepared. These compounds
in turn are often viable precursors to stable high-
nitrogen and high-fluorine materials. We and others have
taken advantage of this high reactivity to insert
perfluoroalkanes and polyfluoroalkanes into the nitrogen
chlorine bond(s) of RFNC12 to prepare either secondary
polyfluoroalkyl or perfluoroalkylchloroamines or tertiary
polyfluoroalkyl or perfluoroalkylamines. Nitriles can be
inserted into RFNC1 to form precursors to
polyfluoroalkyl and perfluoroalkyl tetrazanes as well as
other high nitrogen compounds.

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

IDENTIFIERS: (U) PE61102F, WUA0S8230382.
(U) Photodissociation of CO(-3): Product Kinetic Energy Measurements as a Probe of Excited State Potential Surfaces and Dissociation Dynamics.

DESCRIPTIVE NOTE: Rept. 15 Nov 89-14 Nov 90.
MAY 90 11P

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

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

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

UNCLASSIFIED REPORT

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

ABSTRACT: (U) The photodissociation process CO(-3) + hv = 0(-) + CO2 has been investigated at photon energies of 2.41, 2.50, 2.54, 2.60 and 2.71 eV. Experiments were conducted by crossing a mass-selected, 8 keV ion beam with a linearly polarized laser beam, and measuring the kinetic energy distributions of the charged photodissociation products. By varying the angle between the ion beam and laser polarization, angular distributions were obtained at photon energies of 2.41 and 2.54 eV. The photon energy dependence of the average photofragment kinetic energies shows conclusively that photodissociation at these photon energies does not proceed by a direct dissociation process on a repulsive potential surface, or by a statistical vibrational predissociation process on a bound surface. The photofragment angular distributions are isotropic, providing further evidence that precludes direct photodissociation on a repulsive potential surface. Ab initio calculations were performed using the GAUSSIAN86 programs. These calculations indicate that
ground state CO$_3^-$ has a planar D$_3$h geometry, and 2A$_2'$ electronic symmetry. This ground state correlates adiabatically to the CO$_2^-$ + O dissociation asymptote, not the lower energy O-$ +$ CO$_2$ asymptote.

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

IDENTIFIERS: (U) PE61102F, WUA/FSR230381.

- Photodissociation, *Kinetic energy, *Dissociation dynamics, Anions, Excited states, Reprints, *Carbonate ion.

UNCLASSIFIED REPORT

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

ABSTRACT: (U) The sulfonamides CF$_3$SO$_2$N(CH$_3$)$_2$Na and CF$_3$SO$_2$NH$_2$Na have been reacted with polyfluoro cyclic, acyclic and inorganic chlorine and bromine containing species. Nucleophilic displacement of chlorine or bromine in 1,2-dichloro-perfluorocyclobutene, 1,2-dichloroperfluorocyclopentene, benzyl bromide, cyanuric chloride and oxalyl chloride has been found to occur under mild conditions to give good yields of N substituted polyfluoroalkyl and polyfluoroaryl sulfonamides. The effects of solvent and substrate structure on the conditions necessary for reaction to occur, and the yields obtained of the desired products are discussed. Reactions of fluorocarbons with a variety of nucleophiles have been an area of intense study over the last forty years. An excellent discussion on the behavior of fluorocarbons with nucleophiles appears in the older literature.

DESCRIPTORS: (U) BROMINE, CHLORIDES, CHLORINE, CHLORINE COMPOUNDS, CYANODEN, DISPLACEMENT, ELECTRON DONORS, FLUORINATED HYDROCARBONS, INORGANIC COMPOUNDS.
NUCLEOPHILIC REACTIONS, ORGANIC COMPOUNDS, SUBSTITUTION REACTIONS, SUBSTRATES, SULFONAMIDES.


RHODE ISLAND UNIV KINGSTON DEPT OF ELECTRICAL ENGINEERING

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

DESCRIPTIVE NOTE: Final rept. 1 Mar 89-28 Feb 91. MAY 91 6P

PERSONAL AUTHORS: Kay, Steven

CONTRACT NO. AFOSR-89-0298

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR TR-91-0877

UNCLASSIFIED REPORT


Reprint: Predictive Probability as a Criterion for Model Selection.

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A8.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A242 416 12/2 7/5

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

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

91 21P

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

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF

TR-91-0830, AFOSR

UNCLASSIFIED REPORT

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

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

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


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

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR

TR-91-0836

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

PERSONAL AUTHORS: Clark, Wayne D.; Lin, Tzu-Yu; Melekhia, Simin D.; Lagow, Richard J.

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

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

IDENTIFIERS: (U) PE61102F. WUAFOSR230382. *Organic
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY, SEARCH CONTROL NO. T85001

AD-A242 166 7/4

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The Synthesis of Perfluoro Highly Branched Heterocyclic Fluorine Compounds by Direct Fluorination, 90 17P

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

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

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

UNCLASSIFIED REPORT

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

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

DESCRIPTORS: (U) FLUORINATED HYDROCARBONS, FLUORINATION, FLUORINE COMPOUNDS, HETEROCYCLIC COMPOUNDS.
DTIC REPORT BIBLIOGRAPHY

UNCLASSIFIED

AD-A242 165  7/3
IDaho Univ. Moscow DePrt of Chemistry
(U) Oxadiazoles with NF2-Containing Substituents.

DESCRIPTIVE NOTE: Journal article.
JUL 91  12P
PERSONAL AUTHORS: John, Earnest O.; Kirchmeier, Robert L.; Shreeve, Jeanne M.

CONTRACT NO. AFOSR-87-0067
PROJECT NO. 2303
TASK NO. B2
MONITOR: AFOSR, XF
TR-91-0861, AFOSR

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, Oxadiazyl chloride, Sodium-5-(difluoroamino) difluormethyltetrazolate, Sodium-5-pentafluoroethyltetrazolate, Perfluoroacetyl acid chlorides, 2,5-Disubstituted 1,3,4-oxadiazoles, Reprints.

UNCLASSIFIED REPORT

AD-A242 164  7/6
Texas Univ. at Austin DePrt of Chemistry
(U) A Facile Synthesis for Functional Perfluoropolyether Oligomers, Diacids, Diesters, and Surfactants.

91  11P
PERSONAL AUTHORS: Persico, Daniel F.; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084
PROJECT NO. 2303
TASK NO. B2
MONITOR: AFOSR, XF
TR-91-0837, AFOSR

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, Perfluoropolyether oligomers, Diacids, Diesters, Surfactants, Reprints.

AD-A242 164
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A242 163 7/6
TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The Direct Fluorination of Acetone,
91 8P

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

PROJECT NO. 2303

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

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, Direct fluorination, Hexafluoroacetone, Reprints.

UNCLASSIFIED REPORT

AD-A242 063 20/5
CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

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

APR 90 8P

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

CONTRACT NO. AFOSR-89-0102
PROJECT NO. 2303

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

UNCLASSIFIED REPORT

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

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

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

DTIC REPORT BIBLIOGRAPHY

IDENTIFIERS: (U) PE8102F, WUAFOSR2303B1, Reprints.

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

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

DESCRIPTIVE NOTE: Rept. for 25 Nov 89-14 Nov 90,
JUL 90 9P

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

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

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

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v83 n2
p1158-1164, 15 Jul 90. Available only to DTIC users. No
copies furnished by NTIS.

ABSTRACT: (U) A mass selected ion beam of ArN2+ clusters
is brought to a spatial focus and crossed with the
polarized output of an Argon Ion Laser. Photofragment
ions are mass and energy analyzed using an electrostatic
analyzer and detected using single ion counting methods.
Photoproducts observed over the photon energy range of 2.
1 to 3.5 eV are Ar+/N2 and N2+/Ar with the former favored
by about a factor of three. Analysis of the data indicate
the upper state is purely repulsive leading to strongly
translationally and vibrationally excited products. The
absolute cross section has an onset at about 800 nm and
smoothly increases to 357 nm. In order to reasonably
interpret the data it is suggested the higher energy
asymptote diabatically correlates to the ground state of
ArN2+ and the lower energy asymptote diabatically
correlates to the repulsive state accessed by the photon.
Detailed dynamics in the region where the curves cross
are responsible for the observed product distribution.
Application of an impulsive model indicates the ground
state of ArN2+ is linear.

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

UNCLASSIFIED PAGE 40 T85001
Photodissociation of the Benzene Dimer Cation in the Gas Phase,

Snodgrass, J. T.; Dunbar, R. C.; Bowers, M. T.

AFOSR-89-0102

2303

B1

AFOSR. XF
TR-91-0854, AFOSR

Availability: Pub. in Jnl. of Chemical Physics, v94 n8 p3648-3651 1990. Available only to DTIC users. No copies furnished by NTIS.

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

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

Identifiers: (U) PEB1102F, WUAFOSR2303B1.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A242 057 14/2

CALIFORNIA UNIV  SANTA BARBARA DEPT OF CHEMISTRY

(U) The Mechanism and Photodissociation Dynamics of the (S,
S02)+ Cluster at 308 nm,
90  23P

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

CONTRACT NO.  AFOSR-89-0102

PROJECT NO.  2303

TASK NO.  B1

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

UNCLASSIFIED REPORT

Availability: Pub. in International Jnl. of Mass
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A pulsed laser technique has been
developed for studying the photodissociation of ions and
ion clusters in a fast ion beam. The experiments were
conducted using a reverse geometry double focusing mass
spectrometer. Ions were produced via multiphoton
ionization by crossing a continuous supersonic jet with a
20nm plus of a HeC1 excimer laser. These ions were
accelerated to 8 keV, mass selected by a magnet, and
brought to a spatial focuses where they were intercepted
by the focused 308nm output of a second pulsed XeC1
excimer laser. The major ions produced in the ion source
were S+, S0+ and clusters of these ions with S02.
Photodissociation of the (S,S02)+ cluster ion was
investigated. The predominant product channel leads to S+
+ S0 products, but small amounts of S+ + S02 and S02+ + S
products were also observed. Photofragment kinetic energy
distributions were measured for each product channel.
Production of S+ + S02+ products in their ground
electronic states is favored. In contrast, S+ + S02
products are formed with S+ in electronically excited
spin-orbit states. The observation of a strong S02 + S0
photodissociation channel is a surprising result.
DTIC REPORT BIBLIOGRAPHY

COLUMBIA UNIV. NEW YORK DEPT OF CHEMISTRY

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

91 8P

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

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

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

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) WUAFOSR230382, PEG1102F, BNPAA:Bromonaphthalene labeled poly(Acrylic Acid)), Fluorescent probes.

UNCLASSIFIED REPORT

SEARCH CONTROL NO. T85001

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY


91 7P

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

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

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

UNCLASSIFIED REPORT


ABSTRACT: (U) The reactions of elemental fluorine with branched alkyl mercaptans, alkanesulfanyl fluorides, alkyl thioethers, cyclic alkyl thioethers, alkyl sulfones, and an alkanesulfinate have been studied. The synthesis and characterizations of perfluoroisobutylsulfur pentafluoride, perfluoronopentylsulfur pentafluoride, perfluoropropylsulfur pentafluoride, perfluorotetramethylsulfur-tetrafluoride, perfluoro 1,4 thioxane tetrafluoride, perfluoro 2 propane sulfonfluoride, 1,1,1,3,3,3 hexafluoro 2 propanesulfonfluoride, perfluortetramethylene sulfone, perfluorobutanesulfonfluoride, perfluoro 1,4 butane sulfone, and perfluoropropanesulfonfluoride fluoride are discussed. The 19-F and 13-C (19-F) NMR assignments of the fluorinated products are also reported.

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

IDENTIFIERS: (U) WUAFOSR230382, PEG1102F, *Fluorination, AD-A242 053
Organic compounds, Fluorocarbon organosulfur compounds.

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

Personal Authors: Whitmarsh, Chris K.; Interrante, Leonard V.

Contract No.: AFOSR-89-0439

Project No.: 2303

Task No.: A3

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


Abstract: (U) A highly branched hybridopolycarbosilane has been prepared by Grignard coupling of (chloromethyl) trichlorosilane, followed by reduction with lithium aluminum hydride. Trapping studies show that the initial step in the polymerization is a nearly quantitative formation of the Grignard compound C13SiCH2MgCl. This Grignard compound undergoes head-to-tail (Si-C) coupling almost exclusively, and due to its trifunctional SiC3 tail, a complicated, branched, polycarbosilane polymer is obtained, which contains the following structural units: SiC13CH2-, SiC12CH2-, SiC1CH2-, and yields SiCH2-. The chloropolycarbosilane undergoes side reactions with ether, leading to incorporation of small amounts of ethyl and ethoxy functionality. During the reduction step the ethoxy groups are eliminated, yielding a polymer with the approximate formula (SiH1.85Et0.15CH2)n, which has been characterized by 1H, 13C, and 29Si NMR, IR, GPC, and elemental analysis. This polymer is of interest as a precursor to near stoichiometric silicon carbide.

Descriptors: (U) Aluminum compounds, Formulations, Lithium hydride, Polymerization, Side reactions, Silicon
IDENTIFIERS: (U) WUAFOSR2303A2, PE81102F, *Grignard reactions, *Organometallic compounds, Polycarbosilane, Ceramic precursors, Silicon carbides.

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) WUAFOSR2303A2, PE81102F.
ABSTRACT: (U) This report describes the progress accomplished during the first year of research on luminescence and electroluminescence properties of Nd, Tm, Yb doped GaAs and some II-IV compounds. The photoluminescence study of GaAs:Yb shows no 4f emission. The PL spectra of CdS:Nd were recorded and about 20 sharp emission lines were observed. This indicates that in CdS, Nd3+ occupies different symmetry sites. The PL of CdS:Yb at 9.3 K reveals five sharp lines in the 985 nm - 990 nm range and a strong broader line at 998.3 nm. Electroluminescence of ZnS:Tm embedded in a Boric matrix was observed for the first time. Strong emission was observed at room temperature as well as at low temperature revealing only five groups of strong sharp lines which are assigned to transitions within the 4f shell of Tm3+. EL intensity was investigated as a function of voltage, temperature and frequency. The voltage dependence of the EL intensity shows that the direct impact excitation mechanism is a dominant one. Photoluminescence spectra of InP:Yb at different temperatures consist of sharp peaks related to Yb3+ transition.
Intramolecular Energy Transfer and Mode-Specific Effects in Unimolecular Reactions of Disilane.

