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14. ABSTRACT During the performance of this contract UES, Inc. provided research evaluation services for the Chemistry & Life Sciences Directorate, Air Force Office of Scientific Research in areas that include Neurosciences, Computer Sciences, Computer Sciences, Otolaryngology, Meteorology, Chemistry, Biotechnology and Fuels and in related program under development. Evaluations were secured for 68 research proposals. Three program reviews were held in the areas of Molecular Dynamics & Theoretical Chemistry, BioInspired Concepts (BIC) Theme and Biomimetic and Biomaterial & Biointerfacial Sciences. Three workshops were held in the areas of Culture & Personality in Models of Adversarial Decision-Making, Cell-Like Entities (CLE), and Dip-Pen Nanolithography (DPN). One panel meeting was held in Molecular Dynamics & Theoretical Chemistry.					
15. SUBJECT TERMS Neurosciences, Molecular, Dynamics, Perception, Cognition, Chronobiology, DipPen, Nanolithography Biomimetic, Biomaterial, Biointerfacial					
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Final
ANNUAL REPORT

CHEMISTRY AND LIFE SCIENCES RESEARCH PROGRAM

CONTRACT NO. F49620-00-C-0009

Period of Performance: 3/1/00 – 11/30/05

Prepared For:

**AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
CHEMISTRY AND LIFE SCIENCES DIRECTORATE**

Dr. Genevieve Haddad, Program Manager

20060306 030

Presented By:

**UES, Inc.
4401 Dayton-Xenia Road
Dayton, OH 45432-1894**

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5. Electrochemistry, Washington, DC (23 Mar 2005)
6. Cognition Program Review, St. Augustine FL, 18-19 April 2005
7. Polymer Matrix Composites 8-12 August 2005

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INTRODUCTION

UES, Inc. is providing research evaluation services to the Directorate of Chemistry and Life Sciences, Air Force Office of Scientific Research (AFOSR), in sub areas that include Neurosciences (e.g., Neurochemistry, Biology, Electrophysiology, Neuroanatomy, Multisensory Integration/Spatial Orientation, Cardiovascular Physiology, and Bioenvironmental Hazards; Psychophysics, Psychophysiology, Physiological Psychology, Sensation, Perception, Cognition); Computer Sciences (e.g., Vision and Robotics); Otolaryngology; Meteorology, Chemistry (e.g., computational chemistry, polymeric and organic materials, photonic materials, inorganic and surface chemistry, high density materials); Biotechnology (e.g., materials and processes); and Fuels (e.g., petroleum and synthetic); and in related programs under development.

The services provided by UES, Inc. include: selecting qualified scientists to evaluate proposals, assembling scientific groups to evaluate, analyze and advise on content and direction of Chemistry and Life Sciences Programs; organizing workshops to assist in the definition of new basic research areas proposed by the Chemistry and Life Sciences Directorate; providing advisors to make presentations and assist government personnel with analyzing areas of relevant science; and providing advisors to assist and advise on site visits to research laboratories.

The fourth option year included: 143 Proposals Reviewed, 7 Program/Contractor Reviews, 4 Workshops, 2 Panel Meetings and 1 Conference!

A. Evaluations of Individual Research Proposals

UES mailed 143 proposals to evaluators during the performance period of 1 March 2004 through 30 November 2005.

UES has been providing the Director of Chemistry and Life Sciences a Summary of Proposals under Review (SPUR) report on a biweekly basis. This report is now being sent electronically as well as a hard copy. This report is composed of the UES log sheet indicating the proposals sent out, the names of the evaluators to whom the proposals were sent, the dates the proposals were mailed, the tickle date, any necessary comments, and the date the reviews were received. This allows the Program Managers to have a current listing of all proposal activity.

B. Contractor/Program Reviews

1. Cognition Program Review 9-10 March 2004

2004 AFOSR Polymer Matrix Composites, Long Beach, CA, 21-22 May 2004.

The review was held at the Hyatt Regency Long Beach Hotel. UES provided on-site support, abstract booklets and made all arrangements for the review. (\$2,387)

Dr. Charles Lee, Program Manager

Total Attendance: 48

Speakers: 25

Attendees: 23

B. **Contractor/Program Reviews** - continued

2. **2004 AFOSR Tribology Program Review,**

3-5 November 2004, Lowes Annapolis Hotel, Annapolis, MD. UES provided on-site support, abstract booklets and made all arrangements for the review. (\$5,147)

Major Jennifer Gresham, Program Manager

Total Attendance: 60

Speakers: 24

Attendees: 36

3. **AFOSR MURI Review, 4-5 November 2004, Hope Hotel, Wright-Patterson AFB, OH.** UES provided on-site support and made all arrangements for the review. (\$525)

Total Attendance: 31

Speakers: 15

Attendees: 16

4. The fifth program review was the **2005 Biomimetic, Biomaterial & Biointerfacial Sciences**, Shelter Pointe Hotel, Shelter Point, CA, 16-21 January 2005. UES provided on-site support, abstract booklets and made all arrangements for the review. (\$4,300)

Dr. Hugh De Long, Program Manager.

Total Attendance: 50

Speakers: 31

Attendees: 29

5. The sixth program review was the **2005 AFOSR Electrochemistry Program Review**, the Churchill Hotel, Washington, DC, 23 March 2005. UES provided abstract booklets and made all arrangements for the review. (\$2,229)

Dr. Jennifer Gresham, Program Manager

Total Attendance: 56

Speakers: 13

Attendees: 43

6. The seventh program review was the **2005 AFOSR Cognition Program Review, Hilton Historic Bayfront Hotel**, St. Augustine, FL, 18-19 April 2005. UES provided on-site support, abstract booklets and made all arrangements for the review. (\$12,896)

Dr. Robert Sorkin, Program Manager

Total Attendance: 56

Speakers: 20

Attendees: 36

7. **AFOSR STTR Review**, Wyndham Hotel, Albuquerque, NM, 11 May 2005.
UES made all arrangements for the review. (\$979.96)

Dr. Charles Lee, Program Manager

Total Attendance:

Speakers

Attendees

8. **2005 Polymer Matrix Composites Program Review**, Sheraton Suites Hotel, San Diego, CA. 8-12 August 2005. UES provided on-site support, abstract booklets and made all arrangements for the review. (\$14,596)

Dr. Charles Lee, Program Manager

Total Attendance: 146

Speakers: 78

Posters: 21

Attendees: 47

C. Workshops

1. **AFOSR Contractor's Review on Ionic Liquids Research**, Tampa, FL, 7-8 March 2004. Review was held at the Tampa Marriott Westshore Hotel. Fifteen scientists gave presentations regarding their grant proposal in this area. There were a total of 27 attending this review. UES made all arrangements for the review. (\$600)

Dr. Michael Berman, Program Manager

Total Attendance: 27

Speakers: 15

Attendees: 12

2. **AFOSR Workshop on Information Fusion**, Clarion Hotel Stockholm, Stockholm, Sweden, 30 June 2004. Refreshments provided. (\$805.97)

Dr. John Tangney, Program Manager

3. **2005 AFOSR Computer Information Sciences Workshop**, Savoy Restaurant Rome, NY, 15-19 August 2005. UES provided on-site support and made all arrangements for the workshop. (\$3,763)

Dr. John Tangney & Dr. Robert Herklotz, Program Managers

Total Attendance:

Speakers:

Attendees:

4. **Workshop on Multifunctional Materials**, Keystone Resort, Keystone, CO, 21-26 August 2005, (\$868)

Major Jennifer Gresham, Program Manager

Total Attendance:

Speakers: 44

Attendees:

D. **Panel Meeting**

1. **Molecular Dynamics & Theoretical Chemistry Panel Meeting**, Marriott Hotel, Dulles, VA, 10 June 2004. (\$866)
Dr. Michael Berman, Program Manager
Number of Panel Members Present: 7
2. **Molecular Dynamics & Theoretical Chemistry Panel Meeting**, Marriott Hotel, Dulles, VA, 15 June 2005. (\$733)
Dr. Michael Berman, Program Manager
Number of Panel Members Present: 7

E. **Conference**

1. **AFOSR Conference on Culture & Adversary Modeling**, Hilton Palacio del Rio Hotel, San Antonio, TX, 29 November – 1 December 2005. (\$12,896)
Dr. John Tangney, Program Manager
Total Attendance: 189
Speakers: 42
Attendees: 147

F. **Advisors**

In addition to advisors provided for Program Reviews, Workshops and Panel Meetings, UES provided travel, per diem and in many cases, honorarium for the following advisors:

Charles Wight, **Ionic Workshop**, Tampa, FL

7-8 March 2004

(\$491.70 Reimbursement for Expenses)

Dr. Michael Berman, Program Manager

Whitman Richards, **Cognition & Decision Making Workshop**, Chandler, AZ

9-10 March 2004

(\$987.87 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Rick DeShon, **Cognition & Decision Making Workshop**, Chandler, AZ

9-10 March 2004

(Declined Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Zygmunt Pizlo, **Cognition & Decision Making Workshop**, Chandler, AZ

9-10 March 2004

(\$696.63 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Robert Sekuler, **Cognition & Decision Making Workshop**, Chandler, AZ

9-10 March 2004

(\$1,017.38 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

David Weiss, **Cognition & Decision Making Workshop**, Chandler, AZ

9-10 March 2004

(\$580.30 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

James Shanteau, **Cognition & Decision Making Workshop**, Chandler, AZ

9-10 March 2004

(Declined Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Brian J. Stankiewica, **Cognition & Decision Making Workshop**, Chandler, AZ

9-10 March 2004

(\$816.17 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Robert Steinman, **Cognition & Decision Making Workshop**, Chandler, AZ

9-10 March 2004

(\$835.67 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Advisors – continued

Bradly Love, Cognition & Decision Making Workshop, Chandler, AZ

9-10 March 2004

(\$961.06 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Wayne Gray, Cognition & Decision Making Workshop, Chandler, AZ

9-10 March 2004

(\$962.05 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Verlin Hinsz, Cognition & Decision Making Workshop, Chandler, AZ

9-10 March 2004

(\$1,009.36 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Steven Sibener, Molecular Dynamics & Theoretical Chemistry Contractors Meeting,

Newport, RI

23-26 May 2004

(\$1,210.26 Reimbursement for Expenses)

Dr. Michael Berman

Edmond Murad, Molecular Dynamics & Theoretical Chemistry Contractors Meeting,

Newport, RI

23-26 May 2004

(\$950.88 Reimbursement for Expenses)

Dr. Michael Berman

Carlos Pinedo, MIT Research, AFRL/HEPG, Wright-Patterson AFB, OH

2-3 June 2004

(\$382.76 Reimbursement for Expenses)

Dr. Willard Larkin, Program Manager

Charles Oman, MIT Research, AFRL/HEPG, Wright-Patterson AFB, OH

2-3 June 2004

(\$410.76 Reimbursement for Expenses)

Dr. Willard Larkin, Program Manager

Laurence Young, MIT Research, AFRL/HEPG, Wright-Patterson AFB, OH

2-3 June 2004

(\$571.98 Reimbursement for Expenses)

Dr. Willard Larkin, Program Manager

James Lisy, Molecular Dynamics & Theoretical Chemistry Panel Meeting,

Dulles, VA

10 June 2004

(\$524.15 Reimbursement for Expenses, \$802.00 Honorarium)

Dr. Michael Berman, Program Manager

Advisors – continued

Bruce Garrett, **Molecular Dynamics & Theoretical Chemistry Panel Meeting**,
Dulles, VA
10 June 2004
(\$652.00 Reimbursement for Expenses, \$802.00 Honorarium Paid)
Dr. Michael Berman, Program Manager

Albert Wagner, **Molecular Dynamics & Theoretical Chemistry Panel Meeting**,
Dulles, VA
10 June 2004
(\$410.35 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Mark Johnson, **Molecular Dynamics & Theoretical Chemistry Panel Meeting**,
Dulles, VA
10 June 2004
(\$446.45 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