JUL 91 17P

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

CONTRACT NO. AFOSR-89-0085

PROJECT NO. 2303

TASK NO. B3

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

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

DESCRIPTORS: DISASSOCIATION, ENERGY, ENERGY TRANSFER, ENVELOPE(SPACE), FOURIER TRANSFORMATION, FUNCTIONS, INTERNAL, KINETIC ENERGY, MOLECULAR ENERGY LEVELS, MOLECULAR PROPERTIES, MOLECULES, NORMALITY, RATES.
(U) Local Extinction Mechanisms in Non-Premixed Turbulent Combustion.

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

AUG 91 78P

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

CONTRACT NO. F48620-88-C-0086

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XF TR-91-0071, AFOSR

ABSTRACT: (U) The goal of this research was a quantitative understanding of turbulence-chemistry interactions pertinent to future aeropulsion combustors. For example, (1) flameout and relight in turbine combustors are related to interactions of turbulence with chain-branching reactions; (2) hydrogen burnout in supersonic combustors is related to interactions with recombination reactions; and (3) emissions of NOx, CO, smoke and other observables are related to nonequilibrium in the populations of intermediate species such as oxyhydrogen radicals and C(x) HCY. A bluff-body stabilized turbulent diffusion flame, time- and space-resolved lase Raman measurements of major species, and a nonequilibrium computational fluid mechanics code were applied to the problem. Principal conclusions include: (1) Turbulent jet flames are being abandoned in the search for more intensely turbulent flames (2) An axisymmetric bluff-body stabilized turbulent diffusion flame burner is a reasonable choice for combustion research at high Reynolds numbers approaching blowoff. (3) Raman scattering for measurements of major species and temperature can be extended into the sooting/chemiluminescent environment of methane flames. Space- and time-resolved Raman scattering measurements were made in bluff-body stabilized CO/H2/N2 and CH4 flames at conditions approaching blowoff. (4) A thermochemical submodel based on partial equilibrium in the oxyhydrogen radical pool was developed for the 27.5% CO/32.3% H2/40.2% N2-air system. The chemistry can be described in terms of two scalars. The elliptic form of the time-averaged Navier Stokes equations with k-epsilon closure was solved using an iterative finite-volume pressure-correction algorithm.

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

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

OCT 90 13P
PERSONAL AUTHORS: Bowers, Michael T.; Kim, H-S.; Kuo, C-H.

ABSTRACT: The mass selected KrH2O+ cluster is photodissociated in the range 514 to 357 nm using lines from an Argon ion laser. Product branching ratios are measured and shown to be a strong function of photon wavelength: Kr+/H2) products dominate at 357 nm (90%) but are equal in intensity to H2O+/Kr products at 514 nm. A small KrH+/OH product is observed at all wavelengths, representing the first observation of a photoinduced intracuster proton transfer reaction. The total cross section is estimated to be 2 x 10^-19 cm^2 at 514 nm. Laser polarization studies indicated the Kr+/H2O products come from direct accessing of a repulsive upper state (intracuster charge transfer reaction). Both Kr+(2P3/2) and Kr+(2P1/2) spin orbit states are formed but their branching ratio is very strongly dependent on wavelength: 100% Kr+(2P3/2) at 514 nm and 100% Kr+(2P1/2) at 357 nm and variable amounts of each in between.


IDENTIFIERS: PE81102F, WUAFOSR230381, PE81102F.
ABSTRACT: (U) The aim of this project was to investigate features of binary images by considering a special case of the image algebra methodology obtained by representing digitized images (both monochrome and colored) by certain polynomials in two variables with coefficients from the binary field. Since polynomials can be easily manipulated and our proposed operators can be described conveniently in terms of algebraic operations on these polynomials, this approach provides a significant foundation for practical applications which would be of significant interest to AFOSR. Our specific objectives have been as follows. We have developed algebraic operators in the context of the polynomial approach to determine the contour, magnification and shrinking, and a sequence of approximations (from finer to coarser) of a binary image. Further, we have extended our techniques to process gray images and do operations such as template decomposition, shape decomposition, connected component labelling. Also, we have developed an algebraic system to process colored images. Also, we have developed some fast sequential and parallel thinning algorithms. We have also extended the polynomial approach to three dimensional by developing equivalents of the standard morphological operations and applying these to do a number of operations for the
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY
SEARCH CONTROL NO. T85001

AD-A242 007  9/5

SMQ TECHNOLOGY INC  LA JOLLA CA


DESCRIPTIVE NOTE: Annual technical rept..

AUG 91  24P

PERSONAL AUTHORS: Podney, Walter N.

REPORT NO.: SMQ-91-101R

CONTRACT NO.: F49620-90-C-0058

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

UNCLASSIFIED REPORT

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A241 994 7/3

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

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

DESCRIPTIVE NOTE: Journal article.

90 5P

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

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR

TR-91-0863

UNCLASSIFIED REPORT


ABSTRACT: (U) The synthesis and characterization of perfluoro- and polyfluorophosphonic acids is a topic that continues to receive a great deal of attention, as evidenced by the large number of reports found in the literature. For example, several routes to a variety of perfluoroalkylphosphonic and bis(perfluoroalkylphosphonic acids) as well as to the polyfluoroalkyl acids have been published. The cyclic polyfluoroalkanediybis(phosphates) and the mixed phosphonic/sulfonic and sulfonic/carboxylic and phosphonic/carboxylic acids have also been reported.

Much of the interest in these compounds stems from their potential use as phosphate mimics (difluoromethylene phosphonates) in biological systems, as metal chelating agents, or as fuel cell electrolytes.

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

IDENTIFIERS: (U) PEB1102F, WUAFOSR230382.

AD-A241 994 4/19/92 2:30 PM 164305 800552 05

AD-A241 994 CONTINUED

Polyfluorophosphonic acids, *Olefinic linkages, X-ray crystal structure, (OH)P(O)CF=CFP(O)(OH)O= and Zn(H2O)62+, Polyfluoro cyclic, Acyclic alkene phosphonates, Triethyl phosphate, Bis(Phosphonic acids), Reprints.
ABSTRACT: (U) The primary purpose of the experiments on the linac were to demonstrate that channeling radiation can be an inexpensive source of bright, hard x-rays with picosecond duration. Channeled particle trajectories are similar to the trajectories in a magnetic wiggler, but the equivalent magnetic field would have to be about ten megagauss. Indeed, a photon flux of 10 to the 19th power photons/sr-keV-sec was measured over a picosecond duration at a wavelength of 0.42 Å. Our peak current levels were about 10 to the 13th power times greater than the currents used in previous channeling experiments and average currents were about 10 to the 8th power times greater. To perform these measurements a spectrometer was developed capable of operating at high photon fluxes with several percent energy resolution at x-ray wavelengths, and in a bremsstrahlung background. This was accomplished using a graphite crystal Bragg reflector, a photomultiplier detector, and specially designed. In addition to the high power channeling radiation research, we also studied channeling radiation in superlattices, both theoretically and experimentally. Superlattices offer a means for increasing the radiation, utilizing the periodicity of the layers. The MADEY storage ring was to provide a bright positron current source for seeking x-ray laser action by means of channeling radiation. A current density of 10 to 100 million A/sq cm could be obtained, which would provide significant stimulated gain over a picosecond time interval. (The time duration is determined by the interval over which the crystal remains intact.)

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

Reactions of 5-(Perfluoroalkyl)tetrazolates with Cyanogen, Nitrolyl, and Cyanic Chlorides.

DESCRIPTION: Journal article.

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

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR TR-91-0865

UNCLASSIFIED REPORT

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

ABSTRACT: (U) Compounds with high nitrogen content, especially tetrazoles and their salts, are high-energy materials and may explode when exposed to mechanical, thermal, or electrical stimulation. Tetrazoles as well as their salts that contain the NF2 moiety are useful oxidizers when chemically combined with fuels such as anhydrous hydrazine. Sodium azide and hydrazoic acid may undergo 1,3-dipolar or H1 type addition reactions. However, 1,3-dipolar addition is the most commonly observed mechanism in reactions with acetylene and nitriles. An exothermic reaction occurs between sodium azide and 2-(difluoroaminodifluoromethyl)tetrazole.

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

IDENTIFIERS: (U) PEB1102F, WAFAOSR2303B, "Tetrazoles," AD-A241 992
IDaho Univ. Moscow Dept. of Chemistry

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

DESCRIPTIVE NOTE: Journal article,

JUL 91 6P

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

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF

TR-91-0864, AFOSR

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

DESCRIPTORS: (U) ACIDS, CATALYSTS, ELECTROLYTES, ENERGY, FLUORINATION, FUEL CELLS, HIGH TEMPERATURE, KINETICS, MIXING, OXYGEN, PHOSPHONIC ACIDS, REDUCTION,
Observation of Small Doubly Charged Niobium Clusters

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

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

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

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A241 976 20/5

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING
(U) Structure and Atomization Properties of Dense Turbulent Sprays,
90 9P

PERSONAL AUTHORS: Faeth, G. M.

CONTRACT NO. AFOSR-89-0516
PROJECT NO. 2308
TASK NO. A2
MONITOR: AFOSR, XF
TR-91-0825, AFOSR

UNCLASSIFIED REPORT


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

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

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

AD-A241 976

NEW MEXICO UNIV ALBUQUERQUE CENTER FOR HIGH TECHNOLOGY MATERIALS
(U) Precision Float Polishing.

DESCRIPTIVE NOTE: Annual interim technical rept. 1 Feb 90-31 Jan 91,
SEP 91 25P

PERSONAL AUTHORS: Jungling, Kenneth

CONTRACT NO. AFOSR-90-0145
PROJECT NO. 2301
TASK NO. A9
MONITOR: AFOSR, XF
TR-91-0644, AFOSR

UNCLASSIFIED REPORT

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

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

DESCRIPTORS: (U) CALIFORNIA, CRYSTALS, DAMAGE.

AD-A241 972

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

IDENTIFIERS: (U) WUAFOSR2301A9.

IDaho UNIV MOSCOW DEPT OF CHEMISTRY
(U) Secondary (Polyfluoroalkyl)chloroamines: Precursors to Fluoroazaalkenes.

DESCRIPTION NOTE: Journal article.

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

CONTRACT NO. AFOSR-87-0067

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF

TR-91-0889, AFOSR

UNCLASSIFIED REPORT


ABSTRACT: (U) There are a very large number of fluorinated azaalkenes, and there is an excellent review of synthetic methods for and reported chemistry of these compounds. A facile, nearly quantitative route to azaalkenes provided by the photolysis of Rf(CF2CFXCl)Cl (Rf = CF3, C2F5; X = Cl,F) has been reported. We now have extended this reaction by taking advantage of recently synthesized precursors to synthesize azaalkenes. Chlorine fluoride can be reacted smoothly with C12C = NC-C12CC12N = CC12 to saturate the carbon-nitrogen double bond and partially fluorinate the compound. Repeated photolysis and reaction with chlorine fluoride provide a high yield. Gases and volatile liquids were handled in a conventional Pyrex glass vacuum system fitted with a Heise Bourdon tube and Televac thermocouple gauges. Volatile starting materials and products were quantitated by using PVT techniques. Infrared spectra were recorded on a Perkin-Elmer 1710 Fourier transform infrared spectrometer with a 10-cm gas cell equipped with KBr windows. 19F NMR spectra were measured on a JEOL FX-900 Fourier transform nuclear magnetic resonance spectrometer with CCl3F as reference and CDCl3 as solvent.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T85001

AD-A241 969 7/2

IDAHO UNIV MOSCOW DEPT OF CHEMISTRY

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

DESCRIPTIVE NOTE: Journal article, 90 3P

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

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF

TR-91-0868. AFOSR

UNCLASSIFIED REPORT


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

DESCRIPTORS: (U) ALKALI METAL COMPOUNDS, BROMINE, CARBON DIOXIDE, CARBONYL COMPOUNDS, CHEMICAL AGENTS, CONVERSION, FLUORIDES, FLUORINATION, HIGH TEMPERATURE.
HYDROGEN FLUORIDE, INORGANIC MATERIALS, MELTING POINT.
OXIDES, PHOSPHORUS COMPOUNDS, SULFUR, UTILIZATION.
VOLATILITY, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR230302,
*Nondestructive fluorination, Trifluoramine oxide,
Phosphines, Phosphites, Carbonyl fluoride, Sulfanyl
fluoride, Oxidative fluorination, Metals, Reprints.

AD-A241 968 7/2
IDAHO UNIV MOSCOW DEPT OF CHEMISTRY
(U) Reactions of Polycyano Compounds with Chlorine
Fluoride.

DESCRIPTION NOTE: Journal article,
91 4P

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

CONTRACT NO. AFOSR-87-0067
PROJECT NO. 2303
TASK NO. B2
MONITOR: AFOSR, XF
TR-91-0867. AFOSR

UNCLASSIFIED REPORT

Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Dihaloalperfluoralkylamines continue to be
of interest as isolable intermediates. Straightforward,
high-yield syntheses of chlorofluoramines have made
these compounds readily available in useful quantities.
Dichloroperfluoralkylamines are commonly used for
generation of perfluoroalkyldiazones via photolytic or
thermal processes. We have sought to produce new N,N-
dichloroperfluoro(polyfluoro)alkylamines by the reaction
cCFi with compounds possessing two or more cyano groups.
In this way, new compounds with multiple-NCl2
functionalities should result that could lead to new
heterocycles or possibly azo polymers. Compounds that
contain two -NC12 groups are known; e.g., with C1F,
cyano gives C12NCFzCF2NC12. However H2NCN was observed
to lose NC13 upon reaction with an excess of C1F, which
suggests that C12NCF2NC12 was an intermediate.
Perfluoromalononitrile, also gives a bis-NC12 derivative.
Compounds with two or more cyano groups undergo rapid
reaction to produce the respective derivatives in nearly
quantitative yields.