David Chandler, **Molecular Dynamics & Theoretical Chemistry Panel Meeting**,
Dulles, VA
10 June 2004
(\$587.85 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Robert Whetten, **Molecular Dynamics & Theoretical Chemistry Panel Meeting**,
Dulles, VA
10 June 2004
(\$505.21 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Ann Chaka, **Molecular Dynamics & Theoretical Chemistry Panel Meeting**,
Dulles, VA
10 June 2004
(Declined Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Da-Ren Chen, **2004 MURI Kick-Off Meeting on Relationship between
Physicochemical Characteristics and Toxicological Properties of Nanomaterials**
University of Rochester, Rochester, NY
13-15 July 2004
(\$542.05 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Advisors - continued

Mengdawn Chen, **2004 MURI Kick-Off Meeting on Relationship between Physicochemical Characteristics and Toxicological Properties of Nanomaterials**
University of Rochester, Rochester, NY
13-15 July 2004
Dr. Walter Kozumbo, Program Manager

Vicki Colvin, **2004 MURI Kick-Off Meeting on Relationship between Physicochemical Characteristics and Toxicological Properties of Nanomaterials**
University of Rochester, Rochester, NY
13-15 July 2004
(\$1,010.22 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

David Y.H. Pui, **2004 MURI Kick-Off Meeting on Relationship between Physicochemical Characteristics and Toxicological Properties of Nanomaterials**
University of Rochester, Rochester, NY
13-15 July 2004
(\$1,174.22 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Juergen Pohlmann, **MDA Polymer Technology Demonstration Radar Beam Steering**,
Austin, TX
9 September 2004
(\$673.46 Reimbursement for Expenses)
Dr. Charles Lee, Program Manager

Wesley Henderson, **14th International Symposium on Molten Salts**, Honolulu, HI
3-8 October 2004
(\$2,997.66 Reimbursement for Expenses)
Dr. Paul Trulove, Program Manager

Douglas Fox, **14th International Symposium on Molten Salts**, Honolulu, HI
3-8 October 2004
(\$4,298.52 Reimbursement for Expenses)
Dr. Paul Trulove, Program Manager

Errol Zeiger, **AFOSR Jet Fuel Toxicology Workshop**, Tucson, AZ
13-15 October 2004
(\$1,054.38 Reimbursement for Expenses, \$2,406.00 Honorarium Paid)
Dr. Walter Kozumbo, Program Manager

Ashok Kumar, **AFOSR Tribology Program Review**, Annapolis, MD
3-5 November 2004
(\$1,030.52 Reimbursement for Expenses)
Major Jennifer Gresham, Program Manager

Advisors - continued

Peter Schmidt, **AFOSR Tribology Program Review**, Annapolis, MD

3-5 November 2004

(Declined Reimbursement for Expenses)

Major Jennifer Gresham, Program Manager

Terence Risby, **Jet Fuel Workshop**, Kettering, OH

16-17 November 2004

(\$664.89 Reimbursement for Expenses, \$802.00 Honorarium Paid)

Dr. Walter Kozumbo, Program Manager

Errol Zeiger, **Jet Fuel Workshop**, Kettering, OH

16-17 November 2004

(\$809.15 Reimbursement for Expenses, \$2,005.00 Honorarium Paid)

Dr. Walter Kozumbo, Program Manager

W. Kent Anger, **Jet Fuel Workshop**, Kettering, OH

16-17 November 2004

(\$1,041.83 Reimbursement for Expenses, \$401 Honorarium Paid)

Dr. Walter Kozumbo, Program Manager

John Reynolds, **Attend Scientific Meeting**, Boston, MA

29 November – 3 December 2004

(\$2,036.10 Reimbursement for Expenses)

Dr. Charles Lee, Program Manager

Steven Forrest, **Attend Scientific Meeting**, Boston, MA

29 November – 3 December 2004

(\$1,363.20 Reimbursement for Expenses)

Dr. Charles Lee, Program Manager

Xiang-Gen Xia, **Rome Laboratory Advisor**, Rome, NY

8-9 December 2004

(\$414.94 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Fredericus VanKuijk, **Kick off Meeting**, Houston, TX

16 December 2004

(\$2,353.51 Reimbursement for Expenses, \$401.00 Honorarium Paid)

Dr. Walter Kozumbo, Program Manager

Edward Pugh, **AFOSR Funded Study of Laser Flash Blindness at AFRL**, Brooks AFB, TX

8 January 2005

(Declined Reimbursement for Expenses)

Dr. Willard Larkin, Program Manager

Advisors – continued

Rick Blum, AFRL/Rome Laboratory, Rome, NY

8 January 2005

(\$387.63 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Paul Osenar, AFOSR Electrochemistry Review, Washington, DC

23 March 2005

(\$723.29 Reimbursement for Expenses)

Major Jennifer Gresham, Program Manager

**Bruce Garrett, AFOSR Molecular Dynamics & Theoretical Chemistry Panel Meeting,
Dulles, VA**

14 June 2005

(\$685.53 Reimbursement for Expenses, \$802 Honorarium Paid)

Dr. Michael Berman

**James Lisy, AFOSR Molecular Dynamics & Theoretical Chemistry Panel Meeting,
Dulles, VA**

14 June 2005

(\$595.66 Reimbursement for Expenses, \$802 Honorarium Paid)

Dr. Michael Berman

**Ann Chaka, AFOSR Molecular Dynamics & Theoretical Chemistry Panel Meeting,
Dulles, VA**

14 June 2005

(Declined Reimbursement for Expenses)

Dr. Michael Berman

**Albert Wagner, AFOSR Molecular Dynamics & Theoretical Chemistry Panel Meeting,
Dulles, VA**

14 June 2005

(\$521.20 Reimbursement for Expenses)

Dr. Michael Berman

**Arthur Suits, AFOSR Molecular Dynamics & Theoretical Chemistry Panel Meeting,
Dulles, VA**

14 June 2005

(\$403.39 Reimbursement for Expenses)

Dr. Michael Berman, Program Manager

Randy Seeley, AFRL-HE/AFOSR Workshop, Wright-Patterson AFB, OH

15 June 2005

(\$238.65, Reimbursement of Expenses, \$150.00 Honorarium Paid)

Dr. Willard Larkin, Program Manager

Advisors – continued

Mehdi Adineh, **AFRL-HE/AFOSR Workshop**, Wright-Patterson AFB, OH
15 June 2005
(\$38.25 Reimbursement of Expenses, \$150.00 Honorarium Paid)
Dr. Willard Larkin, Program Manager

Frank Robb, **AFRL-HE/AFOSR Workshop**, Wright-Patterson AFB, OH
15 June 2005
(\$467.69 Reimbursement of Expenses, \$401.00 Honorarium Paid)
Dr. Willard Larkin, Program Manager

Edouard Assam, **AFOSR-HE Workshop**, Wright-Patterson AFB, OH
15 June 2005
(\$660.13 Reimbursement of Expenses, \$401.00 Honorarium Paid)
Dr. Willard Larkin, Program Manager

Randy Seeley, **AFRL-HE Workshop**, Wright-Patterson AFB, OH
15 June 2005
(\$88.65 Reimbursement for Expenses, \$150.00 Honorarium Paid)
Dr. Willard Larkin, Program Manager

D. M. Fox, **EUCHEM Molten Salts Conference**, Piechowice, Poland
19-24 June 2005
(\$2,814.86 Reimbursement for Expenses)
Dr. Paul Trulove, Program Manager

R. Schultz-Friedrich, **Bio-Solar Hydrogen MURI Kickoff Meeting**, Princeton, NJ
20 June 2005
(\$1,446.75 Reimbursement for Expenses, \$600.00 Honorarium Paid)
Dr. Walter Kozumbo, Program Manager

Michael Maroney, **Bio-Solar Hydrogen MURI Kickoff Meeting**, Princeton, NJ
20 June 2005
(\$783.58 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Ben Hankamer, **Bio-Solar Hydrogen MURI Kickoff Meeting**, Princeton, NJ
20 June 2005
(Declined Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Roger Prince, **Bio-Solar Hydrogen MURI Kickoff Meeting**, Princeton, NJ
20 June 2005
(\$223.25 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Advisors – continued

Simon P.J. Albracht, **Bio-Solar Hydrogen MURI Kickoff Meeting**, Princeton, NJ

20 June 2005

(\$1,895.57 Reimbursement for Expenses, \$600.00 Honorarium Paid)

Dr. Walter Kozumbo, Program Manager

Oliver Lenz, **Bio-Solar Hydrogen MURI Kickoff Meeting**, Princeton, NJ

20 June 2005

(\$1,754.15 Reimbursement for Expenses, \$600.00 Honorarium Paid)

Dr. Walter Kozumbo, Program Manager

Jerome Busemeyer, **Visit with Dr. Sorkin on Possible IPA Appointment**, Arlington, VA

14-15 July 2005

(\$443.48 Reimbursement for Expenses)

Dr. Robert Sorkin, Program Manager

Peter Kofinas, **Polymer Matrix Composites Program Review**, San Diego, CA

7-13 August 2005

(\$1,718.90 Reimbursement for Expenses)

Dr. Charles Lee, Program Manager

Vladimir Lefebvre, **Conference on Culture and Adversary Modeling**, San Antonio, TX

29 November – 1 December 2005

(\$939.04, Reimbursement for Expenses)

Dr. John Tangney, Program Manager

SUMMARY

UES is pleased to have performed the specific tasks assigned to them in accordance with provisions of the contract. Participants were Dr. Mike Livingston as Program Manager, Judith M. Flory, Program Manager and Amiee Nichols as Program Assistant. UES personnel are appreciative opportunity they had to be of service to AFOSR in this interesting and worthwhile program.

LIST OF APPENDICES

Breakdown of Research Proposals by Program Manager

Agenda - AFOSR Contractor's Review on Ionic Liquids

Agenda - 2004 AFOSR Polymer Matrix Composites

Agenda – 2004 AFOSR Tribology Program Review

Agenda – AFOSR MURI Review

Agenda – 2005 Biomimetic, Biomaterial & Biointerfacial Sciences

Agenda – 2005 AFOSR Electrochemistry Program Review

Agenda – 2005 AFOSR Cognition Program Review

Agenda – AFOSR STTR Review

Agenda – 2005 Polymer Matrix Composites Program Review

Agenda – 2005 Computer Information Sciences Workshop

Agenda – Workshop on Multifunctional Materials (Keystone Conference)

Agenda – AFOSR Conference on Culture & Adversary Modeling

BREAKDOWN OF RESEARCH PROPOSALS BY PROGRAM MANAGER

<u>PROGRAM MANAGER</u>	<u>NO. OF PROPOSALS</u>
Berman	42
De Long	10
Kozumbo	13
Larkin	19
Lee	34
Sorkin	17
Tangney	2
Trulove	6

AFOSR Contractor's Review on Ionic Liquids Research

**March 7 & 8, 2004
Tampa Marriott Westshore
813-287-2555
Tampa, FL**

Sunday March 7

- 9:00 Introduction and Welcome Mike Berman/Greg Drake
9:10 Greg Drake "Update of Synthetic Efforts at AFRL"
9:40 Robin Rogers (U. Alabama) "Synthesis of Ionic Liquids"
10:10 Jean'ne Shreeve (U. Idaho) "Synthesis of Ionic Liquids"

10:40 Break

11:00 Alan Katritzky (U. Florida) presented by Robin Rogers "Synthetic Efforts in New Ionic Liquids"
11:20 Jeff Bottaro/Mark Petrie (SRI Intl.) "New Species for Ionic Liquids"
11:40 John Wilkes (USAF Academy) "Thermal Properties of Ionic Liquids"