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

DTIC REPORT BIBLIOGRAPHY

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

IDENTIFIERS: (U) PE61112F, WUAFOSR230382, 
*Tetracyanoethene, Chlorine fluoride, Cyclic diazene, 
Dichlorotrifluoromethylamine malononitrile, 1,1-dicyano-
2,2-bis(trifluoromethyl)ethene, Reprints.

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

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

NOV 90 9P

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

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF

TR-91-0848, AFOSR

UNCLASSIFIED REPORT

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

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

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

AD-A241 968 CONTINUED

AD-A241 961 7/2

AD-A241 961 9P
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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T85001

AD-A241 960 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

AD-A241 961 CONTINUED

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F, Reprints.


MAY 91 9P

PERSONAL AUTHORS: Roehl, Colleen M.; Snodgrass, Joseph T.; Deakyn, Carol A.; Bowers, Michael T.

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF

TR-91-0847, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics. v94 n10 p8546-8552, 15 May 91. Available only to DTIC users. No copies furnished by NII.

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

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

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F, Reprints.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 959 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

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

MAY 91 9P

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

CONTRACT NO. AFOSR-89-0102

PROJECT NO. 2303

TASK NO. B1

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

UNCLASSIFIED REPORT

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

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

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

IDENTIFIERS: (U) WUAFOSR230381, PE61102F.

UNCLASSIFIED

SEARCH CONTROL NO. T85001

AD-A241 949 20/5

UNITED ENGINEERING TRUSTEES INC NEW YORK

(U) Scanned Probe Microscopies: STM and Beyond.

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

FEB 91 6P

PERSONAL AUTHORS: Stewart, Charles

CONTRACT NO. AFOSR-91-0099

PROJECT NO. 2306

TASK NO. C1

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

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) WUAFOSR230681, PE61102F.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 948 12/7

TEMPLE UNIV PHILADELPHIA PA DEPT OF COMPUTER AND INFORMATION SCIENCES

(U) Event Oriented Design and Adaptive Multiprocessing.

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

AUG 91 77P

PERSONAL AUTHORS: Lefkovitz, David

CONTRACT NO. AFOSR-89-0157

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF

TR-91-0795, AFOSR

UNCLASSIFIED REPORT

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

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

GORDON RESEARCH CONFERENCES INC KINGSTON RI


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

SEP 91 19P

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

CONTRACT NO. AFOSR-91-0173

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

UNCLASSIFIED REPORT

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

DESCRIPTORS: (U), AEROSPACE SYSTEMS, ALLOYS, ALUMINUM ALLOYS, CONTROL, CRYSTAL GROWTH, DECOMPOSITION, ELECTRONIC EQUIPMENT, FOUNDATIONS(STRUCTURES), INDUSTRIES, INTERFACES, KINETICS, MATERIALS, METALS, MICROSTRUCTURE, MODELS, NEW HAMPSHIRE, PHASE, PHYSICAL METALLURGY, POSITION(LOCATION), SOLIDIFICATION, SOUTH(DIRECTION), STABILITY, TEST AND EVALUATION, THEORY, UNIVERSITIES, VERIFICATION.
ABSTRACT: (U) One of the important activities of the Combustion Institute during the period of Grant AFOSR-90-0332 was the Twenty-Third International Symposium on Combustion. The proceedings were published in a volume as a permanent record. It includes the Hotell Lecture, four invited papers, three invited mini-reviews, and 230 contributed papers, all refereed by the Program Subcommittee. Peter P. Gray, Master of Gonville and Caius College, Cambridge University, gave the Hotell Lecture on The Non-linear Role of Chemistry in Combustion. Papers were organized into five Colloquia: Reaction Kinetics in Combustion; Laminar Flames; Turbulent Combustion; Combustion in Practical Systems; Combustion of Solid Fuels. Topical sessions included Detonations, Diagnostic Methods, Fire, High Temperature Synthesis, Ignition, Microgravity Combustion, Non-Steady Flames, Propellants, Soot, and Spray and Droplet Combustion. There were 307 poster presentations of work-in-progress presented at the conference. Over 1,000 scientists from 25 countries attended the symposium.

DESCRIPTORS: (U) CHEMISTRY, COMBUSTION, DETONATIONS, DROPS, FLAMES, FRANCE, HIGH TEMPERATURE, IGNITION, LAMINAR FLOW, NONLINEAR SYSTEMS, PROPPELLANTS, REACTION KINETICS, SOLID FUELS, SOOT, STEADY STATE, SYMPOSIA, SYNTHESIS, TURBULENCE.
(U) Advanced Tomographic Imaging Methods for the Analysis of Materials.

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

AUG 91 235P

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

CONTRACT NO. AFOSR-91-0087
PROJECT NO. 2306

TASK NO. A2

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

UNCLASSIFIED REPORT

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


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

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

IDENTIFIERS: (U) PE81102F, WUAFSOR2306A2.

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

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

IDENTIFIERS: (U) PE81102F, WUAFSOR2305B3, 'Neural nets, Algorithms, Heuristic methods.'
Luminescence of Ruthenium(II) Poly(pyridyl) complexes: Evidence for Intercalative Binding to Z-DNA.

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

CONTRACT NO. AFOSR-90-0049
PROJECT NO. 2303
TASK NO. B2
MONITOR: AFOSR, XF
TR-91-0831, AFOSR

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

DESCRIPTORS: DEOXYRIBONUCLEIC ACIDS, INTERACTIONS, METAL COMPLEXES, NUCLEIC ACIDS, PROTEINS, RECOGNITION, SEQUENCES, SHAPE, SITES, TRANSITION METALS.


Vorticity Induced by a Moving Elliptic Belt.

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

CONTRACT NO. AFOSR-89-0497
PROJECT NO. 2304
TASK NO. A1
MONITOR: AFOSR, XF
TR-91-0886, AFOSR

ABSTRACT: Vorticity Induced by a Moving Elliptic Belt.

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

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. T85001

AD-A241 889  7/3  7/6

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

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

91  6P

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

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

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

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. Chem. Soc. Perkin Trans. v1
p871-875, 1981. Available to DTIC users only. No copies
furnished by NTIS.

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

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

DTIC REPORT BIBLIOGRAPHY

AD-A241 886 20/4
WASHINGTON UNIV  SEATTLE DEPT OF APPLIED MATHEMATICS
(U) Eddy Breakdown and Structure Development.

DESCRIPTION NOTE: Final technical rept. 1 Jul 89-30 Jun 91.
SEP 91 4P

PERSONAL AUTHOR(S): Criminale, W. O.

CONTRACT NO.  AFOSR-89-0404
PROJECT NO.  2307
TASK NO.  BS
MONITOR:  AFOSR, XF
TR-91-0874, AFOSR

UNCLASSIFIED REPORT

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

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

IDENTIFIERS:  (U) Eddies, Fluid Mechanics, Three dimensional flow, Boundary value problems, Vortices, Turbulent flow, Mathematical models, Problem solving, Shear flow, Perturbations, Linear systems, Ellipses, PE81102F, WUAFOSR23078S.

AD-A241 886

SEARCH CONTROL NO. T85001

AD-A241 883 6/1

COLUMBIA UNIV  NEW YORK DEPT OF CHEMISTRY
(U) Interaction of Horse Plasma Gelsolin with the Hydrophobic Fluorescent Probe 2-(N-Methylanilino) Naphthalene-6-Sulfonic Acid.

MAR 91 10P

PERSONAL AUTHOR(S): Ruiz Silva, B. E.; Burtnick, L. D.; Turro, N. J.

CONTRACT NO.  AFOSR-90-0049
PROJECT NO.  2303
TASK NO.  B2
MONITOR:  AFOSR, XF
TR-91-0832, AFOSR

UNCLASSIFIED REPORT

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

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

DESCRIPTIONS:  (U) ADDITION, BLUE(COLOR), BONDING, CIRCULAR, DICHR0ISM, DISSOCIATION, FLUORESCENCE, HORSES, HYDROPHOBIC PROPERTIES, INTERACTIONS, MELTING, MOLECULES, MUSCLE PROTEINS, PEPTIDES, PLASMAS(PHYSICS), POLARIZATION.
ABSTRACT: (U) Using various growth technique and different buffer structures, we have been able to reduce dislocation density to below 10 to the 6th power cm⁻² and internal stress below 10 to the ninth power dynes/sq cm. The improvements lead to the restoration of TE polarization as the dominant polarization in DH GaAs/Si lasers for the first time and bring us hope that we are close to achieving long operating life for lasers fabricated with lattice-mismatched films. However, impressive these improvements are, they are still some distance away from those needed for long life lasers with dislocation density below 10 to the third power cm⁻² and internal stress below 2 x 10 to the eighth power dynes/sq cm. Two possible approaches remaining unexplored for further improvements include (1) use of oxygen-free Si, especially near the surface upon which GaAs film is to grow and (2) use of quaternary quantum well as the laser-active region. The former is to smooth the transition between mechanically strong Si substrate and more ductile III-V film, thus to minimize defect generation at the interface. The purpose of the latter is three-fold. Decreasing the active layer thickness reduces the probability of intercepting dislocations. It also lowers the laser threshold and thus lessens the chance of thermal generation of dislocations. Finally, it is well
known that quaternary (GaInAsP) lasers are more forgiving in terms of laser degradation and hence have much longer life than GaAs lasers. Using the new approaches in conjunction with the various growth techniques already tried with some degree of success, we believe that we are on the verge of making long-life a reality for lattice-mismatched lasers.

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

**IDENTIFIERS:** (U) *Dislocation density, *Internal stress, GaAs/Si lasers, *Gallium arsenide lasers, Lattice mismatched lasers, Long life lasers, Photoluminescence, WUAF05R2305C1, PE61102F.

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

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

**IDENTIFIERS:** (U) *Numerical analysis, *Optimization, PE61102F, WUAF05R2304A8.
ABSTRACT: (U) Work carried out under the present grant was directed principally to the wet chemical synthesis of various oxide ceramics in film, fiber and powder forms. These include (1) chemical synthesis of high temperature oxide superconductors, the formation of glasses of such superconductors, their subsequent crystallization behavior, and the wet chemical synthesis of barrier layers for use with superconducting thin films; (2) ceramic-organic hybrid composites (POLYCEM); (3) synthesis and dielectric properties of POLYCEM; (4) novel optical materials comprising of non-linear organic dyes in POLYCEM hosts; (5) wet chemical coating of fibers for composites and synthesis of bulk transformation - toughened ceramics; (6) seeded transformation of alumina gels from different precursors; (7) ferroelectric powders, films and fibers; and (8) second harmonic generation from ferroelectric thin films.

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

REPORT BIBLIOGRAPHY

UNCLASSIFIED

DTI REPORT BIBLIOGRAPHY

AD-A241 847 13/13 12/3

CLARK ATLANTA UNIV GA

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

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

AD-A241 847 CONTINUED

AUG 91 40P

PERSONAL AUTHORS: Bota, Kwabena

CONTRACT NO. F49620-89-C-0075

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF

TR-91-0888, AFOSR

UNCLASSIFIED REPORT

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

DTIC REPORT BIBLIOGRAPHY

AD-A241 809 20/9 21/3

OHIO STATE UNIV COLUMBUS DEPT OF MECHANICAL ENGINEERING

(U) Fundamental Research on Erosion in Magnetoplasmadynamic Thrusters.


JUL 91 42P

PERSONAL AUTHORS: Subramaniam, V. V.

PROJECT NO. AFOSR-87-0360

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF

TR-91-0891, AFOSR

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) WUAFOSR2308A1, PEB1102F, 'Electrode

AD-A241 809

AD-A241 809 CONTINUED

plasma interactions, Magnetoplasmadynamic thrusters, Erosion, Current densities.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 807 5/8

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF COMPUTER SCIENCE

(U) A Complexity Theory of Neural Networks.

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

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

CONTRACT NO. AFOSR-87-0400

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

UNCLASSIFIED REPORT

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

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


AD-A241 808

SEARCH CONTROL NO. T85001

AD-A241 806 20/10 20/8 20/3

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF ELECTRICAL AND COMPUTER ENGINEERING


DESCRIPTIVE NOTE: Final rept. 1 Mar 88-28 Feb 90, JUN 90 23P

PERSONAL AUTHORS: Kaplan, Alexander E.

CONTRACT NO. AFOSR-87-0152

PROJECT NO. 2301

TASK NO. A1

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

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) PEG1102F, WUAFOSR2301A1, *Nonlinear
Inertial Manifolds for Navier-Stokes Equations and Related Dynamical Systems.

UNCLASSIFIED

DESCRIPIVE NOTE: Annual rept. (final) 1 Aug 87-31 May 91.

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

PROJECT NO. 6103

AD-A241 806 CONTINUED

AD-A241 805

MINNESOTA UNIV MINNEAPOLIS SCHOOL OF MATHEMATICS

CONTRACT NO. F49620-87-C-0095

TASK NO. 99

UNCLASSIFIED REPORT

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

IDENTIFIERS: (U) PE61102F, WUAFOSR610399.

Manifolds(Mathematics), Euler galerkin method, Kolmogorov flow.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. T85001

AD-A241 793  6/5

MISSISSIPPI UNIV MEDICAL CENTER JACKSON

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

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

SEP 91  11P

PERSONAL AUTHORS:  Mehendale, Harthara M.