12:10 Lunch Break

1:00 Thomas Litzinger/Stefan Thynell (Penn State University) "Studies of EMIM nitrate"
1:30 Tomas Baer (U. North Carolina) "Rapid evaporation mass spectrometry of aerosolized ionic liquids"
2:00 Bill Larson/Angelo Alfano/Ghanshyam Vaghjiani (AFRL) "Ignition efforts of Ionic Liquids"
2:30 Chuck Wight (U. Utah) "Oscillations Reactions during Thermal Decomposition of Ionic Liquids"
2:50 Jerry Boatz/Jeff Mills(AFRL) "Computational Studies of Ionic Liquids"

3:15 Break

3:30 Greg Voth (U. Of Utah) "Modeling of ionic liquid properties"
4:00 E. Maginn (Notre Dame) "Molecular Modeling of Solute-Solvent Interactions in Ionic Liquids"
4:30 Mark Gordon (Iowa State) "Theoretical/Computational Studies of Ionic Liquids"
5:00 Don Thompson (Oklahoma State) "Modeling of ionic liquid melts"

6:30 Dinner (No Host)

Monday March 8

8:30 – 11:00 Round Table discussions

**2004 Polymer Matrix Composite Review
Hyatt Regency Long Beach
200 South Pine Avenue
Long Beach, CA**

21-22 May 2004

21 May (Friday)

0715 Registration and Continental Breakfast (Regency Ballroom B & C)

0755 Welcome/Introduction

Charles Lee, Air Force Office of Scientific Research, Arlington, VA

**0800 Developments in High Frequency Dielectric Techniques for
Non Destructive Evaluation**

Richard Pethrick and David Hayward, University of Strathclyde,
Glasgow, Scotland, UK

**0830 Water-network Interactions in Adhesive Joints and the
Assessment of Joint Quality**

Jovan Mijovic, Polytechnic University, Brooklyn, NY

**0900 Advanced Material Development for Polymer Matrix Composites I;
HTRTM (Hyperbranch Additions), E- Beam Processing & Transitions**

Fred Arnold, AFRL/MLBCO, Wright-Patterson AFB, OH

**0930 Advanced Material Development for Polymer Matrix Composites II;
Nanosilicates & Transitions**

Fred Arnold, AFRL/MLBCO, Wright-Patterson AFB, OH

1000 Break

**1015 The Structure-Processing-Performance Relations of High Temperature
Polymers and Their Composites**

Roger J. Morgan, Texas A&M University, College Station, TX

**1045 In-Situ Chemical Kinetic Characterization and Modeling of EB Cured
Thermoset Polymers and the Design of Improved Material Systems**

Giuseppe R. Palmese, Drexel University, Philadelphia, PA

1115 Developments of Real-Time EB Cure Characterization Techniques and Their Application

Giuseppe R. Palmese, Drexel University, Philadelphia, PA and Donald Klosterman, University of Dayton Research Institute, Dayton, OH

1145 Polynanomeric Matrix Interlayer Composite Systems

James C. Seferis, University of Washington, Seattle WA

21 May (Friday) continued

1215 Lunch (Hyatt Regency, Regency Ballroom B & C)

1315 Electrospinning of Nanofibers for Composite Laminates

Yuris Dzenis and Xiangfa Wu, University of Nebraska, Lincoln, NE

1345 High Temperature Thermoset Nanocomposites

Derrick R. Dean, Tuskegee University, Tuskegee, AL

1415 Structure/Property Relationship of Organically Modified Layered Silicate/ Resin Matrix

Dharmaraj Raghavan, Howard University, Washington, DC

1445 Nanocomposites Containing Carbon Nanofiber, Treated Clay or Polyhedral Silsesquioxane Nanophases

Charles U. Pittman, Jr., Mississippi State University, Starkville, MS

1515 Break

1530 Modeling Long-Term Behavior of High Temperature Polymer Matrix Composites

Gregory Schoeppner, Oishore Pochiraju and Erik Ripberger, AFRL/MLBC, Wright-Patterson AFB, OH

1600 Automated Composite Microstructural Analysis as a Basis for Determination of Stochastic Variation in Structural Performance

Gregory P. Dillon, Pennsylvania State University, State College, PA

1630 Processing-Interphase-Property Relationships in the Curing of Thermosetting-matrix Composites

Ranga Pitchumani, University of Connecticut, Storrs, CT

1700 Process Analysis and Adaptive Control of Resin Transfer Molding

Robert Minaie, University of South Alabama, Mobile, AL

22 May (Saturday)

0730 Registration and Continental Breakfast (Regency Ballroom B & C)

0800 Nanoscale Intralaminar Reinforcement for Bismaleimide Composites

Margaret Roylance, Foster-Miller, Inc., Waltham, MA

0830 Multi-functional Nanocomposite Materials with High Temperature Polymer Resin Matrices

Ranji Vaidyanathan, Advanced Ceramics Research, Tucson, AZ

0900 The Introduction of a Nanophase for Carbon Fiber-Reinforced Polymer Matrix Composites: Processing and Characterization

James H. Koo, Texas A&M University, College Station, TX

0930 Thermo-Oxidative Aging of Nanoparticle Filled Cyanate Ester Composites

Apoorva Shah, Triton Systems, Inc., Chelmsford, MA

1000 Break

1015 Investigation of Adhesive Joints for Nano-Engineering and Modeling

Chris H. Jenkin and Robb Winters, South Dakota School of Mines & Technology, Rapid City, SD

1045 Nanocomposite Rocket Ablative Materials (NRAM) Summary

Gary Beall, Texas State University, San Marcos, TX

1115 Improved Oxidation Resistant Carbon-Carbon Composites

Radha Agarwal and Harry Katz, Utility Development Corporation, Livingston, NJ

1145 The Development of Nanomodified Carbon/Carbon Composites for Intermediate Temperatures (700° – 1,200°F)

Joseph H. Koo, Texas A&M University, College Station, TX

1215 End

2004 AFOSR Tribology Program Review
Annapolis Maryland
3-5 Nov 2004

Wednesday, 3 November (Ballroom)

1130 – 1215 Registration

Tribology Core Programs

1215 – 1230 **Introduction**

Jennifer Gresham, AFOSR

1230 – 1300 **Lubrication Mechanisms of Doped Solid Lubricants: MoS₂/Sb₂O₃/graphite**

J. S. Zabinski, B.S. Phillips, J. J. Hu, J. E. Bultman, and J. H. Sanders,
Air Force Research Laboratory, Wright-Patterson Air Force Base, Dayton, OH

1300 – 1330 **Synthesis of Nano Structured Solid Lubricants for Advanced Coatings**

Ajay P. Malshe, University of Arkansas, Fayetteville, AK

1330 – 1400 **Laser Processing of “Chameleon” Tribological Surfaces**

A. A. Voevodin, J. G. Jones, C. Muratoree, and J. S. Zabinski, Air Force
Research, Wright-Patterson Air Force Base, Dayton, OH

1400 – 1430 **Break**

1430 – 1500 **Tribological Relevance of the Surface Chemical Reactivity of Metal Carbides**

Scott. S. Perry, University of Houston, Houston, TX

1500 – 1530 **Metal Carbide Surface Chemistry Modeling using Density
Functional Theory**

Stephen V. Didziulis, The Aerospace Corporation, El Segundo, CA

1530-1600 **Vapor Phase Lubrication of Gold/Gold Interfaces**

Scott. S. Perry, University of Houston, Houston, TX

1730 – 1930 **Reception/Poster Session Powerhouse Building**

Thursday, 4 November (Ballroom)

0730 – 0800 **Registration/Continental Breakfast**

0800 – 0830 **Molecular-Scale Tribology of Solid Lubricants for MEMS Applications**
Judith Harrison, US Naval Academy, Annapolis, MD

0830 – 0900 **Micro/Nanotribology of RF MEMS Switches**
S. T. Patton¹, K. C. Eapen¹, and J. S. Zabinski², (1) University of Dayton Research Institute, Dayton, OH, (2) Air Force Research, Wright-Patterson Air Force Base, Dayton, Ohio

0900 – 0930 **SPM Studies of Linear Chain Alcohols as Potential Lubricants for MEMS Devices: A Fundamental Approach**
J. Nainaparampil¹, K. C. Eapen², S. Smallwood³, and J. S. Zabinski¹, (1) Air Force Research, Wright-Patterson Air Force Base, Dayton, OH, (2) University of Dayton Research Institute, Dayton, OH, (3) Universal Technology Corporation, Dayton, OH

0930 – 1000 **Break**

Tribology MURI Programs

1000 – 1030 **Introduction to the North Carolina State/UC Irvine/Naval Academy Extreme Environment Tribology MURI Program**
Jacqueline Krim, North Carolina State University, Raleigh, NC

1030 – 1115 **Silicon and RF MEMS Contact Tribology**
Angus Kingon¹, Jacqueline Krim¹, Don Brenner¹, and Mike Dugger², (1) North Carolina State University, Raleigh, NC, (2) Sandia National Laboratory, Albuquerque, NM

1115 – 1245 **Lunch** (on your own)

1245 – 1315 **Terrestrial Applications: High Temperature and Moist/Dry Environments**
Robert Nemanich¹, Mohammed Zikry¹, Kathy Wahl², and Jeff Zabinski³ (1) North Carolina State University, Raleigh, NC, (2) Naval Research Laboratory, Washington, DC, (3) Air Force Research, Wright-Patterson Air Force Base, Dayton, OH,

1315 – 1345 **Space, Cryogenic and Vacuum Environments**
Peter Taborek¹, Judith Harrison², and Jim Rutledge¹, (1) University of California-Irvine, Irvine, CA, (2) U.S. Naval Academy, Annapolis, MD

1345 – 1415 **Introduction to the UF-RPI MURI Research Group**
W. Gregory Sawyer, University of Florida, Gainesville, FL

1415 – 1430 **Break**
Friday, 5 November - continued

1430 – 1500 **Polymer and Precursor Derived Ceramic Composites**
Leonard V. Interrante, Rensselaer Polytechnic Institute, Troy, New York

1500 – 1530 *Carbon Nanotube Structures*
P. M. Ajayan, Rensselaer Polytechnic Institute, Troy, New York

1530 – 1600 **Microtribology of Aligned Arrays of Multi-Walled Carbon Nanotubes**
W. Gregory Sawyer, University of Florida, Gainesville, FL

Friday, 5 November (Ballroom)

0900-0930 **Continental Breakfast**

0930 – 1000 **Design of High Vacuum Tribometers Using Multi-Axis Load Cells and Flexures**
John C. Ziegert, University of Florida, Gainesville, FL

1000 – 1030 **Ultra-Low Wear Polymeric Composites of PTFE & PEEK**
W. Gregory Sawyer, University of Florida, Gainesville, FL

1030 – 1100 **Molecular Dynamics Simulations of PTFE Transfer Films**
Simon R. Phillpot, University of Florida, Gainesville, FL

1100 – 1130 **Wrap-up**



AFOSR MURI Review (F49620-02-1-0381)



Multidimensional Surface-Enhanced Sensing and Spectroscopy

Program Review Meeting

November 4-5, 2004

Hope Hotel & Conference Center, Bldg 823, Area A, WPAFB OH 45433-5000

Agenda for Thursday, November 4, 2004

- 8:30 - 8:40 Michael Berman, AFOSR
Welcome Remarks
- 8:40 - 8:55 Richard Van Duyne, Northwestern University
"Overview of the MURI on Multidimensional Surface-Enhanced Sensing and Spectroscopy"
- 8:55 - 9:05 Janet Jensen - ARL
"TBA"

SESSION IA

Chair: Kathy Rowlen

- 9:05 - 9:35 Richard Van Duyne, Northwestern University
"Surface-Enhanced Raman Sensors"
- 9:35 - 10:05 Shuming Nie, Emory University
"Surface-Enhanced Raman Probes for Spectroscopic Tagging of Single Cells"
- 10:05 - 10:35 Break
- 10:35 - 11:05 Louis Brus, Columbia University
"Electromagnetic Field Enhancement and Optical Forces at Junctions between Large Ag Nanocrystals"
- 11:05 - 11:35 Richard Van Duyne, Northwestern University
"Single Nanoparticle Sensing and Spectroscopy"
- 11:35 - 12:05 George Schatz, Northwestern University
"Nanoparticle Electrodynamics and Electronic Structure Studies of SERS"

12:05 - 1:20

Lunch

SESSION IB

Chair: Shuming Nie

- 1:20 - 1:30 Paul Pellegrino, ARL
- 1:30 - 2:00 Kathy Rowlen, University of Colorado
"Surface-Enhanced Raman Spectroscopy on Nanoaperture Arrays"
- 2:00 - 2:30 Paul Bohn, University of Illinois at Urbana-Champaign
"Growth of Self-Limiting Atom-Scale Metal Junctions for Electronic and Optical Sensing of Lewis Base Adsorbates"

2:30 - 3:00 Break

SESSION II **Chair: Alan Campion**
 3:00 - 3:30 Alan Campion, University of Texas at Austin
 "Raman Microscopy and Raman NSOM; Chemical Imaging on the Submicron Length Scale"
 3:30 - 4:00 Richard Van Duyne, Northwestern University
 "Tip-Enhanced Raman Spectroscopy: Materials and Instrumentation"
 4:00 - 4:30 Lukas Novotny, Rochester University
 "TBA"
 4:30 - 5:00 Naomi Halas, Rice University
 "TBA"

5:00 - 6:30 Poster Session (posters stay up until Friday AM)

6:30 Adjourn for Dinner

Agenda for Friday, November 5, 2004

SESSION III **Chair: David Jonas**
 9:00 - 9:30 Ken Spears, Northwestern University
 "Second Harmonic Excitation Spectroscopy of Ag Nanoparticle Arrays"
 9:30 - 10:00 David Jonas, University of Colorado
 "Two-Dimensional Spectroscopy Leads to New Insight into SERS"
 10:00 - 10:30 Gilbert Chang, Postdoc (Schatz), Northwestern University
 "FDTD calculations on nanohole arrays"

10:30 - 11:00 Break

SESSION IV **Chair: Richard Van Duyne**
 11:00 - 11:10 Dept of Homeland Security Participant (or other govt participant)
 "TBA"
 11:10 - 11:20 NIH Speaker (or other government speaker)
 11:20 - 11:40 Discussion

11:40 - 11:50 Concluding Remarks
 Richard Van Duyne, PI

11:50 - 12:00 Concluding Remarks
 Michael Berman, AFOSR

Biomimetic, Biomaterial and Biointerfacial Sciences Program Review

Shelter Pointe Hotel & Marina

Shelter Pointe, CA

16-21 January 2005

Sunday, 16 January 2005 Registration and Reception, 5:00 to 7:00 PM

Monday, 17 January 2005

0830 Opening Remarks – Hugh De Long

Air Force Office of Scientific Research, AFOSR/NL

Silk

0845 *Processing and Structural Analysis of Silk Films*

Rajesh R. Naik, Air Force Research Laboratory, MLPJE

0925 *Ionic Liquid Processing and Characterization of Silk*

Robert A. Mantz, Air Force Research Laboratory, MLPJE

1005 Break

1035 *Nanomechanics of Biopolymers*

Kathryn J. Wahl, Naval Research Laboratory

1115 *Predicting the Mechanical Properties of Silk*

David Porter, Oxford University

1215 Lunch

1930 *Transgenic silk moths to produce spider silk*

Rene Herrera, Florida International University

2010 *Films of Electrospun Silk Containing Green Fluorescent Protein (GFP)*

Ronald K. Eby, the University of Akron

Tuesday, 18 January 2005

- 0830** *Silk Protein Block Designs for Improved Expression and Materials Processing*
David Kaplan, Tufts University
- 0910** *Spider Silk as a Material*
Randolph Lewis, University of Wyoming
- 0950** **Break**
- Thermal Sensors**
- 1020** *Development of an Ultra-Lightweight and Uncooled Protein/Polymer Thermal Sensor Array*
Rajesh R. Naik, Air Force Research Laboratory, MLPJE
- 1100** *A Long-Range Attraction Between Aggregating 3T3 Cells Mediated By Near-Infrared Light Scattering*
Guenter Albrecht-Buehler, Northwestern University
- 1140** *Toward the Engineering of a Mechanically Activated Nanosensor*
Paul Blount, University of Texas
- 1220** **Lunch**
- 1930** *Infrared Sensory Systems in Pyrophilous Insects*
Helmut Schmitz, Bonn University
- 2030** *Novel Biomimetic MEMS Based Infrared Sensor*
Lei Zhang, Agiltron

Wednesday, 19 January 2005

Chromophores

- 0830** *Optical, Biochemical, and Molecular Characterization of New Bioluminescence Systems*
Dimitri Deheyn, Scripps Institution of Oceanography, UC-San Diego
- 0910** *Characterization and Mutagenesis Studies to Develop Novel Bioluminescent Systems*
Bruce Branchini, Connecticut College
- 0950** **Break**

Directed/Self Assembly

- 1020** *Characterization and Analysis of DNA Immobilization on Surfaces*
Lloyd J. Whitman, Naval Research Laboratory
- 1100** *Biomimetic Tribological Systems: Molecular-Level Design of Low Friction Surfaces*
Scott Perry, University of Houston
- 1140** **Lunch**
- 1930** *Ultra-Sensitive and Selective Chip-Based Detection of DNA*
Chad Mirkin, Northwestern University
- 2010** *Surface-Templated Bio-Inspired Synthesis and Fabrication of Nanomaterials*
Mark Ratner, Northwestern University

Thursday, 20 January 2005

- 0830** *Self-Assembling Biological Structures with Engineered Functionalities*
Rajesh Naik, Air Force Research Laboratory, MLPJE
- 0910** *Bio-Inspired and Bio-Directed Self-Assembly of Porous and Composite Nanostructures*
C. Jeffrey Brinker, University of New Mexico
- 0950** **Break**
- 1020** *Free-Suspended Flex Nanomembranes as Highly-Sensitive Sensors*
Vladimir V. Tsukruk, Iowa State University
- 1100** *Design and Development of Nanoscale Biomotor Power Units*
Richard C. Holz, Utah State University
- 1140** *Combinatorial Analysis of Functional Interfaces and Surfaces Generated Via Dip-Pen Nanolithography*
Thomas B. Higgins, Harold Washington College
- 1220** **Lunch**

1930 ***Front-End Processing of Cell Lysates for Enhanced Chip-Based Detection and Analysis***
James W. Schneider, Carnegie Mellon University

2010 ***S-layer Templated Nanoparticle and Carbon Nanotube Arrays***
Dietmar Pum, Universität für Bodenkultur

Friday, 21 January 2005

0830 ***Direct Nanoscale Conversion of Bio-Molecular Signals into Electronic Information***
Jimmy Xu, Brown University

Biomaterialization

0920 ***Biomimetic Synthesis of Inorganic Materials***
Rajesh Naik, Air Force Research Laboratory, MLPJE

1000 **Break**

1030 ***Chemically-Tailored 3-D Nanoparticle Structures by the BaSIC Process***
Kenneth H. Sandhage, Georgia Institute of Technology

1110 ***Studies of Biosilicification: The Role of Proteins, Carbohydrates and Model Compounds in Structure Control***
Carole C. Perry, The Nottingham Trent University

1150 **End**

2005 AFOSR Electrochemistry Program Review
The Churchill Hotel, Washington D.C.
23 March 2005

0700 – 0730 Registration and continental breakfast

0730 – 0740 **Introduction**
Jennifer Gresham, AFOSR

Sensing (Biological, Chemical, Physical)

0740 – 0820 **Microdevices for Biomolecular Detection**
Scott Manalis, Massachusetts Institute of Technology

0820 – 0900 **High Gain Optical Sensing at the Nanoscale**
Daniel Nocera, Massachusetts Institute of Technology

0900 – 0940 **Functionalized Hybrid Structures for Detection and Delivery**
SonBinh Nguyen, Northwestern University

0940 – 1000 **Break**

1000 – 1040 **Nanowire Nanophotonics: Nanoscience and Emerging Technologies**
Charlie Lieber, Harvard University

1040 – 1120 **Artificial Haircell Sensors and Sensitive Skin**
Chang Liu, University of Illinois, Champaign-Urbana

1120 – 1300 **Lunch** (on your own)

Compact Power and Fuel Cell Technologies

1300 – 1340 **Self-Organization of Electrochemical Devices from Heterogeneous Colloids**
Yet-Ming Chiang, Massachusetts Institute of Technology

1340 – 1420 **Building New Structures from Nanorod Arrays: Polymer Membranes and Tubes and Their Application Toward Ion Conduction**
John Arnold, University of California-Berkeley

- 1420 – 1500 **NMR Transport Studies of Neutral and Charged Species in Fuel Cell Membranes**
Steve Greenbaum, Hunter College-CUNY
- 1500 – 1520 **Break**
- 1520 – 1600 **Development of a New Generation of Hybrid Membranes for Fuel Cell Applications**
Emmanuel Giannelis, Cornell University
- 1600 – 1640 **Molecular Modeling and Experimental Validation of Transport and Electrocatalysis Processes in PEMFCs**
Xiangyang Zhou and George Philippidis, Florida International University
- Miscellaneous Surface Science
- 1640 – 1720 **Use of Optical Probes and Laser Scanning Confocal Fluorescence Microscopy for High Throughput Characterization of Dispersion in Nanocomposites**
Jeff Gillman, NIST
- 1720 – 1800 **Strong Emission of Broad Visible Light from ZnO Nanowires**
Jie Liu, Duke University
- 1800 – 1820 **Wrap-up (PM and Reviewers only)**

**2005 AFOSR Cognition Program Review
18-19 April 2005**

**Hilton Historic Bayfront Hotel,
St. Augustine, FL**

Monday, 18 April 2005

- 1330 Opening Remarks – G. Haddad and R. Sorkin
Air Force Office of Scientific Research, AFOSR/NL
- 1345 Perceiving Geometry: Distortions of Visual Space Explained by Natural Scene Statistics
D. Purves, Duke University
- 1415 Computational Models of Orientation and Navigation in Virtual Environments
G. Gunzelmann and D. Lyon Air Force Research Laboratory
- 1445 Break
- 1500 From Navigating When Disoriented to Seek and Disrupt: Understanding the Cognitive Limitations in Sequential Decision Making with Uncertainty
B. Stankiewicz, University of Texas
- 1530 Towards a New Computational Model of Human Thinking and Problem Solving
Z. Pizlo, Purdue University
- 1600 Inference in Dynamic Environments
M. Steyvers, University of California, Irvine
- 1530 A Unified Model of Advice Acquisition and Usage
R. Sorkin, University of Florida
- 1700 Adjourn
- 1800 Reception – Menendez Grand Ball Room

Tuesday, 19 April 2005

- 0830 Computational Cognitive Modeling of Adaptive Choice Behavior
W. Gray, Rensselaer Polytechnic Institute
- 0900 The Economics of Cognition; Resource Allocation in Simple Command and Control Decision Tasks
A. Wearing, University of Melbourne
- 0930 Designing Networks against Rational and Irrational Enemy Action
C. Smith, University of Arizona
- 1000 Break