CONTRACT NO.  AFOSR-88-0009

PROJECT NO.  2313

TASK NO.  A5

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

UNCLASSIFIED REPORT

ABSTRACT:  (U) The possibility of unusual toxicity due to interaction of toxic chemicals upon environmental or occupational exposures to two or more chemicals, particularly when exposures involve levels ordinarily considered harmless individually is an important toxicological concern. Progress in this area of environmental toxicology has suffered for want of a model where the two interactants are individually nontoxic. Models, where toxic doses of chemicals are employed are not very representative of low level, environmental exposure. Prior exposure to nontoxic levels of the pesticide Kepone (chlordecone, CD) results in a 67-fold amplification of CCI4 lethality in experimental animals. This propensity for chlordecone to potentiate hepatotoxicity of halomethanes such as CCI4, CHCl3 and BrCCI3 has been the subject of this intense inquiry to unravel the underlying mechanism. The biological effects of this interaction include extensive hepatotoxicity characterized by histological alterations, hepatic dysfunction, and perturbation of related biochemical parameters.

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

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001
AD-A241 791 20/4 AD-A241 791 CONTINUED

NEW YORK UNIV NY

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

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

DEC 90 3P

PERSONAL AUTHORS: Liu, Tai-Ping

CONTRACT NO. AFOSR-89-0203

PROJECT NO. 2304

TASK NO. A9

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

UNCLASSIFIED REPORT

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

DESCRIPTORS: (U) ACoustic WAVes, compressible FLOW, CONSERVATION, COUPLING (INTERACTION), ELASTIC PROPERTIES, ENERGY, ENTROPY, GAS FLOW, inviscid FLOW, MODELS, NAVIER STOKES EQUATIONS, NONLINEAR DIFFERENTIAL EQUATIONS, NONLINEAR SYSTEMS, PARABOLAS, PARTIAL DIFFERENTIAL EQUATIONS, SHOCK WAVES, VISCOSITY, WAVES.
ABSTRACT: (U) One of the outstanding problems of chaotic dynamics has been to show that chaos develops monotonically as the parameter is varied, for some systems. Results along this line have been very few. An overview of these results has been given in the proposal for this funding period. Kan and Yorke have discovered results in two dimensions which clearly indicate the situation is far worse than previously believed. Their results require some mild nondegeneracy conditions which shall not be spelled out in detail here. Their results are for diffeomorphisms that depend on a parameter. They show that monotonicity never occurs in two dimensions as the parameter varies, except in the most trivial situations. In (K) these results have been written for a special prototype example which seems quite typical. This example has nice simple choices of coordinates, and analysis is facilitated. Establishment of the full result was much more difficult and the analysis has been carried out in (K).

DESCRIPTORS: (U) CHAOS, DYNAMICS, THEORY.

IDENTIFIERS: (U) P681102F, WUAFSR2304A4, Operations research, Chaos, Dynamics.
ABSTRACT: (U) The studies we have completed to data suggest that monkey auditory and visual P300s in passive and in active operant conditions exhibit morphological and functional characteristics similar to those observed in human subjects. The role of NA-LC in the genesis of P300 was examined in the present study by recording ERPs in squirrel monkey (Saimiri sciureus) before and after systemic administrations of the alpha-2 adrenergic agonist, clonidine, in doses that are known to suppress the electrophysiological activity of LC neurons. Clonidine significantly decreased the area and increased the latency of P300-like potentials without affecting other ERP components. It also increased EEG power in the alpha range (8-12Hz) and decreased power in the upper beta range (20-40 Hz) which leaving performance unaffected. Administration of clonidine, however, had no effect on the amplitude, area, or latency of the visual P300 component.

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

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A2
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 705  14/2  12/4

ILLINOIS UNIV AT CHICAGO CIRCLE

(U) Design of Experiments and Reliability Models.

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

MAY 91  3P

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

CONTRACT NO. AFOSR-89-0221

PROJECT NO. 2304

TASK NO.  A5

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

UNCLASSIFIED REPORT

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

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

IDENTIFIERS: (U) WUAFOSR2304A5, PEB1102F, 'Experimental design, Communication engineering, Aerospace medicine, Reliability, 'Mathematical models, Multistate coherent systems.

SEARCH CONTROL NO. T85001

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

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) Far East Optoelectronics Conferences.

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

SEP 88  20P

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. AFOSR-88-0151

PROJECT NO. 2301

TASK NO.  A1

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

UNCLASSIFIED REPORT

ABSTRACT: (U) The proceedings contain the majority of the papers presented at the Topical Meeting on Laser Materials and Laser Spectroscopy which was held at the Tien Ma Hotel in Shanghai, China on July 25-27, 1988. This topical meeting is a post conference meeting for the 18th International Quantum Electronics Conference in Tokyo, Japan and it focused on the relatively narrow subject of laser materials and laser spectroscopy. The purpose of this topical is to review the state-of-the-art research achievements in the fields of laser materials and laser spectroscopy and to create an academic and harmonic environment of understanding and interaction between the international scientists in China.

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

IDENTIFIERS: (U) WUAFOSR2301A1, Symposia, 'Laser materials, Optical equipment, 'Laser spectroscopy, Yag lasers, Photoluminescence.
ABSTRACT: (U) The objective of the present research is to formulate, develop and implement new theoretical descriptions of the following atomic and molecular processes: Laser-Assisted Collisions: A new theory of laser-assisted electron-excited atom collisions, in which the dressed states of the atom A in the laser field are closely coupled and the Volkov states of the projectile electron in the laser field are included; Termolecular Recombination: The transport-collisional set of Master equations for Termolecular Recombination, A + B + M yields AB + M as a function of gas density has been developed by M. R. Flannery. Angular Momentum Changes in Collisions with excited atoms: Work is progressing on the cross sections for angular momentum changes in heavy-particle and electron-atom (e-B) collisions where the target atom is initially in an excited state.

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


ABSTRACT: (U) We have obtained a number of results pertaining to image compression, robust estimation, and robust signal detection. All of this work has admitted the presence of data whose statistics are imperfectly known. Our results have featured adaptivity, flexibility, and nontraditional approaches. In order to employ more realistic statistical models, we have directed our research to admit nonstationarity and dependency. Much of our work in robust estimation and detection has employed a geometric approach which we have originated in past research. Our geometric techniques provide a quantitative way to measure the degree of robustness, thus offering the designer more flexibility in meeting the performance/robustness needs of the user. Our results include generalized robustness criteria involving curvature as well as manifold slope, as well as generalized nonlocal robustness criteria which supersede prior nonlocal criteria based on the worst case perspective. In addition, we have applied the geometric perspective to show how linear estimation algorithms can be modified to optimize a weighted combination of performance and robustness, thus offering the user the option of selecting various performance/robustness combinations as deemed appropriate for a specific application.
ABSTRACT: (U) The intention of this project was to synthesize a number of organic molecules whose decomposition would lead to highly vibrationally excited intermediates, and then to study the energy disposition in these intermediates and compare it with the predictions of stochastic models which are believed to be deficient in this domain. At the termination of the project the synthesis of all target molecules had been accomplished and the study of their behavior had just begun. Significant evidence for dynamic control of branching ratios was obtained even from the limited experimental work that could be carried out before termination of the project.

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

IDENTIFIERS: (U) Molecular energy levels, Decomposition, *Organic compounds, Synthesis(Chemistry), Optically active compounds, Reaction kinetics, PE61102F, WUAFOSR2303B1.
Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.

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

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

IDENTIFIERS: (U) PE61102F, WUAFOSR2300A2, Spectroscopy, High pressure, Dye lasers, Diagnostic equipment, Shot noise, Pump probe spectroscopy, ASOPS(Asynchronous Optical Sampling), High pressure flames.

UNCLASSIFIED REPORT

NEW YORK UNIV NY DEPT OF PSYCHOLOGY

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

DESCRIPTORS: (U) Activation, closures, fragmentation, hypotheses, mathematics, memory devices, perception, pictures, predictions, primers, recognition, signal to noise ratio, stimuli, test and evaluation, transients, vehicles.

IDENTIFIERS: (U) DB01102F, WAFO0R231A34, +Visual perception, +Memory(Psychology), Implicit memory, Explicit memory, Recognition memory, Connectionist models, Psychology, fragmented pictures, pictures.

(1) Transition-metal fluoro compounds containing carbonyl, phosphine, arsine and stibine ligands.

91 22P

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

CONTRACT NO. AFOSR-87-0362

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF

TR-91-0768, AFOSR

This review describes the considerable variety of transition-metal fluoro compounds containing carbonyl, phosphine, arsine, and stibine ligands reported in the literature. Included are a number of stable low-valent organometallic fluorides, a class of compounds frequently assumed to be inaccessible on the basis of hard/soft acid/base predictions. A wide range of metal ligand environments can support fluoro ligands. In fact, fluoro complexes are more stable in many instances than the corresponding heavier halogen analogues. Table II-IX provide a comprehensive survey of the methods used to prepare metal fluoro complexes. From the compounds and chemistry described in this review, several features emerge concerning the reactivity of the transition-metal fluoro compounds containing carbonyl, phosphine, arsine and stibine ligands. The combination of soft low-valent transition-metal centers and hard fluoride ions can produce unusual compounds with new reactivity patterns (e.g., RuF(PCy3)2). Fluoride appears to promote ligand substitution liability at metal centers; this effect, combined with the stability of metal fluoride bonds, suggests promise for the use of organometallic fluoro compounds as catalysts and reagents in aprotic media. Fluoro ligands can also be useful sites for reaction.
chemistry; the propensity of F to form hydrogen bonds to hydroxylic compounds and the extremely strong Si-F bond can be used in synthetic schemes to prepare transition-metal compounds not accessible from chloro, bromo, or iodo starting materials.

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

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 624  CONTINUED

radicals is largely diminished.

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

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

AD-A241 623  7/4

KANSAS STATE UNIV  MANHATTAN DEPT OF CHEMISTRY

(U)  Reactions of NF(a)(gamma) with Nitrogen, Oxygen, and Carbon Atoms.

91  9P

PERSONAL AUTHORS:  Setser, Donald W.

CONTRACT NO.  AFOSR-88-0279

MONITOR:  AFOSR, XF

TR-91-076B, AFOSR

UNCLASSIFIED REPORT

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

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

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

AD-A241 624

AD-A241 623

UNCLASSIFIED

PAGE  89  T85001
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 623 CONTINUED

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

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Ring Opening Metathesis Polymerization of 1,1-Diphenyl-1-sila-Cyclopent-3-ene.

JUL 91 4P

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

CONTRACT NO. AFOSR-89-0007

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF

TR-91-0783, AFOSR

UNCLASSIFIED REPORT


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

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

IDENTIFIERS: (U) PE81102F, WUAOSR2303B2, :Metathesis polymerization, Reprints, POMP, Pentenes, Polymers, Organic reactions.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 617 6/5

TEXAS A AND M UNIV COLLEGE STATION DEPT OF BIOLOGY

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

DESCRIPTIVE NOTE: Annual rept. 1 Mar 90-30 Apr 91, AUG 91 6P

PERSONAL AUTHORS: Cassone, Vincent M.

CONTRACT NO. AFOSR-90-0244

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XF

TR-91-0760, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project had two interrelated thrusts, both of which are currently in progress. The first, cellular mechanisms of melatonin's action using an in vitro hypothalamic slice preparation, has been set up. Our initial data indicate a modest but significant decrease in the relative LGU by 10 nM and 100 nM melatonin but not 10 pM melatonin at CT9-10. The second major thrust of this project is progressing very well. This study indicates that, although pinealectomy has no effect on rat circadian rhythms in LD or constant darkness (DD), the surgery completely disrupts circadian rhythms in constant light.

DESCRIPTORS: (U) CIRCADIAN RHYTHMS, CYTOLOGY, DARKNESS, IN VITRO ANALYSIS, INTERACTIONS, LIGHT, MAMMALS, ORGANIZATIONS, PINEAL GLAND, RATS, SURGERY, THRUST.


UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this conference were to discuss, evaluate, and promote unique and new applications that are awaiting free electron laser devices that will operate at wavelengths below 300 nm. The subjects included: atomic and molecular spectroscopy, materials and surface physics, surface photochemistry, chemical dynamics, industrial photochemical processes, photoelectron spectroscopy, photolithography, materials processing, biological structures and radiation effects, plasma physics, and laser radar.

DESCRIPTORS: (U) ATOMIC SPECTROSCOPY, BIOLOGY, CHEMICAL REACTIONS, DYNAMICS, ELECTRONIC EQUIPMENT, FREE ELECTRON LASERS, INDUSTRIAL PRODUCTION, LASER APPLICATIONS, MATERIALS, MOLECULAR SPECTROSCOPY, OPTICAL RADAR, PHOTOCHEMICAL REACTIONS, PHOTODECCTION SPECTRA, PHOTOLITHOGRAPHY, PHYSICS, PLASMAS(PhysiCS), PROCESSING, RADIATION EFFECTS, STRUCTURES, SURFACES.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 610 5/2 7/3 7/2 4/1

AD-A241 G10 CONTINUED

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL
WASHINGTON DC

(U) Evaluation of Chemical and Atmospheric Sciences Research.

DEScriptive NOTE: Final rept. Sep 87-Oct 90.

OCT 90 13P

PERSONAL AUTHORS: Raber, Douglas J.

CONTRACT NO. F49620-87-C-0120

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF

TR-91-0815, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The National Research Council (NRC), through its Board on Chemical Sciences and Technology (BCST) provided the AFOSR Directorate of Chemical and Atmospheric Sciences with external scientific review of research proposals, program assessments, and advice. The work was carried out (with assistance by BCST staff) by volunteer panels that were appointed according to NRC procedures. The scope of these panels included the chemical and atmospheric sciences research programs administered jointly by the Air Force Office of Scientific Research (AFOSR) and the Air Force Astronautics Laboratory. Standing panels were established for three reviewing areas: Atmospheric Sciences, Chemical Sciences, and High Energy Density Materials (HEDM). The purposes of this project were to: assist the AFOSR in evaluating research proposals for scientific merit via peer review, conduct overall evaluations of research programs of the Directorate; and, to undertake special studies upon request by the Directorate, upon approval by the NRC governance. The three panels conducted convened-group review of 449 research proposals, based on 1,671 reviews received from 814 reviewers.

DESCRIPTORS: (U) AERONOMY, AIR FORCE FACILITIES, ASTRONAUTICS, ATMOSPHERES, CHEMISTRY, EXTERNAL, HIGH

AD-A241 610

AD-A241 610

UNCLASSIFIED

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 609  20/5

Pennsylvania State Univ, University Park Dept of Materials Science and Engineering

(U) Detailed Modeling of Soot Particle Nucleation and Growth.

DESCRIPTIVE NOTE: Rept. for 1 Jan 88-31 Dec 90.

90  9P

PERSONAL AUTHORS: Frenklach, Michael; Wang, Hai

CONTRACT NO. AFOSR-88-0072

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR. XF

TR-91-0771. AFOSR

UNCLASSIFIED REPORT


ABSTRACT: (U) Detailed modeling of soot particle nucleation and growth in laminar premixed hydrocarbon flames is presented. The model begins with fuel pyrolysis, followed by the formation of polycyclic aromatic hydrocarbons, their planar growth and coagulation into spherical particles and finally, surface growth and oxidation of the particles. The computational results are in quantitative agreement with experimental results from several laminar premixed hydrocarbon flames. A detailed analysis of soot particle inception and surface growth processes is presented. Surface growth was described in terms of elementary chemical reactions of surface active sites. The density of these sites was found to depend on the chemical environment. The model predicts the classical picture of soot particle inception and the classical description of soot particle structure.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2308A2, *Soot formation, *Computer modeling, Reprints.

DESCRIPTORS: (U) AROMATIC HYDROCARBONS, CHEMICAL REACTIONS, CHEMISTRY, COAGULATION, COMPUTATIONS, FLAMES, FUELS, GROWTH (GENERAL), HYDROCARBONS, LAMINAR FLOW, MIXING, NUCLEATION, OXIDATION, PARTICLES, PICTURES.
Environmental biotechnology for hazardous wastes is operationally defined as the use of living organisms or their processes for socio-economic benefit in environmental protection and restoration. Often, biotechnology for control of wastes and toxic materials is viewed as the extremes of either conventional biological waste treatment technology or genetically engineered 'super bugs' of consequent risk to the environment. Between these extremes, environmental biotechnology has evolved from the integration of Engineering, Environmental and Biological sciences as an important new research field contributing to the development, application and optimization of biological processes in hazardous waste control. An analysis of applications of biological process in hazardous waste control leads to the identification of major areas in which environmental biotechnology can contribute new problem solutions and directions for the development or more reliable technology.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 578  20/4  21/2
YALE UNIV  NEW HAVEN CT
(U) Acquisition and Representation of 2D and 3D Data from Turbulent Flows and Flames.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Jan 91, Aug 89 8P

PERSONAL AUTHORS: Long, Marshall B.; Lyons, Kevin; Lam, Joseph K.

CONTRACT NO.  AFOSR-88-0100

PROJECT NO.  2308

TASK NO.  A3

MONITOR:  AFOSR, XF
TR-91-0804, AFOSR

UNCLASSIFIED REPORT

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

Reprint: Acquisition and Representation of 2D and 3D Data from Turbulent Flows and Flames.

DESCRIPTORS:  (U) TURBULENT FLOW, FLAMES, FLOW VISUALIZATION, EXPERIMENTAL DESIGN, TURBULENCE, REPRINTS.

IDENTIFIERS:  (U) PE81102F, WUAFOSR2308A3, Laser diagnostics.

UNCLASSIFIED REPORT

AD-A241 578

Wisconsin Univ-Madison Dept of Chemistry
(U) The First Bicyclic System with o(Si-Si)-Pi Conjugation: Synthesis of Bicyclo[6.6.0]-1,6-Diisopropyl-4,5,5,11,11,12,12-Octamethyl-1,4,5,8,11,12-Hexasila-2,6,9,13-Tetrayne.

91  6P

PERSONAL AUTHORS: Iwahara, Takahisa; West, Robert

CONTRACT NO.  AFOSR-89-0004

PROJECT NO.  2303

TASK NO.  B2

MONITOR:  AFOSR
TR-91-0814

UNCLASSIFIED REPORT


ABSTRACT: (U) Bicyclic systems consisting of Delta (Si-Si) Pi conjugations are of some interest, since such a fused system may lead to unusual electronic and physical properties through unique (Si-Si) Pi conjugation. Quite interesting properties are observed for the bicyclic 2,2,0 hexasilane compound reported by Nagai et al. Recently we have reported a new route to a good yield of strained cyclic disilanylene acetylenes using di Grignard reagents of 1,2-diethynylsilane in dilute THF solutions. The bicyclic compound can be obtained by the reaction of 1,2-diisopropyltetrachlorosilane with 2 equiv. of di Grignard reagent of 1,2-diethynylethamethyldisilane in dilute THF solution. A shorter reaction time or on-and-off reaction decreased the yield. In these cases, a pale yellow viscous liquid and small amounts of white solid were obtained as crude products.

DESCRIPTORS: (U) ACETYLENES, ELECTROMAGNETIC PROPERTIES, LIQUIDS, PHYSICAL PROPERTIES, REACTION TIME, VISCOSITY, YELLOW(COLOR).

IDENTIFIERS:  (U) PE81102F, WUAFOSR2303B2.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 576  7/4

WISCONSIN Univ-MADISON DEPT OF CHEMISTRY

(U) The Crystal Structure of a 1,2-Disilanediol, (t-
Bu2SiOH)2,

91 8P

PERSONAL AUTHORS:  West, Robert; Pham, Eric K.

CONTRACT NO.  AFOSR-89-0004

PROJECT NO.  2303

TASK NO.  B2

MONITOR:  AFOSR, XF

TR-91-0813, AFOSR

UNCLASSIFIED REPORT


ABSTRACT:  (U) Disilenes, the silicon congener of alkenes, are now well established in the chemical literature. In a few cases they can be prepared thermally by reduction of 1,2-dihalodisilanes. We have explored the reductive chemistry of tetra-t-butyl-1,2-diiododisilane, the course of these studies, we have isolated a 1,2-disilanediol, whose novel structure is discussed here. All reactions were performed under an atmosphere of nitrogen or argon. Air-sensitive materials were handled using standard Schlenk techniques. Tetra-1-butyl-1,2-diiododisilane (1) was prepared according to the literature procedure. Several attempts were made to dehalogenate in the presence of trapping agents. The following experiment is illustrative: to a Schlenk flask containing a THF solution and two molar equivalents of LiCl0H at -78C, an excess of methanol (2mL) was added by syringe. The mixture was then allowed to warm to ambient temperature.

DESCRIPTORS:  (U) ARGON, ATMOSPHERES, CHEMICALS,

CRYSTAL STRUCTURE, DOCUMENTS, METHANOLS, NITROGEN.

IDENTIFIERS:  (U) PE61102F, WUAFOSR2308A3, Turbulent flames, Turbulent combustion, Flame fronts, Laser diagnostics.

SEARCH CONTROL NO. T85001

AD-A241 575  21/2

YALE Univ NEW HAVEN CT

(U) Two-Dimensional Measurements of the Time Development of a Turbulent Premixed Flame.

DESCRIPTIVE NOTE:  Final rept. 1 Jan 88-31 Jan 91, 89 9P

PERSONAL AUTHORS:  Winter, Michael; Long, Marshall B.

PROJECT NO.  2308

TASK NO.  A3

MONITOR:  AFOSR, XF

TR-91-0803, AFOSR

UNCLASSIFIED REPORT


DESCRIPTORS:  (U) COMBUSTION, FLAMES, TURBULENCE,

PHOTOGRAPHIC ANALYSIS, REPRINTS.

IDENTIFIERS:  (U) PE61102F, WUAFOSR2308A3, Turbulent flames, Turbulent combustion, Flame fronts, Laser diagnostics.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 574 7/6

COLUMBIA UNIV NEW YORK

(U) Stereochemistry of Photocycloaddition of (E)-1,2-
Dicyano- and (Z)-1,2-Diethoxyethylene to 5-Substituted
Adamantanones.


91 7P

PERSONAL AUTHORS: Chung, Wen S.; Turro, Nicholas J.;
Srivastava, Sushil; Le Noble, William J.

CONTRACT NO. AFOSR-80-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-91-0770, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Organic Chemistry, v56 n17
p5020-5025 1991. Available only to DTIC users. No copies
furnished by NTIS.

ABSTRACT: (U) The photocycloaddition of olefins to 5-
substituted adamantanones produces two geometrically
isomeric oxetanes in which the oxygen atom and the 5-
substituent are in anti syn positions. The substituent
was varied from fluoro-, chloro-, bromo-, hydroxy,
aryl-phenyl to tert-butyl. Although the mechanisms of the
reaction with electron-rich and electron poor olefins are
quite different, the product ratios are similar (60:40) in
all instances. The preference of product formation from
the attack on the zu face is discussed in terms of
transition-state hyperconjugation.

DESCRIPTORS: (U) ATOMS, GEOMETRIC FORMS, ISOMERS,
OXETANES, OXYGEN, RATIOS, RESPONSE.

IDENTIFIERS: (U) Adamantanones, *Photocycloaddition,

AD-A241 573 7/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) Soot Formation and Inert Addition in Diffusion Flames,
90 8P

PERSONAL AUTHORS: Axelbaum, R. L.; Law, C. K.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0770, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on
Combustion/The Combustion Institute (23rd) p1517-1523
1990. Available only to DTIC users. No copies furnished
by NTIS.

ABSTRACT: (U) An experimental study has been conducted
in coflow diffusion flames in order to identify the
relative importance of fuel concentration dilution and
flame temperature reduction on soot formation when inert
is added to fuel. Two different methodologies were used
to isolate dilution and temperature effects, both
involving substitution of inerts with different specific
heats. To quantify the extent of soot reduction, laser-
light extinction as well as smoke point measurements were
made. The results are in agreement with previous studies
in counterflow flames and show that soot formation rates
in the coflow flame behave nearly linearly with fuel
concentration. Furthermore, while temperature exerts a
strong influence on soot formation, dilution can also
affect formation rates and smoke points when inerts are
added to fuels. It is found that the relative importance
of dilution and temperature depends on the extent of
addition. When moderate amounts of inert are added, the
temperature reduction is typically very small so that the
effect of dilution can be considerably greater than that
of temperature. When large amounts of inert are added,
temperature effects may dominate those of dilution
although, in an absolute sense, dilution effects could
still be important because fuel concentrations are low.

DESIGNERS: (U) ADDITION, CONCENTRATION, COMPOSITION, DIFFUSION, DILUTION, FLAMES, FLOW, FUELS, INERT MATERIALS, MEASUREMENT, RATES, REDUCTION, SMOKE, SOOT, TEMPERATURE.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F, SOOT formation, Diffusion flames, Temperature effects, Inert addition, Reprints.


CONTRACT NO.: AFOSR-89-0293
PROJECT NO.: 2308
TASK NO.: A2

MONITOR: AFOSR, XF
TR-91-0777, AFOSR

ABSTRACT: (U) Using the counterflow flame technique, laminar flame speeds of mixtures of ethane, ethylene, acetylene and propane with oxygen and nitrogen have been accurately determined over extensive lean-to-rich fuel concentration ranges and over the pressure range of 0.25 to 3 atm. These data are then compared with the numerically calculated values obtained by using various kinetic schemes in the literature as well as one compiled in the present study. The present scheme yields close agreement with all of the experimental flame speeds except for diluted, rich acetylene flames, for which the calculated values are higher. The relative importance and influence of the individual reactions on the flame speed and reaction mechanism are assessed and discussed with the aid of sensitivity analysis. The study also demonstrates that C2 schemes validated through comparisons based on methane flame speeds may not be accurate enough for flame speed predictions of the C2 fuels, and that the C2 schemes developed through comparisons with the flame speeds of the C2 fuels are rather insensitive to the details of the C3 sub-mechanism.
The importance of having accurate values of the thermophysical properties of radicals for flame simulation is also emphasized.

DESCRIPTORS: (U) ACCURACY, ACETYLENE, CHEMICAL RADICALS, ETHANES, ETHYLENE, FLAMES, FLOW, KINETICS, LAMINAR FLOW, METHANE, NITROGEN, NUMERICAL ANALYSIS, OVERPRESSURE, OXYGEN, PREDICTIONS, PROPANE, RESPONSE, SIMULATION, THERMOPHYSICAL PROPERTIES, VALUE, VELOCITY, YIELD.

IDENTIFIERS: (U) WJAFORSR2308A2, PE61102F, *Flame propagation speeds, Methane, Ethane, Ethylene, Acetylene, Propane, Chemical kinetics, Reprints.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T85001

AD-A241 571 9/3

YALE UNIV NEW HAVEN CT

(U) Technique for Three-Dimensional Measurements of the Time Development of Turbulent Flames.

JUN 91 4P

PERSONAL AUTHORS: Frank, Jonathan H.; Lyons, Kevin M.; Long, Marshall B.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XF

TR-91-0782, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters. v16 n12 p958-960, 15 Jun 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A three-dimensional imaging technique has been developed that permits the investigation of the time development of a scalar in turbulent reacting flows. An aerosol-seeded premixed flame was illuminated by four closely spaced parallel laser sheets of different wavelength. Lorenz Mie scattering from the four illumination sheets was imaged onto an intensified two dimensional charge coupled device array. Bandpass filters and a multi-image optical component in the collection optical allowed individual sheets to be imaged onto different areas of the charge-coupled-device array. A double-pulsed Nd: YAG laser was used in conjunction with a rotating mirror in the collection optics to enable instantaneous three-dimensional images to be obtained at two times separated by 100 micro seconds.