Tuesday, 19 April 2005 - continued

- 1015 Models of Collective Choice
W. Richards, Massachusetts Institute of Technology
- 1045 Dynamic Resource Allocation and Adaptability in Teamwork
S. Kozlowski, Michigan State University
- 1115 Acquisition and Retention of Team Coordination in Command-and-Control:
Data, Metrics, and Models
N. Cooke, Arizona State University
- 1145 Lunch
- 1300 Modeling Team Performance in Simulated Aircraft Task Environments
V. Hinsz, North Dakota State University
- 1330 Development and Testing of Intelligent Agents for Distributed Team Training
W. Shebilske, Wright State University
- 1400 There Really Are "T"s in Team
D. Weiss, California State University
- 1430 Break
- 1445 Cluster-based Modeling of Human Learning: Joint Influences of Task and Environment
B. Love, University of Texas
- 1515 Using an Optimal Model of Task Performance to Guide Training in a National
Missile Defense (NMD) Task
B. Best, MAAD, Ltd
- 1530 Automated Intelligent Training System – Building the Expert Domain
R. Lathon, EMT, Incorporated
- 1545 UPDATE: Usability Problem Data Analysis Technology, and MOST:
Model-based Optimal System for Training
J. Freeman, Aptima, Incorporated
- 1630 Usability Engineering with the Software Therapist, a Latent Semantic
Analysis-Based Problem Solving Environment
R. Sparks, Pearson Knowledge Technologies
- 1645 Closing Discussion

2005 Polymer Chemistry & Polymer Matrix Composite Reviews
Sheraton Suites
San Diego, CA

8-13 August 2005

8 August (Monday)

0715 Registration and Continental Breakfast

0750 Welcome/Introduction

Charles Lee, Air Force Office of Scientific Research, Arlington, VA

0800 New Generation Materials and Structures for Nanophotonics and Nanoelectronics

Paras Prasad, University of Buffalo, Buffalo, NY

0900 Smart Skin MURI

Larry Dalton, University of Washington, Seattle, WA

0930 STW 21- Photonic Polymers

Frank Harris, University of Akron, Akron, OH

1000 Photonic Polymers

Loon-Seng Tan, Air Force Research Laboratory, Wright-Patterson AFB, OH

1030 Break

1045 Polymer Nanocomposites for RF Antenna Applications

Max Alexander, Air Force Research Laboratory, Wright-Patterson AFB, OH

1115 Application of Organic Materials to 3D Optical Circuitry

George Stegeman, University of Central Florida, Orlando, FL

1145 Synthesis and Studies of New Non-Destructive Readout Materials for Rewritable Optical Storage and Optical Switches

Peter Renzetsis, University of California, Irvine, CA

1215 Polynanomeric Matrix Interlayer Composite Systems

Paras Prasad, University of Buffalo, Buffalo, NY

1245 Lunch

1400 Applications of Organic Materials in Warfighter Effectiveness

Darrel Hopper, Air Force Research Laboratory, Wright-Patterson AFB, OH

8 August (Monday) continued

- 1430 High Performance Photorefractive Polymer Composites**
Nasser Peyghambarian, University of Arizona, Tucson, AZ
- 1500 Search For Better Photorefractive And Photovoltaic Materials**
Luping Yu, University of Chicago, Chicago, IL
- 1530 Break**
- 1600 Diffractive Wavefront Control with Spatial Light Modulators: Components, Applications, Analysis and Demonstrations**
Mark Gruneisen, Air Force Research Laboratory, Kirtland AFB, NM
- 1615 Bio-inspired Organic/Inorganic Hybrid Electronic and Photonic Materials and Structures**
Alex K-Y. Jen, University of Washington, Seattle, WA
- 1645 The Realization of New and Enhanced Materials Through Nanostructural Control**
Larry Dalton, University of Washington, Seattle, WA
- 1715 Novel Wavelength Selective Switch Based On Electro-Optic Polymer Microrings**
Antao Chen, University of Washington, Seattle, WA
- 1745 end**

9 August (Tuesday)

- 0750 Registration and Continental Breakfast**
- 0800 Progress in Electronic Polymers**
Douglas Dudis, Air Force Research Laboratory, Wright-Patterson AFB, OH
- 0830 Electro-Optical Properties Of Polymer Blends: Lasing, Electroluminescence And Photophysics**
Frank Karasz, University of Massachusetts, Amherst, MA
- 0900 Molecularly Engineered Chromophores of π -Conjugated Polymers for Probing Structure-Charge Injection/Luminescence Relationship, and for Improved Optical Properties**
Yi Pang, Clark Atlanta University, Atlanta, GA
- 0930 Two Photon Porphyrin Core Dendrimers For Optical Power Limiting**
Alexander Rebane, Montana State University, Bozeman, MT

1000 Break

1015 Visible Initiators for Thiol-ene Based HPDLCs

Tim Bunning, Air Force Research Laboratory, Wright-Patterson AFB, OH

1045 Development Of Multifunctional Ultra-Nonlinear Liquids And Liquid Crystals for Sensor Protection Applications

I. C. Khoo, Pennsylvania State University, University Park, PA

1115 Programmable Triplet Formation and Decay In Metal-Organic Chromophores

Felix N. Castellano, Bowling Green State University, Bowling Green, OH

1145 Starburst Fullerene-Chromophore Conjugates for Multi-photon Absorption Applications

Long Chiang, University of Massachusetts Lowell, Lowell, MA

1215 Lunch

1330 Electrospinning of Nanofibers for Composite Laminates

Fazio Nash, Air Force Research Laboratory, Rome, NY

1400 Platinum Acetylide Materials for Optical Limiting

Kirk Schanze, University of Florida, Gainesville, FL

1430 Optical, Electronic, and Thermal Properties of Polymer Nano-Composites

Carroll, Wake Forrest University, Wake Forrest, NC

1500 Towards Active Optical Wavefront Control Using Photoactive Polymers

Joe Ritter, University of Hawaii, Kula, HI

1530 Break

1545 Electro-Optic Materials / DNA Photonics

Richard Hopkins, Air Force Research Laboratory, Wright-Patterson AFB, OH

1615 Conductive Liquid Crystalline Elastomer for Aircraft Gap Treatment

Richard Hreha, Cornerstone Research Group, Dayton, OH

1645 Separation of Carbon Nanotubes

Fotios Papadimitrakopoulos, University of Connecticut, Storrs, CT

1715 High Performance Polymer Electronic Devices: Polymer Leds, Solar Cells and Memory Devices

Yang Yang, University of California, Los Angeles, CA

1745 end

10 August (Wednesday)

0750 Registration and Continental Breakfast

0800 Organic-Based Photovoltaic Devices

Michael Durstock, Air Force Research Laboratory, Wright-Patterson AFB, OH

0830 Nanoscale Polymeric Solar Cells with Transparent Carbon Nanotube Electrodes

Anvar Zakhidov, University of Texas At Dallas, Richardson, TX

0900 Very High Performance Organic Photonic Devices

Stephen Forrest, Princeton University, Princeton University

0930 "Plastic" Optoelectronics: Injection Lasers Fabricated from Soluble Semiconducting Polymers and Bulk Heterojunction Solar Cells Fabricated from Soluble Semiconducting Polymers

Alan Heeger, University of California, Santa Barbara, Santa Barbara, CA

1000 Break

1015 Opportunities In Photovoltaics For Space Power Generation

Paul Hausgen, Air Force Research Laboratory, Kirtland AFB, NM

1045 Development of High Efficiency, Low-Cost Flexible Dye-Sensitized Solar Cells

Michael Graetzel, Laboratory of Photonics and Interfaces, Lausanne, Switzerland

1115 High Mobility Polymer Semiconductors

Samson A. Jenekhe, University of Washington, Seattle, WA

1145 Optimized Variable Gap Conjugated Polymers

John Reynolds, University of Florida, Gainesville, FL

1215 Lunch

1330 Radiation Effects In Organic Semiconductor Based Thin Film Transistors

Roderick Devine, Air Force Research Laboratory, Kirtland AFB, NM

1400 Organic Solar Cells Using Star Conductive Polymers

Fei Wang, EIC Laboratories, Inc., Norwood, MA

1430 Intermolecular Charge-Transfer Complexes in Conjugated Polymer Solar Cells

Dmitry Parashuk, Moscow State University, Moscow, Russia

10 August (Wednesday) continued

1500 Break

1530 Flexible Thin-Film Transistors

Bijan Radmard, Triton Systems, Inc., Chelmsford, MA

1615 Carbon Nanotube Based Transistors and Opto-Electronic Devices

Koene, Luna,

1645 High Mobility Stable Crosslinked Conductive Polymer

Fei Wang, EIC Laboratories, Inc., Norwood, MA

1715 Organic Based Flexible Transistors and Electronic Devices

Klaus Dimmler, Organic, Colorado Springs, CO

1745 end

11 August (Thursday)

0750 Registration and Continental Breakfast

0800 Virus Based Metal-Organic Ordered Nanostructures

Edwin Thomas, Massachusetts Institute of Technology, Cambridge, MA

0830 Agile Response Coatings

Carroll, Wake Forrest University, Wake Forrest, NC

0900 Application of Low-loss RF Polymer Composite Materials

Leo Kempel, Air Force Research Laboratory, Wright-Patterson AFB, OH

0930 Photoinduced Magnetism in Molecule-Based Magnets

Arthur Epstein, the Ohio State University, Columbus, OH

1000 Break

1015 Organic Polymers with Magneto-Dielectric Properties

Andrzej Rajca, University of Nebraska, Lincoln, NE

1045 Block Copolymer Nanoarchitectures for Radio Frequency Applications

Peter Kofinas, University of Maryland, College Park, MD

1115 Polymer Nanocomposites: Enhancing Performance and Imparting Adaptivity through the Interface

Richard Vaia, Air Force Research Laboratory, Wright-Patterson AFB, OH

1145 Microstructure, Processing and Mechanical Performance of Polymeric Nano-Composites
Mary Boyce, Massachusetts Institute of Technology, Cambridge, MA

11 August (Thursday) continued

1215 Lunch

1330 Polymer Nanocomposite Research Efforts for Air Force and Propulsion Applications
Joseph Mabry, Air Force Research Laboratory, Edwards Air Force Base, CA

1400 Polymer/Carbon Nanotube Composite Film and Fibers
Satish Kumar, Georgia Institute of Technology, Atlanta GA

1430 Swnt Composite Fibers (Scf)
Wen-Fang Hwang, Rice University, Houston, TX

1500 Material Outgassing Study
John Prebola, Arnold Test Center, Arnold Air Force Base, TN

1530 Break

1545 Smart Structures
Sanders, AFRL/MLBC, Wright-Patterson AFB, OH

1615 Functionalization of Carbon Nanotubes via Electrophilic Substitution Reaction in Polyphosphoric Acid
Jong-Beom Baek, Chungbuk National University, Chungbuk, South Korea

1645 Hyperbranched Polymers as Toughening Processing Aids for Composite Matrices
Patrick Mather, Case Western Reserve University, Cleveland, OH

1715 Optomechanical Coatings for High-Power Mirrors and Adaptive Optics
Joseph Talghader, University of Minnesota, Minneapolis, MN

1745 end

12 August (Friday)

0750 Registration and Continental Breakfast

0800 Fiber reinforced Composites/Interest of MLBC

Fred Arnold, Air Force Research Laboratory, Wright-Patterson AFB, OH

0830 Structure-Property Relations of High Temperature Fluorinated Polyimides and their Composites

Roger J. Morgan, Texas A&M University, College Station, TX

0900 Nano-scale Control of Interfacial and Interphase Development in Polynanomatrix Composites

James Seferis, University of Washington, Seattle, WA

0930 Novel Continuous Carbon Nanofibers for the Next Generation Lightweight Structural Nanocomposites

Yuris Dzenis, University of Nebraska, Lincoln, NE

1000 Break

1015 Real-Time *In-situ* Characterization of Electron-Beam-Induced Bulk Polymerizations

Giuseppe Palmese, Drexel University, Philadelphia PA

1045 Durability Characterization of POSS-based Polyimides and Carbon-Fiber Composites for Air Force-Related Applications

Andre Lee, Michigan State University, East Lansing, MI

1115 Integrated Analysis Tools For Determination Of Structural Integrity and Durability Of High Temperature Polymer Matrix Composites

Gregory Dillon, Penn State University, College Station, PA

1145 Effects Of Physical Aging And Chemical Degradationon Mechanical Behavior of High-Temperature Polymer Matrix Composites