DESCRIPTORS: (U) ARRAYS, BANDPASS FILTERS, CHARGE COUPLED DEVICES, COLLECTION, FLAMES, ILLUMINATION, IMAGES, LASERS, MEASUREMENT, MIE SCATTERING, MIRRORS, OPTICS, PARALLEL ORIENTATION, ROTATION, SHEETS, THREE DIMENSIONAL, TIME, TURBULENCE, YAG LASERS.

IDENTIFIERS: (U) *Three-dimensional, Lorenz Mie
Measurement of Three-Dimensional Concentrations in Turbulent Jets and Flames.

PERSONAL AUTHORS: Long, Marshall B.; Yip, Bandon

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF

TR-91-0808, AFOSR

ABSTRACT: (U) Laser-based techniques for obtaining measurements of a three-dimensional scalar field in turbulent jets and flames are described. In one experiment, three dimensional scalar gradients are determined by detecting the scattered light intensity from two parallel illumination sheets intersecting the flow. Another experimental approach gives more complete three dimensional data by scanning a single laser sheet through the flow, and recording the scattering corresponding to different sheet locations. Data from nonreacting and reacting flows are presented and important factors in the measurement techniques are discussed. Laser diagnostic techniques are now widely used for making nonintrusive, in situ measurements in reacting and nonreacting flows. Quantitative measurements of temperature, species concentration, density, and velocity have been demonstrated using a number of different light scattering mechanisms. New laser-diagnostic techniques have first been demonstrated for measurements at a single point. Subsequently, some techniques have been extended to allow simultaneous measurements in one or two dimensions.

DESCRIPTORS: (U) APPROACH, DIAGNOSIS(GENERAL).
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T85001

AD-A241 569 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Three-Dimensional Visualization of Temporal Flow Sequences.

MAR 91 6P

PERSONAL AUTHORS: Van Cruyningen, I.; Lozano, A.; Mungal, M. G.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0067

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF

UNCLASSIFIED REPORT

TR-91-0779, AFOSR

Availability: Pub. in AIAA Jnl., v29 n3 p479-482 Mar 91. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) FLOW visualization remains one of the most powerful methods of gaining insight into turbulent flow physics. Recently there have been several excellent reviews that describe some of the latest developments in the field. It is also well known among the research community that movie or video sequences of flow visualization images, because of their dynamic nature, are frequently used to study flow development. Presentation of these data as a series of successive frame-by-frame images allows some correlation of temporal information, but is generally unsatisfactory as the human eye is much more adept at determining spatial correlations within a single image. This note describes the application of a method to generate single three-dimensional views that emphasize temporal correlations of time-evolving two-dimensional data sets (i.e. movies), thereby improve interpretation of such data.

DESCRIPTORS: (U) CORRELATION, EYE, FLOW, FLOW VISUALIZATION, HUMANS, IMAGES, PHYSICS, SEQUENCES, SPATIAL DISTRIBUTION, THREE DIMENSIONAL, TURBULENT FLOW, VIDEO SIGNALS.

IDENTIFIERS: (U) Reprints. WUAFOSR2308A3, PE61102F.

AD-A241 569
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 505 11/2

CALIFORNIA INST OF TECH PASADENA DIV OF CHEMISTRY AND CHEMICAL ENGINEERING

(L) Microscopic Theoretical Modeling of the Chemical and Tribological Properties of Ceramic Surfaces and Interfaces.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 87-31 Oct 89.

SEP 91 58P

PERSONAL AUTHORS: Goddard, William A., III

CONTRACT NO. AFOSR-88-0051

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF

TR-91-0816, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The major goal to this research was to develop a strategy for establishing a microscopic atomic level understanding of the fundamental surface processes ultimately responsible for friction, adhesion at surfaces, and abrasion. The approach was; (1) to use quantum chemical studies to establish the dominant surface species for clusters of atoms modeling various ceramics and to elucidate the thermochemistry and detailed mechanism steps involved in surface reactions of such systems; (2) to develop theoretical force fields based on the energy surfaces from clusters in I that allow predictions of the energies and geometries for infinite surfaces and interfaces; (3) to use the force fields from I to predict the barriers and kinetics for various diffusion and reaction processes relevant for catalysis, corrosion, and materials synthesis processes; (4) to develop procedures for molecular dynamics and Monte Carlo simulations of various chemical processes in these systems, and, (5) to interface the results of these simulations onto appropriate graphics systems, allowing the designer to interactively follow a three dimensional image of the evolving system.
ABSTRACT: (U) Two processes of dense sprays are being studied: (1) turbulence modulation, which involves the turbulent field generated by drop motion; and (2) secondary drop breakup which can be the rate controlling process in dense sprays. Since past work on turbulence modulation highlighted the need for information on drop wake properties for low drop Reynolds numbers (10-1000), measurements of these flows are in progress using spheres traversing in stagnant glycerol baths. Three wake regions have been identified: a fast-decaying wake (caused by eddy shedding at drop Reynolds numbers greater than 200), a turbulent wake (extending to wake Reynolds numbers of 5-8), and a final laminar wake. Turbulence is not highly developed in the turbulent wakes, yet mean velocities satisfy similarity theory quite well. Current work is concentrating on results at higher Reynolds numbers, to approach results in the literature; studying wakes in turbulent environments; and introducing these results into a stochastic theory of turbulence modulation. Secondary drop breakup is being studied in a shock tube using water, glycerol and n-heptane drops. A breakup regime map has been developed, defining no-deformation, oscillatory deformation, non-oscillatory deformation, bag breakup, multimode breakup and shear breakup regimes as a function of Weber and Ohnesorge numbers. Results at Ohnesorge numbers greater than 4 show that these conditions are dominated by the no-deformation regime.
(U) Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.

DESCRIPTIVE NOTE: Final rept.

SEP 91 22P

PERSONAL AUTHORS: Dagdigian, Paul J.; Alexander, Millard H.

CONTRACT NO. F49620-88-C-0056

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF

TR-91-0789, AFOSR

ABSTRACT: (U) A joint experimental and theoretical study of the dynamics of phototypical reactions of the azide radical (N3) with light atoms, as well as the decomposition of the azide radical and its precursor, hydrazoic acid (HN3), has been carried out. Reactions of atoms with free radicals are an interesting class of chemical reactions whose dynamics has not been extensively studied, in part because of the difficulties in preparing two labile reagents. Because of the open shell nature of atoms and radicals, these reactions necessarily involve multiple potential energy surfaces, only one of which will usually lead to a strongly bound intermediate, namely the stable molecule formed by the chemical bonding of two reagents.

DESCRIPTORS: (U) ATOMS, AZIDES, CHEMICAL AGENTS, CHEMICAL BONDS, CHEMICAL REACTIONS, DECOMPOSITION, DYNAMICS, FREE RADICALS, HYDRAZOIC ACID, LIGHT, MOLECULES, PHOTODISSOCIATION, POTENTIAL ENERGY, SHELLS (STRUCTURAL FORMS), STABILITY, SURFACES.

IDENTIFIERS: (U) PE81102#, WUAFOSR2303B1, *Azides, *Hydrazoic acid, Photodissociation, Chemiluminescence, Electronic quenching, Atom radical reactions, N3(Azide)
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. T85001

AD-A241 560  5/8

CALIFORNIA UNIV IRVINE DEPT OF PHARMACOLOGY

(U) Cellular Analogs of Operant Behavior.

DESCRIPTIVE NOTE: Annual rept.,

DEC 90  5P

PERSONAL AUTHORS: Stein, Larry

CONTRACT NO. AFOSR-89-0213

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XF

TR-91-0781, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our previous work indicates that hippocampal CA1 bursting may be reinforced by dopaminergic agents such as dopamine itself, cocaine, and certain dopamine receptor agonists. A major concern is that these agents may facilitate bursting merely by direct or indirect pharmacological stimulation of neuronal activity rather than by a cellular reinforcement process. We have always required as critical evidence of cellular reinforcement that noncontingent or random presentations of the positive agents will be relatively ineffective; and indeed random applications of dopamine, cocaine, and dynorphin A are ineffective and even tend to suppress the bursting of hippocampal pyramidal cells. One approach is to attempt to reinforce hippocampal bursting with a nonspecific depolarizing agent such as glutamate. Unlike dopamine and cocaine, burst-contingent applications of glutamate did not produce selective facilitation of cellular bursting when compared to random presentations; indeed, both contingent and random glutamate applications reduced the likelihood of bursts, while at the same time increasing the frequency of individual spikes.

DESCRIPTORS: (U), ANALOGS, CELLS, CELLS(BIOLOGY), COCAINE, DOPAMINE, GLUTAMIC ACID, HIPPOCAMPUS, PHARMACOLOGY, PYRAMIDS, SALTS, SENSE ORGANS, SPIKES, STIMULATION(GENERAL).

AD-A241 560  CONTINUED

UNCLASSIFIED  PAGE 105  T85001

ABSTRACT: (U) The goal to develop an experimental diagnostic technique suitable for gas flows of densities intermediate between atmospheric and rarefied. A laser assisted Electron Beam Fluorescence technique which we call electron photon fluorescence was developed.

Theoretical work was done to predict the time dependence of the excitation/deexcitation processes. As described in the original proposal, our goal in this work was the attainment of an experimental diagnostic technique suitable for gas flows of densities intermediate between atmospheric and rarefied. Measurements in such intermediate density flows, typical of hypersonic flight at altitudes above about 50 km, present difficulties in that traditional wind-tunnel techniques (shadow and schlieren, as well as laser based scattering techniques) provide insufficient signal. Moreover, the resonant scattering techniques may require an absorptive species as a tracer to be seeded into the flow, a requirement inconsistent with the realities of existing large facilities. On the other hand, the densities are not enough for continuous electron-beam fluorescence (EBF) to be used due to beam spreading and collisional quenching.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 514
16/2 16/2.1 17/7.3 15/3.1

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Hypervelocity Aerodynamics and Control.

DESCRIPTIVE NOTE: Final rept. 15 Sep 86-14 Oct 87.

DEC 87 6IP

PERSONAL AUTHORS: Adamson, T. C., Jr.; Hove, R. M.

CONTRACT NO. F48620-86-C-0138

PROJECT NO. 2587

TASK NO. 00

MONITOR: AFOSR
TR-91-0787

UNCLASSIFIED REPORT

ABSTRACT: (U) The research objective of this study of optimal aerodynamics and propulsive control at supercircular speeds is to develop methods for determining optimal guidance and control of earth launch kinetic energy weapons designed to intercept intercontinental ballistic missiles early in their ascent trajectory. Optimal control techniques are used to obtain multistage trajectories based on minimizing the mass ratio. Study parameters include time of flight, down range intercept distance and intercept altitude. Re-entry/ skip trajectories are considered. Innovative means of attitude control of the final stage which intercepts the target are being studied. An investigation of the control of aerodynamic forces on hypersonic vehicles by boundary layer injection has also been started. Its goal is to determine optimal patterns of injection of a gas into a boundary layer on a hypersonic vehicle, to generate desired aerodynamic forces. Two directions of approach are being studied. In the first, analytical means are being used to study the effects of blowing on simple flow problems in the various flow regimes; a combination of asymptotic and numerical methods are used. In the second, numerical methods are being used, with particular emphasis on obtaining efficient codes which result in the computation of crisp shock waves and which can handle blowing in the boundary layer. Both distributed and strip blowing are under consideration. Preliminary results are presented.

DESCRIP'TORS: (U) , AERODYNAMIC FORCES, AERODYNAMICS, ALTITUDE, ASCENT TRAJECTORIES, ATTITUDE CONTROL SYSTEMS, BOUNDARY LAYER, CODING, CONTROL, DISTRIBUTION, EFFICIENCY, FLIGHT, FLOW, GUIDANCE, GUIDED MISSILES, HYPERSONIC VEHICLES, HYPERSONIC VELOCITY, INJECTION, INTERCEPTION. LONG RANGE(DISTANCE), MASS, NUMERICAL METHODS AND PROCEDURES. OPTIMIZATION, PARAMETERS, PATTERNS, RANGE(DISTANCE), RATIOS, REENTRY VEHICLES, SHOCK WAVES, STAGING, TIME, TRAJECTORIES.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 513 21/3
CALIFORNIA INST OF TECH PASADENA GUGGENHEIM JET
PROPELLION CENTER
(U) Electron-Cyclotron-Resonance Plasma Thruster Research.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-30 Jun 91,
AUG 91 18P
PERSONAL AUTHORS: Culick, F. E.; Sercel, Joel C.
CONTRACT NO. AFOSR-87-0205
PROJECT NO. 2308
TASK NO. A1
MONITOR: AFOSR, XF
TR-91-0809, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results of a
three year program devoted to theoretical and
experimental research on plasma acceleration by Electron-
Cyclotron-Resonance (ECR). Theoretical work in the first
year of this effort centered on simple analytical
treatment of many of the phenomena which have a role in
ECR plasma acceleration. These analytical studies pointed
out which phenomena are sufficiently important to be
incorporated in the more rigorous theoretical studies of
years two and three and also provided vital guidance to
the process of designing the experimental apparatus. An
experimental facility was developed in the first year of
this program so that an ECR research device could be
tested. The JPL facility has the unique capability of
providing up to 20 kW of S-band microwave power and 18,
000 liters/second of high quality vacuum system pumping
for the study of advanced microwave propulsion concepts.

DESCRIPTORS: (U) MICROWAVES, PLASMA ACCELERATORS,
PROPELLION SYSTEMS, RADIOFREQUENCY POWER, RESEARCH
FACILITIES, S BAND, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, *Cyclotron
resonance, *Plasma engines.