Marina Ruggles-Wrenn, Air Force Institute of Technology, WPAFB, OH

1215 Lunch

1330 Composites for Munitions

Robert Sierakowski, Air Force Research Laboratory, Elgin AFB, FL

1400 Investigation and Optimization of High Performance Nanocomposites Produced with Nanotube Buckypaper Materials

Ben Wang, Florida State University, Tallahassee, FL

12 August (Friday) continued

1430 Nanomodified Carbon/Carbon Composites for Intermediate Temperatures
Joseph Koo, University of Texas at Austin, Austin, TX

1500 Intermediate Temperature Carbon/Carbon Structures
Harry Katz, Utility Development Corporation, NJ

1530 Break

1545 Multi-Functional Nano-Composite High-Temperature Resin Matrix Composites – Properties and Processing – An Update
Ranji Vaidyanathan, Advanced Ceramics Research, Inc, Tucson, AZ

1615 Nanocomposites for Carbon Fiber Reinforced Polymer Matrix Composites
Apoorva Shah, Triton Systems Inc, Chelmsford, MA

1645 Thermoset Resin Nanocomposites
Charles U. Pittman, Jr., Mississippi State University, Mississippi State, MS

1715 Advanced Polymer Composite Molding through Intelligent Process Analysis and Control

Robert Minaie, Wichita State University, Wichita, KS

1745 end

Keystone Workshop
21-26 August 2005
Agenda

Sunday, 21 Aug 05

5:00p – 7:00p No host reception, Keystone Lodge

Monday, 22 Aug 05

7:30 – 8:30 Continental Breakfast

8:30 – 9:00 Opening Remarks – Dr. Robert Mantz

Session 1 Robert Mantz, AFRL/MLBT, *Multifunctional Aircraft Coatings*

9:00 Adam M. Rawlett, AMSRD-ARL-WM-MA, *Functional Polymer Surfaces via Self-Segregating Additives*

9:30 Wim van Ooij, University of Cincinnati, *A Multifunctional Primer/Coating System for Aluminum Alloys*

10:00 BREAK

10:15 S. R. Taylor, University of Mississippi Medical Center, *Increasing the Functionality of Military Coatings Using Nano-dimensioned Materials*

10:45 Gordon Bierwagen, North Dakota State University, *Mg-Rich Primers: Taking a Unique Concept and "Running With It"*

11:15 Amber Haines, UDRI, *Improved Passive Thermal Control Coatings*

11:45 Joe Osborne, Boeing Phantom Works, *Development of A Hybrid Corrosion Inhibitor and Its Use in an Enhanced Self-Priming Topcoat*

12:15 Break for Afternoon

Session 2 Dr. Joseph Osborne, Boeing Phantom Works, *Specialty Coatings and Coating Design*

7:00 M. Rohwerder, Max-Planck-Institute for Iron Research, *Design of Inherently Delamination Resistant Polymer/Metal Interfaces*

7:30 Ras B. Pandey, University of Southern Mississippi, *Multi-component Film Growth by Computer Simulation Modeling*

8:00 BREAK

8:15 Linda Kasten, UDRI, *Surface Analysis of Organo-Silicate Coatings with Phosphonate Functionalities by XPS and ToF-SIMS*

8:45 Patrick Kinlen, Crosslink, *Applications of Light Emitting Devices of Variable Wavelength Emission*

9:15 ADJOURN

Tuesday, 23 Aug 05

7:30 – 8:30 Continental Breakfast

Session 3 Ken Qassim, AFRL/VSSV, and Pat Valentino, AFRL/MLBT, *ESD Spacecraft Issues (CLOSED to non-US Citizens)*

8:30 Bill Biter, Sensortex, Inc., *Electrostatic Applique for Advanced Variable Emittance Control of Spacecraft Thermal Performance*

9:00 Gary Pippin, Boeing Company, *Status of the Materials International Space Station Experiments (MISSE)*

9:30 J. R. Dennison, Utah State University, *Measurements of Electrical and Electron Emission Properties of Highly Insulating Materials*

10:00 BREAK

10:15 Max Alexander, AFRL/MLBP, *Organic Based Space Durability EMI Shielding Materials*

10:45 Pawel Tlomak, AFRL/VSSV, *Space Plasma Experiment for Thin-Film Photovoltaics with Protective Coatings*

11:15 Suraj Rawal, Lockheed Martin Corporation, *Multifunctional Carbon Nanofiber Based Coatings for ESD Protection*

11:45 David M. Barnett, QFLEX, *Mitigating ESD in an MFS Way*

12:15 Break for Afternoon

6:30 Banquet

Roasted Goat Cheese Stuffed Pear Salad

Brandied Mushroom Soup w/cream & chives

Tenderloin of Beef & Spiced Rubbed Salmon w/jus lie & mango relish

Kiwi Wild Berry Mille Feuille (puff pastry w/almond cream)

PLEASE LET US KNOW IN ADVANCE IF YOU NEED A VEGETARIAN MEAL

Wednesday, 24 Aug 05

7:30 – 8:30 Continental Breakfast

Session 4 Steve Szaruga, AFRL/MLBT, *Military Applications of Coatings*
(*CLOSED to non-U.S. Citizens*)

8:30 Lt Bolanle Akinlemibola, AFRL/MLBT, *Electrical and Thermal
Characterization of Advanced Conductive Materials*

9:00 Lisa Farrier, AFRL/MLBT, *Analysis of Artificially Aged Military Coatings
by X-Ray Photoelectron Spectroscopy*

9:30 Alan Fletcher, AFRL/MLSA, *UV-Curable Exterior Coatings*

10:00 **BREAK**

10:15 Diane Baker, ASC/YSAL, *Coatings Applications, Issues, and
Opportunities for the B-2*

10:45 Shek Hong, Hontek, *High Performance Rain and Sand Erosion Resistant
Sprayable Coatings and Molding Resins for Erosion Protection of Aircraft*

11:15 John DeAntoni, Boeing, *Paint on the Line*

11:45 Eric Morris, Deft Inc., *Advancements in Chrome-Free Technologies*

12:15 *Break for Afternoon*

7:00 *Poster and Panel Session*

Thursday, 25 Aug 05

7:30 – 8:30 Continental Breakfast

Session 5 Linda Kasten, UDRI, *Surface Treatments and Multifunctional Coatings*
8:30 Alex Khramov, Universal Technology Corporation, *Sol-Gel Hybrids with Phosphonate Functionalities as Surface Treatment for Magnesium Materials*

9:00 Seva Balbyshev, Universal Technology Corporation, *Optimization of Processing Parameters of SNAP Coatings for Corrosion Protection of Al Alloys*

9:30 Rudy Buchheit, The Ohio State University, *Chemically Tailored Ion Exchange Compounds for Environmentally Friendly Inhibiting and Sensing Pigments for Corrosion Resistant Organic Coatings*

10:00 BREAK

10:15 Mohammad Khobaib, UDRI, *Detection and Location of Corrosion Underneath Coatings*

10:45 Martin Kendig, Rockwell Scientific Company, LLC, *Corrosion Inhibitors for "Smart" Corrosion Protective Coatings*

11:15 Carrie A. Delcomyn, Applied Research Associates, Inc., *Pressurization of Materials Coated with Multifunctional Strippable Polymers and the Vulnerability to Penetration of Toxic Chemical Agents*

11:45 Albert Schnieders, ION-TOF USA, Inc., *The Application of TOF-SIMS Analysis to the Development of New Multifunctional Materials*

12:15 Break for Afternoon

Session 6 Rajesh Naik, AFRL/MLPJE, *Biologically-Inspired Coatings*

7:00 Ravi Kane, Rensselaer Polytechnic Institute, *The Design of Functional Nanostructured Materials*

7:30 Nikolai Lebedev, US Naval Research Laboratory, *Photoactive Protein-functionalized Surfaces*

8:00 BREAK

8:15 Ashutosh Chilkoti, Duke University, *Passive and Active Surfaces to Control Protein and Cell Interactions*

8:45 Jeff Brinker, Sandia National Laboratories, *Bio-Inspired Self-Assembly of Multifunctional Porous and Composite Nanostructures*

9:15 ADJOURN

Friday, 26 Aug 05

8:30 – 9:30 Continental Breakfast (We will start 1 hour later to allow attendees to check out of the hotel)

Session 7 Gordon Bierwagen, NDSU, *Self-Assembled Monolayer and Layer-by-Layer Thin Films*

9:30 Roger M. Leblanc, University of Miami, *Quantum Dots: Self-assembly and Layer-by-Layer Deposition Towards Sensor Development*

10:00 Don Haynie, Louisiana Tech University, *Designed Polypeptide Multilayer Nanofilms: Science and Technology*

10:30 BREAK

10:45 Nicholas Kotov, University of Michigan, *Multifunctional Composites Made by Layer-by-Layer Assembly*

11:15 Duhua Wang, NDSU, *Self-assembled Monolayer for Adhesion Improvement Between Polymer Coating and Aluminum Alloy Substrate*

11:45 Workshop Adjourn

CONFERENCE

Culture and Adversary Modeling

29 November -- 1 December, 2005

Hilton Palacio del Rio Hotel
200 South Alamo Street
San Antonio TX 78205

210-222-1400

www.hilton.com/en/hi/hotels/index.jhtml?ctyhocn=SATPDHH

Tuesday, 29 November

CULTURE AND ADVERSARY MODELING

- 8:00 Registration and Speaker Set-up (Salon del Rey, 4th Floor Mezzanine)
- 9:00 Welcome and Introduction
John Tangney, AFOSR
- 9:10 Social Simulation of the Pashtun Tribes along the Afghanistan - Pakistan Border
Ed MacKerrow, LANL
- 9:30 Computational Approaches to Understanding Belief Networks
Whitman Richards, MIT
- 9:50 Building Cultural Knowledge Fragments
Gene Santos, Dartmouth
- 10:10 BREAK
- 10:30 Laboratory for Computational Cultural Dynamics
Dana Nau, UMD
- 10:50 Social Influence Network Dynamics and Insurgent Movements
Michael Gabbay, ISL Inc.
- 11:10 Combining Game Theory and Social Network Analysis: an Empirical Example
Elisa Bienenstock, BAH
- 11:30 BREAK
- 11:50 Computational Model of Culture
Scott Page, University of Michigan
- 12:10 Interpretation of Live Data Capture from Cultural Perspective
Jore Park & Wylci Fables, Indasea
- 12:30 LUNCH — local restaurants

- 14:00 Mass Mobilization under Uncertainty of Information
Guillermo Owen, NPS
- 14:20 Control Theoretic Modeling for Uncertain Cultural Attitudes and Unknown
Adversarial Intent
Jeff Shamma, UCLA
- 14:40 Computational Modeling of Cultural Dimensions in Adversary Organizations
Alex Levis, GMU
- 15:00 BREAK
- 15:20 Culture Modeling and Agents for World Diplomacy Games
Barry Silverman, University Pennsylvania
- 15:40 Algorithms for Collaborative and Adversarial Decision Making in Partially
Observable Stochastic Games
Shlomo Zilberstein, University Massachusetts
- 16:00 Algorithmic Tools for Adversarial Games
Lee Krause, Securboracion Inc
- 16:20 BREAK
- 16:40 A Dynamic Network Approach to Adversarial Modeling
Kathleen Carley, CMU
- 17:00 Graph Matching Technologies for Behavior Prediction
Tim Darr, 21st Century Tech Inc.
- 17:20 A Marriage Model of Cultural Interaction
Rick Warren, AFRL/HE
- 17:40 Cultural Understanding at the Tactical Level
Susan Numrich, IDA
- 18:30 **RECEPTION**
Institute of Texan Cultures, 801 S. Bowie Street
(Sponsored by the Institute for the Protection
of American Communities at the UTSA)

Wednesday, 30 November

7:00 Registration and Speaker Set-up

KEYNOTE ADDRESS

8:00 Mirrors and Windows: Media in the Middle East
John W. Rendon, The Rendon Group

PANEL DISCUSSION

8:40 Understanding Adversarial Decision Making from the Operational Viewpoint
LTG Thomas F. Metz, Commanding General III Corps

9:10 Assessing Adversarial Decision Making: An Intelligence Perspective
MG (ret) Glen Shaffer, dNovis Inc

9:40 Madrid: The Evolution of al Qaeda Operations
Marc Sageman, Univ Pennsylvania

10:10 BREAK

GOVERNMENT PROGRAMS

10:30 Systems for Multicultural Collaboration in Effects Based Operations
Linda Pierce, ARL

10:50 Pattern and Anomalies Detection (PAD) Process
Drew Carter, Army 1st IOC (Land)

11:15 Pre-Conflict Anticipation and Shaping (PCAS) Program
Robert Popp, DARPA

11:35 BREAK

11:55 Systems Dynamic Model of a Nation State
Capt J.D. Robbins, AFRL/IF

12:15 Adversarial and Threat Assessment -- New Methods to Integrate Computational and
Social Sciences
D.J. Patil, DTRA

12:35 LUNCH — local restaurants

- 13:35 Culture and Adversarial Modeling
Eric Braedon and Keith Anthony, NASIC
- 13:55 Information Operations Innovative Network (IOIN)
Janet Fender, ACC
- 14:15 MCIA Cultural Initiatives
Emily Jackson, MCIA
- 14:35 BREAK
- 14:55 DMSO Programs in Cultural Modeling
Michael Young, AFRL/HE
- 15:15 Human Network Analysis at JWAC
Capt. Aaron Bell, JWAC
- 15:35 Joint Information Operations Center Overview
Rick Coronado, JIOC
- 15:55 BREAK
- 16:15 Formulation of Research on Adversarial Intent
Carol McCann, DRD (Canada)
- 16:35 Organizational and Cultural Criteria for Adversary Modeling (OCCAM)
Greg Zacharias, CRA
- 16:55 Modeling Culture
Rebecca Goolsby, ONR
- 17:15 Open Sessions Adjourn

Thursday, 1 December

GOVERNMENT PROGRAMS (cont)

Classified Session

8:00 Meet AF Bus Outside Palacio del Rio or
Find Own Transportation to

Kelly Field Club (210) 924-7341
250 Mabry (Bldg 1676)
San Antonio, TX 78226

9:00 Joint Integrative Analysis and Planning Capability
Maj (sel) Ken Stoni, JIOC

9:20 Geo-Spatial Contributions to Modeling
Paul Schaefer, NGIA

9:40 Operationalizing Cultural Awareness
Tom Schmidt, TRADOC

10:00 BREAK

10:20 Identifying Cultural Factors Influencing the Behavioral Responses to
Non-Lethal Weapons
Lt Keith White, AFRL/HE

10:40 Factoring Culture into Influence Planning
Laurie Fenstermacher, AFRL/HE

11:00 DISCUSSION

11:30 Meet Transportation for Return to Hotel

12:00 Conference Adjourns

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
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				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
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14. ABSTRACT During the performance of this contract UES, Inc. provided research evaluation services for the Chemistry & Life Sciences Directorate, Air Force Office of Scientific Research in areas that include Neurosciences, Computer Sciences, Otolaryngology, Meteorology, Chemistry, Biotechnology and Fuels and in related programs under development. Evaluations were secured for 68 research proposals. Three program reviews were held in the areas of Molecular Dynamics & Theoretical Chemistry, BioInspired Concepts (BIC) Theme and Biomimetic and Biomaterial & Biointerfacial Sciences. Three workshops were held in the areas of Culture & Personality in Models of Adversarial Decision-Making, Cell-Like Entities (CLE), and Dip-Pen Nanolithography (DPN). One panel meeting was held in Molecular Dynamics & Theoretical Chemistry.					
15. SUBJECT TERMS Neurosciences, Molecular, Dynamics, Perception, Cognition, Chronobiology, DipPen, Nanolithography Biomimetic, Biomaterial, Biointerfacial					
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ANNUAL REPORT

CHEMISTRY AND LIFE SCIENCES RESEARCH PROGRAM

CONTRACT NO. F49620-00-C-0009

Period of Performance: 3/1/03 – 2/29/04

Prepared For:

**AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
CHEMISTRY AND LIFE SCIENCES DIRECTORATE**

Dr. Genevieve Haddad, Program Manager

Presented By:

**UES, Inc.
4401 Dayton-Xenia Road
Dayton, OH 45432-1894**

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INTRODUCTION

UES, Inc. is providing research evaluation services to the Directorate of Chemistry and Life Sciences, Air Force Office of Scientific Research (AFOSR), in sub areas that include Neurosciences (e.g., Neurochemistry, Biology, Electrophysiology, Neuroanatomy, Multisensory Integration/Spatial Orientation, Cardiovascular Physiology, and Bioenvironmental Hazards; Psychophysics, Psychophysiology, Physiological Psychology, Sensation, Perception, Cognition); Computer Sciences (e.g., Vision and Robotics); Otolaryngology; Meteorology, Chemistry (e.g., computational chemistry, polymeric and organic materials, photonic materials, inorganic and surface chemistry, high density materials); Biotechnology (e.g., materials and processes); and Fuels (e.g., petroleum and synthetic); and in related programs under development.

The services provided by UES, Inc. include: selecting qualified scientists to evaluate proposals, assembling scientific groups to evaluate, analyze and advise on content and direction of Chemistry and Life Sciences Programs; organizing workshops to assist in the definition of new basic research areas proposed by the Chemistry and Life Sciences Directorate; providing advisors to make presentations and assist government personnel with analyzing areas of relevant science; and providing advisors to assist and advise on site visits to research laboratories.

The fourth option year included: 76 Proposals Reviewed, 3 Program/Contractor Reviews, 1 Workshop and 1 Panel Meeting.

A. Evaluations of Individual Research Proposals

UES mailed 76 proposals to evaluators during the performance period of 1 March 2003 through 29 February 2004.

UES has been providing the Director of Chemistry and Life Sciences a Summary of Proposals Under Review (SPUR) report on a biweekly basis. This report is now being sent electronically as well as a hard copy. This report is composed of the UES log sheet indicating the proposals sent out, the names of the evaluators to whom the proposals were sent, the dates the proposals were mailed, the tickle date, any necessary comments, and the date the reviews were received. This allows the Program Managers to have a current listing of all proposal activity.

B. Contractor/Program Reviews

1. The first program review was **Molecular Dynamics and Theoretical Chemistry Program Review**, Shelter Pointe, CA, 18-20 May 2003. The objectives of the molecular dynamics program are to understand, predict, and control the reactivity and flow of energy in molecules. Twenty-five scientists gave presentations regarding their grant proposals in this area. UES provided on-site support, abstract booklets and made all arrangements for the meeting. (\$1,885.92),

Dr. Michael Berman, Program Manager

Total Attendance: 94

Speakers: 27

Posters: 42

2. The second program review was **BioInspired Concepts (BIC) Theme Review**, Lowes Annapolis Hotel, Annapolis, MD, 1-2 June 2003, (\$6,256.98)
Dr. Walter Kozumbo, Program Manager.

Total Attendance:	26
Speakers:	22
Attendees:	4

3. The third program review was **Biomimetic, Biomaterial & Biointerfacial Sciences**, Hawk's Cay Resort, Hawk's Cay, FL, 19-23 January 2004. UES provided on-site support, abstract booklets and made all arrangements for the meeting. (-\$2,169.84)
Dr. Hugh De Long, Program Manager.

Total Attendance:	34
Speakers:	29
Attendees:	5

C. Workshops

1. **AFOSR Culture and Personality in Models of Adversarial Decision Making**
Hilton McLean Tysons Corner, McLean, VA, 13-14 November 2003, (\$5,121.87)
Dr. John Tangney, Program Manager

Total Attendance:	71
Speakers:	31
Attendees:	40

2. **AFOSR Cell-Like Entities (CLE)**, Holiday Inn I-675, Fairborn, OH,
17-18 June 2003 (\$890.33)
Walter Kozumbo, Program Manager.

Total Attendance:	44
Speakers:	11
Attendees:	33

3. **AFOSR Dip-Pen Nanolithography (DPN) Workshop**, Hawk's Cay Resort, Duck Key, FL, 26-27 January 2004, The goal of this workshop was to bring together scientists and engineers with broad backgrounds to explore the state-of-the-art and future capabilities of DPN. DPN is now in over 50 different laboratories around the world and has become a very powerful scientific discovery tool. It also looks quite promising as a flexible production tool for certain applications in the life sciences industries.
(\$1,136.45)

Hugh C. De Long, Program Manager.

Total Attendance:	42
Speakers	24
Attendees	18

D. Panel Meeting

**Molecular Dynamics & Theoretical Chemistry Panel Meeting, Marriott Hotel,
Dulles, VA, 20 June 2003 (\$926.04)**

Dr. Michael Berman, Program Manager

Number of Panel Members Present: 7

F. **Advisors**

In addition to advisors provided for Program Reviews, Workshops and Panel Meetings, UES provided travel, per diem and in many cases, honorarium for the following advisors:

**Plamen Atanasov, 2004 Nano-Materials for Defense Applications Symposium,
Maui, Hawaii**

23-26 February 2004

(\$2,157.35 Reimbursement for Expenses)

Paul Trulove, Program Manager

**Scott Atran, AFOSR Culture & Personality in Models of Adversarial
Decision-Making Workshop, McLean, VA**

13-14 November 2003

(\$1,548.54 Reimbursement for Expenses)

John Tangney, Program Manager

**Kit Bowen, AFOSR Molecular Dynamics/Theoretical Chemistry Panel Meeting,
Dulles, VA**

20 June 2003

(\$340.00 Reimbursement for Expenses)

Dr. Michael Berman, Program Manager

Jillian Buriak, AFOSR DPN Workshop, Duck Key, FL

26-27 January 2004

(\$1,229.79 Reimbursement for Expenses)

Dr. Hugh De Long, Program Manager

**Kathleen Carley, AFOSR Culture & Personality in Models of Adversarial
Decision-Making Workshop, McLean, VA**

13-14 November 2003

(\$1,552.75 Reimbursement for Expenses)

Dr. John Tangney, Program Manager

**Sun-Ki Chai, AFOSR Culture & Personality in Models of Adversarial
Decision-Making Workshop, McLean, VA**

13-14 November 2003

(\$1,181.08 Reimbursement for Expenses)

Dr. John Tangney, Program Manager

**Peter Carnevale, AFOSR Culture & Personality in Models of Adversarial
Decision-Making Workshop, McLean, VA**

13-14 November 2003

(\$1,968.60 Reimbursement for Expenses)

Dr. John Tangney, Program Manager

Advisors - continued

Francis J. Doyle III, **AFOSR Cell-Like Entity Workshop**, Fairborn, OH
27-28 June 2003
(\$803.84 Honorarium, \$1,442.75 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

David Funder, **AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop**, McLean, VA
13-14 November 2003
(\$1,210.50 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

William C. Fuqua, **AFOSR Cell-Like Entity Workshop**, Fairborn, OH
27-28 June 2003
(\$803.84 Honorarium, \$400.39 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Bruce Garrett, **AFOSR Molecular Dynamics/Theoretical Chemistry Panel Meeting**,
Dulles, VA, 20 June 2003
(\$802.00 Honorarium, \$645.00 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Joseph Henrich, **AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop**, McLean, VA, 13-14 November 2003
(\$803.84 Honorarium, \$726.50 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

Wilson Ho, **AFOSR Molecular Dynamics Contractor's Review**, San Diego, CA
18-20 May 2003
(\$459.80 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

John R. Hollenbeck, **AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop**, McLean, VA, 13-14 November 2003
(\$952.51 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