AD-A241 513

SEARCH CONTROL NO. T85001

AD-A241 512 5/2

SOCETY FOR INDUSTRIAL AND APPLIED MATHEMATICS
PHILADELPHIA PA

(U) SIAM Workshop on Automatic Differentiation of

DESCRIPTIVE NOTE: Final rept.,
JAN 91 10P
PERSONAL AUTHORS: Block, I. E.
CONTRACT NO. AFOSR-91-0004
PROJECT NO. 2304
TASK NO. A4
MONITOR: AFOSR, XF
TR-91-0811, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The workshop was attended by sixty-five
researchers, of whom thirty gave half hour lecturers, and
nineteen presented posters. This was the first scientific
meeting devoted to the topic of automatic differentiation
of algorithms. There were many excellent talks on large
scale applications - in particular weather modeling,
oceanography, petroleum reservoir modeling, beam tracing
in optics, satellite orbit analysis, and mechanical
systems simulation. Some of the speakers delineated very
clearly the remaining deficiencies of currently available
automatic differentiation techniques in comparison to
handcoded derivative evaluation programs. From the lively
discussion that followed, it can be expected that the
software developers present will accept the challenge of
closing this gap in efficiency without sacrificing user
convenience. In many formal and informal discussions, the
participants raised the question of how potential users
and the scientific community at large can be made aware
of the extremely promising computational techniques
presented at the workshop. Some felt that the name
Automatic Differentiation sounds too mechanical and fails
to indicate the wealth of intrinsic problems and
ramifications.

DESCRIPTORS: (U) ALGORITHMS, ARTIFICIAL SATELLITES.

AD-A241 512
DTIC REPORT BIBLIOGRAPHY

AD-A241 512 CONTINUED
COMPUTATIONS, COMPUTER PROGRAMS, LECTURES, MECHANICAL
COMPONENTS, MODELS, OCEANOGRAPHY, OPTICS, ORBITS,
PETROLEUM GEOLOGY, RESERVOIRS, SCIENTIFIC ORGANIZATIONS,
SIMULATION, TEST AND EVALUATION, WEATHER.
IDENTIFIERS: (U) PEB1102F, WUAFISR2304A4.

SEARCH CONTROL NO. T85001

AD-A241 511 5/8
EEG SYSTEMS LAB SAN FRANCISCO CA
(U) Neuro-Triggered Training.

DESCRIPTION NOTE: Interim rept. 1 Apr 90-30 Mar 91,
APR 91 15P
PERSONAL AUTHORS: Gevins, Alan S.; Cutillo, Brian A.
CONTRACT NO. F49620-90-C-0026
PROJECT NO. 2313
TASK NO. BS
MONITOR: AFOSR, XF
TR-91-0784, AFOSR

UNCLASSIFIED REPORT

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

ABSTRACT: (U) Cortical neuroelectric patterns during a
working memory task differed from a control task during
two of four split-second intervals when access to the
contents of working memory is assumed to take place.
Prefrontal cortical areas were prominent among those
differentially activated by working memory in these two
intervals, which included a prestimulus preparatory
interval and a late poststimulus response-inhibition
interval. By contrast, patterns were similar between
conditions during an early poststimulus interval and
during a response interval, when the predominant activity
was related to stimulus encoding or response execution.
These results suggest that working memory is a dynamic
process embodied in neuroelectric activity patterns
distributed across the neural areas involved in
performing a particular task. The active aspect of short-
term memory, termed 'working memory' by A. Baddeley and
coworkers, provides the basis for consciously directed
perception, cognition and action, attentional programs,
and extended logical and linguistic operations.

DESCRIPTORS: (U) ACTIVATION, COGNITION, CONTROL,
DYNAMICS, INTERVALS, LINGUISTICS, MEMORY DEVICES,
MEMORY(Psychology), NERVOUS SYSTEM, RESPONSE, SHORT...
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T85001

AD-A241 478 21/2

PRINCETON UNIV  NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING


90 9P

PERSONAL AUTHORS:  Egolfopoulos, F. N.; Law, C. K.

CONTRACT NO.  AFOSR-89-0293

PROJECT NO.  2408

TASK NO.  A2

MONITOR:  AFOSR, XF

TR-91-0773, AFOSR

UNCLASSIFIED REPORT


ABSTRACT:  (U)  By using the counterflow flame technique, laminar flame speeds of H2/02/N2 mixtures have been experimentally determined in the fuel stoichiometric range of ultra-lean to moderately-rich, oxygen concentration range of 7.4 to 30 molar percent of the oxidizer, and pressure range of 0.2 to 2.25 atm. These results are then compared with the numerically-determined values obtained by using several existing H2/02 kinetic schemes. Results show that, while these kinetic schemes accurately predict the propagation speeds of high-temperature flames, they substantially underpredict those of low temperature flames. Furthermore, while the experimental pressure exponents of the mass burning rates exhibit a minimum-point, parabola-like behavior with increasing pressure, indicating the initial, negative influence of the H-02 termination reaction and the subsequent availability of a positive channel which facilitates radical production, the calculated results fail to show the increasing trend in the pressure range investigated.
A Kinetic Criterion of Flammability Limits: The C-H-O-Inert System

90 10P

PERSONAL AUTHORS: Law, C. K.; E golopoulos, F. N.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF

TR-91-0775. AFOSR

A Kinetic Criterion of Flammability Limits: The C-H-O-Inert System

ABSTRACT: (U) An experimental and theoretical investigation has been conducted on the determination of the flammability limits of the C-H-O-inert system and on the understanding of limit phenomena in general. Experimentally, flammability limits have been determined by first measuring the extinction limits of stretched, counterflow flames and extrapolating the results to zero stretch. Consequently, lean and rich flammability limits have been determined for mixtures of methane, ethane, ethylene, acetylene, and propane with air, for mixtures of H2, H2/CH4, and H2/CO with O2/N2, and for the effects of dilution, inert substitution, chemical additives such as CH3Br and H2 and radiative heat loss due to flame broadening. By further hypothesizing that the limit phenomena are primarily controlled by the kinetic processes of chain branching versus termination, a predictive theory has been advanced for the a priori determination of flammability limits. Calculated results largely agree with the experimental data for both the lean and rich limits, except for excessively thick flames for which the limits could be qualitatively affected by radiative heat loss. The study further shows that H + O2
yield $0 + OH$ is the dominant branching reaction for all
lean and rich limits, that $H + O_2 = M$ yields $H_2O + M$ is
the dominant termination reaction for all lean limits.

DESCRIPTORS: (U) ACETYLENE, ADDITIVES, CHAINS,
CHEMICALS, DETERMINATION, ETHERS, ETHYLENE, EXPERIMENTAL
DATA, EXTINCTION, FLAMES, FLAMMABILITY, FLOW, HEAT LOSS,
INERT MATERIALS, KINETICS, LIMITATIONS, METHANE, MIXTURES,
PROPANE, RADIATIVE TRANSFER, RESPONSE, SUBSTITUTES,
THEORY, THICKNESS.

IDENTIFIERS: (U) PE81102F, WUAFO5R2308A2, Flammability
limit, Flame extinction, Hydrocarbon combustion, Chemical
kinetics, Reprint.

ABSTRACT: (U) During the period under report, we have
made significant progress in the studies proposed under
various specific aims. More importantly, antibodies to
three major gap junction (GJ) proteins were generated and
used to characterize the GJ proteins of various tissue
culture systems. Progress has also been made in
understanding the biochemical and molecular basis of the
action of certain tumor promoting chemicals, such as TPA,
mezerein and bromostatin, which indicated that protein
kinase C (PKC), an import component of cellular second
messenger system, was activated. Since gap junction
protein is considered to be affected by PKC, the
observations we made suggest that PKC activating
toxicants can exert their action as tumor promoters
through abolishing GJ protein function. Another study
suggested that certain oncogenes, ras, neu and src,
induce cellular transformation and the resulting
transformed cells have very poor GJIC. Studies are
underway to identify the mechanisms of gap junction
protein regulation.

DESCRIPTORS: (U) ACTIVATION, ANTIBODIES, CELLS,
CHEMICAL REACTIONS, CHEMICALS, FUNCTIONS, INHIBITION,
NEOPLASMS, PROTEINS, TISSUE CULTURE, TOXIC AGENTS,
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 465 CONTINUED

TRANSFORMATIONS

IDENTIFIERS: (U) Gap junctions, *Cell communication, Tumor promoters, Teratogens, *Neurotoxins, Protein kinase C, Chemical toxicity, WUAFOSR2312AS, PEB1102F.

AD-A244 465

CALIFORNIA UNIV LOS ANGELES DEPT OF MECHANICAL AEROSPACE AND NUCLEAR ENGINEER ING

(U) Control Augmented Structural Optimization of Aeroelasticity Tailored Fiber Composite Wings.

DESCRIPTIVE NOTE: Final rept. 11 Nov 86-30 Sep 90. AUG 91 71P

PERSONAL AUTHORS: Friedmann, Peretz P.; Schmit, Lucien A., Jr

PROJECT NO. F49620-87-K-0003

AEROSPACE ENGINEERING

AD-A244 465

ABSTRACT: (U) The problem of control augmented structural optimization of aeroelastically tailored fiber composite wings was addressed in a series of comprehensive studies. This research culminated in the first truly integrated, practical computer program capable of treating this multidisciplinary synthesis problem by simultaneously changing structural, aerodynamic and control type design variables for practical aircraft configurations. The effectiveness and efficiency of this integrated aeroelastic optimization capability was displayed by applying it to an RPV type vehicle as well as the more complex F-16 and X-29 type airplane models. In addition, within the framework of this research a digital adaptive controller capable of suppressing flutter in composite wings under time varying flight conditions in subsonic and transonic flow was developed. This efficient analysis can be used as the basis for structural optimization studies of actively controlled composite wings in transonic flow.

DESCRIPTORS: (U) ADAPTIVE CONTROL SYSTEMS, AEROELASTICITY, AIRCRAFT, AUGMENTATION, COMPOSITE WINGS, COMPUTER PROGRAMS, CONFIGURATIONS, CONTROL, CONTROL SYSTEMS, DIGITAL SYSTEMS, EFFICIENCY, FIBER REINFORCED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. T85001
AD-A241 464 CONTINUED

COMPOSITES, FLIGHT, FLUTTER, OPTIMIZATION, STRUCTURAL
PROPERTIES, SUBSONIC FLOW, SYNTHESIS, TIME, TRANSONIC
FLOW, VARIABLES, VEHICLES.

IDENTIFIERS: (U) PEG1102F. WUAFOSR230281. *Composite
Computerized simulation. Aerodynamics. Structural
analysis, F-16 Aircraft. *Fiber reinforced composites, X-
29 Aircraft. Aircraft models. Subsonic flow. Transonic
*Adaptive control systems.

AD-A241 463 9/3

ARMY BALLISTIC RESEARCH LAB ABERDEEN PROVING GROUND MD

(U) Fundamental Studies of Laser Ignition and Kinetics in
Reactive Gases.

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

JUN 91  7P

PERSONAL AUTHORS: Miziolek, A. W.; Forch, B. E.

CONTRACT NO. MIPR-90-0025

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XF
TR-91-0780, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser ignition experiments involving the
hydrogen atom 2-photon resonance at 243 nm have been
conducted and show an interesting isotope wavelength
dependence. Figure shows the ILE dependence for the
ignition of H2/O2 (curve a) and D2/O2 (curve b) using a
tunable laser near 243 nm. The plots clearly show a
wavelength shift which corresponds to 22 cm⁻¹ at the two-
photon level. This is exactly the energy difference in
the n=2 excited state for the two different isotopes.
Previously, we observed a similar wavelength dependence
for the formation of microplasmas in flows of pure H2 and
D2 gases. Figure 2 shows the ignition ILE dependence on
equivalence ratio for H2/O2 and D2/O2 with the laser set
at the corresponding minimum wavelength points which are
the wavelengths for maximum two-photon excitation. As can
be seen, the two curves are basically alike as would be
expected for these two fuel gases whose flame chemistry
is quite similar.

DESCRIPTORS: (U) CHEMISTRY, EXCITATION, FLAMES,
FREQUENCY, FUELS, GASES, IGNITION, ISOTOPES, LASERS,
PHOTONS, RATIOS, REACTIVE GASES, SHIFTING.

IDENTIFIERS: (U) PEG1102F. WUAFOSR2308BS.

AD-A241 463
ABSTRACT: (U) In June 27-29, the Artificial Intelligence Laboratory of the University of Michigan, in cooperation with the Cognitive Science and Machine Intelligence Laboratory, organized a conference on visual information assimilation. The primary funding agency for the conference was the Air Force Office of Scientific Research. The conference was successful in bringing together a diverse group of participants. About 100 people attended the conference, with cross-disciplinary attendees from both within the University of Michigan and outside.

DESCRIPTORS: (U) , ARTIFICIAL INTELLIGENCE, ASSIMILATION, COGNITION, LABORATORIES, MICHIGAN, VISION.


UNCLASSIFIED REPORT

ABSTRACT: (U) Heterojunction bipolar transistors have been characterized up to 40GHz. In addition to direct current-voltage and high frequency small signal measurements, power and harmonic characterization has been performed. The measurement results were fitted to a ten-element equivalent circuit model in which only three elements were allowed to vary with bias. This bias dependent model is accurate to within 2% over the entire bias range and is the first step toward a true large-signal model. The power and harmonic characteristics of the heterojunction bipolar transistor can also be accurately modeled with increasing number of both bias-dependent and fixed elements. Pulsed DC and thermal measurements have also been accomplished to determine the junction temperature and understand its effects on device characteristics. (Author)

DESCRIPTORS: (U) , BIAS, BIOPOLAR TRANSISTORS, DIRECT CURRENT, ELECTRIC CURRENT, HAFOINICS, HETEROJUNCTIONS, JUNCTIONS, MEASUREMENT, PULSES, SIGNALS, TEMPERATURE, THERMAL PROPERTIES, VOLTAGE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2305R1, WUAFOSR2306B1, *Bipolar transistors, *Heterojunction transistors, Large signals, Bias. Reprints.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 460  4/1
COLORADO STATE UNIV  FORT COLLINS DEPT OF ATMOSPHERIC
SCIENCE

(U) Numerical Modeling of Middle and High Level Clouds
with the Colorado State University Regional
Atmospheric Modeling System RAMS.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 89-1 Jun 91,
AUG 91  152P

PERSONAL AUTHORS: Cotton, William R.; Flatau, Piotr J.;
Stephens, Graeme L.

CONTRACT NO.  AFOSR-88-0143
PROJECT NO.  2310

TASK NO.  A1
MONITOR:  AFOSR, XF
TR-91-0793, AFOSR

UNCLASSIFIED REPORT

ABSTRACT:  (U) Research supported on this grant has
focused on cirrus clouds. The includes the analysis of
data collected during the FIRE cirrus experiment,
refinement of the microphysics of RAMS for cirrus cloud
simulations, development of cirrus radiation theory and
parameterizations, and performing mesoscale simulations of
cirrus clouds. The simulations demonstrated that RAMS
has the ability to simulate many observed features of
cirrus clouds including multiple layering, cirrus
formation zones, and the growth and dissipation of
cirrus for specific cases. The results suggest that RAMS
may be suitable for numerical forecasting of cirrus
clouds.

DESCRIPTORS:  (U)  cirrus clouds; clouds; fires;
forecasting; layers; mathematical models; physics;
radiation; simulation; theory.

IDENTIFIERS:  (U)  PB811028, WA20802310A1, (Cirrus clouds;  
Numerical weather prediction; Electromagnetic scattering;  
Non-spherical particles, Stable layer turbulence, FIRE  
Project.

AD-A241 460

UNCLASSIFIED

SEARCH CONTROL NO. T85001

AD-A241 423  19/1.1

PRINCETON UNIV  NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) The Influence of Carbon Dioxide and Oxygen as
Additives on Soot Formation in Diffusion Flames.

90  GP

PERSONAL AUTHORS:  Du, D. X.; Avellan, R. L.; Law, C. K.

CONTRACT NO.  AFOSR-89-0293
PROJECT NO.  2308

TASK NO.  A2
MONITOR:  AFOSR, XF
TR-91-0772, AFOSR

UNCLASSIFIED REPORT

Availability:  Pub. in Symposium (International) on
Combustion/The Combustion Institute (23rd), p1501-1507,
1990. Available to DTIC users only. No copies furnished
by NTIS.

ABSTRACT:  (U) A study of carbon dioxide and oxygen
addition on soot formation has been performed such that
the effects of dilution, temperature and direct chemical
participation have been isolated for the additives on
both the fuel and oxidizer sides. By measuring soot
inception limits in the counterflow flame and integrated
soot volume fractions in the coflow flame, the influence
of the additives on soot inception, growth and burnout
has also been ascertained. Results demonstrate that
carbon dioxide, whether added to the fuel or oxidizer
side, can suppress soot formation chemically. The effect
of oxygen addition is more complex. When added to the
fuel side of an ethylene flame, the addition leads to an
abrupt increase in the inception limit, indicating that
the inception chemistry has been accelerated. The
addition to propane, however, is initially suppressive
and results in a significant reduction in the soot
inception limit which is more than can be accounted for
by dilution. The addition becomes promoting as the oxygen
mole fraction approaches 40%. Finally, the effect of
oxygen concentration on the oxidizer side, for both
ethylene and propane flames, is almost totally thermal.

AD-A241 423

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DTIC REPORT BIBLIOGRAPHY

AD-A241 423 CONTINUED

AD-A241 422

SEARCH CONTROL NO. T85001

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING


90 8P

PERSONAL AUTHORS: Chelliah, H. K.; Law, C. K.; Ueda, T.; Smooke, M. D.; Williams, F. A.

CONTRACT NO. AFOSR-89-0293

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF

TR-91-0774, AFOSR

UNCLASSIFIED REPORT


ABSTRACT: (U) Laminar opposed flow diffusion flames, established in the forward stagnation region of a porous cylinder or between two opposed jets from circular tubes, have been used extensively to study diffusion-flame structure and extinction, in order to quantify the effect of flame stretch on the interaction of transport and chemical processes. The results provide valuable physical insight and quantitative data for application of laminar-flamelet concepts in modeling turbulent diffusion flames. At fixed nozzle separation distance, increasing the opposed-jet exit velocities increases the axial velocity gradient (strain rate) and the fuel and oxidizer concentration gradients in the mixing layer, thereby decreasing the local diffusion time in the vicinity of the flame. The second Damkohler number, defined as the ratio of the diffusion time to chemical reaction time, also decreases, subjecting the flame increasingly to nonequilibrium effects and eventually resulting in stretch-induced extinction. The critical strain rates beyond which the flame cannot be stabilized have been
studied experimentally and theoretically.

DESCRIPTORS: (U) BOUNDARIES, BURNERS, EXTINCTION, FLOW, FLOW FIELDS, FUELS, GRADIENTS, HIGH PRESSURE, LIMITATIONS, OXIDIZERS, PLUGS, POTENTIAL FLOW, SIDES, STRAIN RATE, THEORY, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, Methane air diffusion, Flames, Extinction, Pressure effects, Dilution effects, Flow field effects, Reprints.

OTHER INDEX: (U) Instantaneous Three-Dimensional Concentration Measurements in Turbulent Jets and Flames.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-31 Jan 91, FEB 88 4P

PERSONAL AUTHORS: Yip, Brando; Schmitt, Randal L.; Long, Marshall B.

PROJECT NO. TR-91-0805, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v13 n2 p98-98, Feb 88. Available to DTIC users only. No copies furnished by NTIS.

Reprint: Instantaneous Three-Dimensional Concentration Measurements in Turbulent Jets and Flames.

DESCRIPTORS: (U) LASER APPLICATIONS, FLAMES, JET FLOW, TURBULENT FLOW, LIGHT SCATTERING, RAYLEIGH SCATTERING, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3, Laser diagnostics.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A241 412 12/2
PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Multivariate Analysis and Its Applications.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 Jan 91.
JAN 91 3P
PERSONAL AUTHORS: Rao, C. R.

CONTRACT NO. AFOSR-89-02079
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR, XF
TR-91-0792, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main lines of research undertaken during the period are: Probability Theory: Major advances were made in obtaining Edgeworth expansions in a variety of situations, e.g., involving discrete variables, and errors in variables models. New limit theorems were established and their applications were discussed. Several contributions have been made to characterization theory. Linear Models and Time Series: New methods of forecasting were developed using dynamic linear models and multiple bilinear time series models. Multivariate Analysis: Topics of research in this area included inference on interclass and intraclass correlations and principal component analysis. M-estimation: A unified theory of robust inference (estimation and tests of hypotheses) was developed using a convex discrepancy function for minimization.

DESCRIPTORS: (U) DYNAMICS, FORECASTING, HYPOTHESES, LIMITATIONS, LINEARITY, MATHEMATICAL MODELS, MODELS, MULTIVARIATE ANALYSIS, PROBABILITY, THEOREMS, THEORY, TIME SERIES ANALYSIS, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Probability theory, Linear models and time series, Multivariate analysis, M-Estimation.

AD-A241 371 21/2
YALE UNIV NEW HAVEN CT

SEP 88 5P
PERSONAL AUTHORS: Namazian, M.; Schmitt, R. L.; Long, M. B.

CONTRACT NO. AFOSR-88-0100
PROJECT NO. 2308
TASK NO. A3
MONITOR: AFOSR, XF
TR-91-0807, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Applied Optics. v27 n17 p3597-3600, 1 Sep 88. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A new technique has been developed which allows simultaneous 2-D mapping of CH and CH4 in a turbulent methane flame. A flashlamp-pumped dye laser using two back mirrors produces output at 431.5 and 444 nm simultaneously. The 431.5-nm line is used to excite the (0,0) band system of CH, and the fluorescence of the (0,1) transition is observed at 489 nm. Coincidentally, the spontaneous Raman scattering from CH4 also occurs near 489 nm for a 431.5-nm excitation. To separate the CH4 that is spectrally separated from the CH fluorescence, Subtraction of the signals generated by the 431.5- and 444-nm wavelength beams yields separate measurements of CH4 and CH. Raman-scattered light records the instantaneous distribution of the fuel, and simultaneously the CH fluorescence indicates the location of the flame zone. The resulting composite images provide important insight on the interrelationship between fuel-air mixing and subsequent combustion.

DESCRIPTORS: (U) COMBUSTION, COMPOSITE IMAGES, DIFFUSION, DISTRIBUTION, DYE LASERS, FLAMES, FLASH LAMPS, FLUORESCENCE, FREQUENCY, FUEL AIR RATIO, FUELS, LASERS, LIGHT SCATTERING, METHANE, MIRRORS, PUMPING (ELECTRONICS).
UNCLASSIFIED

AD-A241 371 CONTINUED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T85001

AD-A241 370 21/2

SIBLEY SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING
ITHACA NY

(U) Computations of Turbulent Combustion: Process and
Challenges,
90 23P

PERSONAL AUTHORS: Hope, S. B.

CONTRACT NO. AFOSR-88-0052

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-91-0781, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Symposium (International) on
Combustion (23th), p591-612 1990. Available only to DTIC
users. No copies furnished by NTIS.

ABSTRACT: (U) We review the significant progress that
has been made in the development and use of turbulent
combustion models applicable to practical combustion
devices. Recent work has focused on the development of
methods that can treat finite-rate kinetics in a
realistic yet tractable way, so that local extinction and
related phenomena can be studied. Direct numerical
simulation cannot be used for this purpose, because it is
computationally intractable; and the potential of large-
eddy simulation is far from clear because combustion
reactions give rise to a severe closure problem. PDF
methods, on the other hand, overcome the major closure
problems, and they have been shown to be tractable for
complex flows and with realistic finite-rate kinetics. A
simple explanation of pdf methods is presented. It is
shown that the single modelled equation for the joint pdf
of velocity, dissipation and composition provides a
closure for turbulent combustion. Reaction and convection
are treated exactly, while the modelling is performed in
a Lagrangian setting, by constructing deterministic or
stochastic models for the evolution of fluid-particle
properties. Examples of recent pdf calculations are
described, including those based on four-step mechanisms.
for methane. Extension of pdf methods to include
composition gradients is discussed, with a view to
improving the modelling of molecular diffusion.

DESCRIPTORS: (U) . CLOSURES, COMBUSTION, COMPUTATIONS,
CONVECTION, EQUATIONS, EXTINCTION, FLOW, LAGRANGIAN
FUNCTIONS, MATHEMATICAL MODELS, METHANE, MODELS,
NUMERICAL ANALYSIS, SETTING(ADJUSTING), STOCHASTIC
PROCESSES, TRACTABLE, TURBULENCE.

IDENTIFIERS: (U) PE61102F, WJAFOSR2308A2.
UNCLASSIFIED

**DTIC REPORT BIBLIOGRAPHY**

**AD-A241 368** 7/4  
**KANSAS STATE UNIV MANHATTAN DEPT OF CHEMISTRY**  
(U) Identification of the SiCl2 (a (3)B1-X (1)A1) Emission System and a Flow Reactor Source of SiCl2(a (3)B1),  
JUN 91 8P  
PERSONAL AUTHORS: Du, Kangyan; Chen, Xiaoshan; Setser, D. W.  
REPORT NO. 5-30173  
CONTRACT NO. AFOSR-88-0279  
PROJECT NO. 2303  
TASK NO. B1  
MONITOR: AFOSR, XF  
TR-91-0783, AFOSR

**UNCLASSIFIED REPORT**


**DESCRIPTORS:** (U) *ORGANIC COMPOUNDS, *CHEMICAL REACTIONS, ARSENIC, PHOSPHORUS, SILICON, CHLORINE, QUENCHING, ATOMS.  
**IDENTIFIERS:** (U) PE81102F, WUAOSR230381, Argon potassium, Reaction rator, Triplet state, Radiative lifetimes.

**SEARCH CONTROL NO. T85001**

**AD-A241 205** 9/1  
**UNIVERSITY COLL OF WALES ABERYSTWYTH DEPT OF PHYSICS**  
(U) Total Electron Content and Scintillation in the Vicinity of the Main Ionospheric through Over Northern Europe.  
JUN 91 28P  
PERSONAL AUTHORS: Kersley, L.; Walker, I. K.  
CONTRACT NO. AFOSR-87-0378  
MONITOR: AFOSR, XF  
TR-91-08, AFOSR

**UNCLASSIFIED REPORT**

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

**ABSTRACT:** (U) A receiving system for NSSS satellites located at Lerwick (60.1N, 1.2W) has been used to make differential carrier phase measurements in the vicinity of the main ionospheric trough. The observations have been calibrated to obtain absolute total electron content using measurements from a co-located GPS receiver for two months near solar maximum. Mapping techniques, developed to study the changes in night-time total electron content as a function of both latitude and time, are described. Examples are given of characteristic trough behaviour for different levels of geomagnetic activity. A new feature of the work is the limited extent of the poleward wall of the trough for moderate geomagnetic conditions. The mapping techniques can also be applied to measurements of radio-wave scintillation allowing comparison between small-scale irregularity behaviour and the larger-scale changes in total electron content.

**DESCRIPTORS:** (U) *BEHAVIOR, ELECTRONS, GEOMAGNETISM, IONOSPHERE, LATITUDE, MAPPING, MEASUREMENT, NORTHERN EUROPE, RADIO WAVES, SCINTILLATION, TRoughs, WAlLS.  
**IDENTIFIERS:** (U) *Electron content, Ionospheric trough, Ionospheric irregularities, Scintillation boundary.