Mark Johnson, **AFOSR Molecular Dynamics/Theoretical Chemistry Panel Meeting**,
Dulles, VA, 20 June 2003
(\$458.03 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Advisors - continued

Helen Altman Klein, AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop, McLean, VA

13-14 November 2003

(\$734.50 Reimbursement for Expenses)

Dr. John Tangney, Program Manager

Craig Knoblock, AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop, McLean, VA

13-14 November 2003

(\$1,629.44 Reimbursement for Expenses)

Dr. John Tangney, Program Manager

James R. Lackner, US Air Force Academy, Colorado Springs, CO

18-20 May 2003

(\$580.00 Reimbursement for Expenses)

Dr. Willard Larkin, Program Manager

James M. Lisy, AFOSR Molecular Dynamics/Theoretical Chemistry Panel Meeting, Dulles, VA, 20 June 2003

(\$802.00 Honorarium, \$773.42 Reimbursement for Expenses)

Dr. Michael Berman, Program Manager

Gerald Matthews, AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop, McLean, VA, 13-14 November 2003

(\$297.00 Reimbursement for Expenses)

Dr. John Tangney, Program Manager

Harley McAdams, AFOSR Cell-Like Entity Workshop, Fairborn, OH

27-28 June 2003

(\$803.84 Honorarium, \$1,023.36 Reimbursement for Expenses)

Dr. Walter Kozumbo, Program Manager

Douglas Medin, AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop, McLean, VA

13-14 November 2003

(\$878.97 Reimbursement for Expenses)

Dr. John Tangney, Program Manager

Phillip Messersmith, AFOSR Cell-Like Entity Workshop, Fairborn, OH

27-28 June 2003

(\$803.84 Honorarium, \$528.45 Reimbursement for Expenses)

Dr. Walter Kozumbo, Program Manager

Advisors - continued

John W. Mintmire, **AFOSR Molecular Dynamics/Theoretical Chemistry Panel Meeting**,
Dulles, VA, 20 June 2003
(\$773.42 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Carlo Montemagno, **AFOSR Cell-Like Entity Workshop**, Fairborn, OH
27-28 June 2003
(\$803.84 Honorarium, \$2,310.49 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Ara Norenzayan, **AFOSR Culture & Personality in Models of Adversarial
Decision-Making Workshop**, McLean, VA
13-14 November 2003
(\$1,362.14 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

Scott Page, **AFOSR Culture & Personality in Models of Adversarial
Decision-Making Workshop**, McLean, VA
13-14 November 2003
(\$896.25 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

Krishna Pattipati, **AFOSR Culture & Personality in Models of Adversarial
Decision-Making Workshop**, McLean, VA
13-14 November 2003
(\$767.29 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

Avrom Pfeffer, **AFOSR Culture & Personality in Models of Adversarial
Decision-Making Workshop**, McLean, VA
13-14 November 2003
(\$1,033.01 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

Steen Rasmussen, **AFOSR Cell-Like Entity Workshop**, Fairborn, OH
27-28 June 2003
(Invoice never received)
Dr. Walter Kozumbo, Program Manager

Terence Risby, **JP-8 Jet Fuel Toxicology Meeting**, Tucson, AZ
14-16 May 2003
(\$1,127.49 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Advisors - continued

James Schneider, **AFOSR Cell-Like Entity Workshop**, Fairborn, OH
27-28 June 2003
(\$803.84 Honorarium, \$541.28 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Uwe Sleytr, **AFOSR Cell-Like Entity Workshop**, Fairborn, OH
27-28 June 2003
(\$803.84 Honorarium, \$541.28 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Lazar Stankov, **AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop**, McLean, VA, 13-14 November 2003
(\$731.50 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

Josh Tenenbaum, **AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop**, McLean, VA, 13-14 November 2003
(\$746.25 Reimbursement for Expenses)
Dr. John Tangney, Program Manager

L. Scott Theibert, **AFOSR Phase I STTR "High Strength C-C Composites**
Dayton, OH, 3 June 2003
(\$401.00 Honorarium)
Dr. Charles Lee, Program Manager

Fritz Vollrath, **Silk Conference**, Montreal, Canada
Week of June 24, 2003
(\$600.00 Reimbursement for Expenses)
Dr. Hugh De Long, Program Manager

Albert F. Wagner, **AFOSR Molecular Dynamics/Theoretical Chemistry Panel Meeting**,
Dulles, VA, 20 June 2003
(\$560.25 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Lei Wang, **AFOSR Cell-Like Entity Workshop**, Fairborn, OH
27-28 June 2003
(\$803.84 Honorarium, \$1,247.00 Reimbursement for Expenses)
Dr. Walter Kozumbo, Program Manager

Robert L. Whetten, **AFOSR Molecular Dynamics/Theoretical Chemistry Panel Meeting**,
Dulles, VA, 20 June 2003
(\$775.25 Reimbursement for Expenses)
Dr. Michael Berman, Program Manager

Advisors – continued

Patrick Winston, **AFOSR Culture & Personality in Models of Adversarial Decision-Making Workshop**, McLean, VA

13-14 November 2003

(\$581.50 Reimbursement for Expenses)

Dr. John Tangney, Program Manager

Yuhong Yang, **Silk Conference**, Montreal, Canada

Week of 24 June 2003

(\$600.00 Reimbursement for Expenses)

Dr. Hugh De Long, Program Manager

Liu Yi, **Silk Conference**, Montreal, Canada,

Week of 24 June 2003

(\$600.00 Reimbursement for Expenses)

Dr. Hugh De Long, Program Manager

Errol Zeiger, **JP-8 Jet Fuel Toxicology Meeting**, Tucson, AZ

13-16 May 2003

(\$1,114.81 Reimbursement for Expenses)

Dr. Walter Kozumbo, Program Manager

SUMMARY

UES is pleased to continue to perform the specific tasks assigned to them in accordance with provisions of the contract. Participants will continue to be Dr. Mike Livingston as Program Manager, Judith M. Flory, Program Administrative Manager and Amiee Nichols as Program Assistant. UES personnel appreciate the opportunity to be of service to AFOSR in this interesting and worthwhile program.

LIST OF APPENDICES

Breakdown of Research Proposals by Program Manager

Program for Molecular Dynamics and Theoretical Chemistry

Program for BioInspired Concepts (BIC) Theme program Review

Program for Biomimetic, Biomaterial & Biointerfacial Sciences

Program for AFOSR Culture and Personality in Models of Adversarial
Decision-Making Workshop

Program for Cell-Like Entities (CEL) Workshop

Program for AFOSR Dip-Pen Nanolithography (DPN) Workshop

BREAKDOWN OF RESEARCH PROPOSALS BY PROGRAM MANAGER

<u>PROGRAM MANAGER</u>	<u>NO. OF PROPOSALS</u>
Berman	22
De Long	7
Kozumbo	7
Larkin	9
Lee	11
Sorkin	12
Tangney	0
Trulove	8

2003 Molecular Dynamics & Theoretical Chemistry Contractors Review

Shelter Pointe Hotel
San Diego, CA

Sunday, 18 May 2003 (Point Loma 1)

- 1:00 PM** **Registration opens**
- 2:45 PM** **Opening remarks**
- 3:00** **Ultrafast Dynamics with Diffraction and Mass Spectrometry**
A. H. Zewail, California Institute of Technology Pasadena, CA
- 3:30** **Free Radical Spectroscopy in Helium Nanodroplets**
R. E. Miller, University of North Carolina, Chapel Hill, NC
- 4:00** **High Resolution Pulsed Infrared Cavity Ringdown Spectroscopy of Ions and Clusters**
R. J. Saykally, University of California, Berkeley, CA
- 4:30** **Break**
- 5:00** **Charge Transfer Reactions of O_2^+ with Alkylbenzenes at High Pressure: Stabilization of the Excited Intermediate and Determination of the Step Sizes for Collisional Energy Transfer**
A. A. Viggiano, Air Force Research Laboratory, Hanscom AFB, MA
- 5:30** **Bonding and Non-bonding Interactions Involving Aluminum and Hydrogen**
P. J. Dagdigian, The Johns Hopkins University, Baltimore, MD
- 6:00** **Nuclear Quantum Effects in Hydrogen Transfer Reactions: Polyhedral Oligomeric Silsesquioxanes and Ionic Liquids**
S. Hammes-Schiffer, Pennsylvania State University, University Park, PA
- 7:00 PM** **Poster Session and Reception (Point Loma 2)**

Monday, 19 May 2003 (Point Loma 1)

- 7:45 AM** **Continental Breakfast/ Registration Desk open**
- 8:30** **Multidimensional Surface-Enhanced Sensing and Spectroscopy**
R. P. Van Duyne, Northwestern University, Evanston, IL
- 9:00** **Plasmonics: Manipulation of Electromagnetic Fields at the Nanoscale**
N. J. Halas, Rice University, Houston, TX
- 9:30** **Polymer Nanocomposites: Issues and Opportunities**
R. A. Vaia, Air Force Research Laboratory, Wright-Patterson AFB, OH
- 10:00** **Break**
- 10:30** **Conformations of Macromolecular Systems: POSS, PPV's and Paracyclophanes**
M. T. Bowers, University of California, Santa Barbara, CA 11:00
- 11:00** **Hyperthermal Reactions of O(³P) with H₂ and Saturated Hydrocarbons**
T. K. Minton, Montana State University, Bozeman, MT
- 11:30** **Hyperthermal O-Atom-Alkene Collision Products - Recent Results**
J. A. Dodd, Air Force Research Laboratory, Hanscom AFB, MA
- 12:00 PM** **Lunch (Point Loma 2)**
- 1:30** **Free time for round table and informal discussions**

Possible topics:

- *Manipulating Atoms: Where Can it Lead?*
- *Potential Contributions from Chemical Physics to Biology*
- *Chemistry with High-Intensity and Tailored Laser Fields*
- *Molecular Design by Genetic Algorithms*

An Evening of Ionic Liquids

- 7:00 PM** **Field Evaporation of Ionic Liquids for Space Propulsion Purposes**
R. A. Dressler, Air Force Research Laboratory, Hanscom AFB, MA
- 7:20** **Structural Effects on the Physical Properties of Ionic Liquids**
G. W. Drake, Air Force Research Laboratory, Edwards AFB, CA
- 7:40** **The Multi-Scale Simulation of Ionic Liquids**
G. A. Voth, University of Utah, Salt Lake City, UT
- 8:20** **Discussion**

Tuesday, 20 May 2003 (Point Loma 1)

- 7:45 AM** **Continental Breakfast**
- 8:30** **Structural, Electronic, and Impurity-Doping Effects in Nanoscale Chemistry: Supported and Free Gold Nanoclusters**
U. Landman, Georgia Institute of Technology, Atlanta, GA
- 9:00** **Phase Transitions in Inorganic Nanorods**
A. P. Alivisatos, University of California, Berkeley, Berkeley, CA
- 9:30** **New Tools for the Study of Combustion Chemistry and Chemisorption on Nanoscale Supported Metals**
A. M. Rappe, University of Pennsylvania, Philadelphia, PA
- 10:00** **Break**
- 10:30** **Model Catalysts Prepared by Size- and Energy-Selected Ir Nanocluster Deposition**
S. L. Anderson, University of Utah, Salt Lake City, UT
- 11:00** **A Theoretical Study of the Mechanism of Propene Epoxidation on Au/TiO₂**
H. Metiu, University of California, Santa Barbara, CA
- 11:30** **Manipulation of Chemical Interactions with the STM**
W. Ho, University of California, Irvine, Irvine, CA
- 12:00 PM** **Lunch (AJ's Lounge)**
- 1:15** **Polynitrogen Chemistry**
K. O. Christe, Air Force Research Laboratory, Edwards AFB, CA
- 1:45** **New High Energy Density Materials from High Pressure**
R. J. Hemley, Carnegie Institution of Washington, Washington, DC
- 2:15** **Evidence for Photolytic Production of Cyclic-N₃**
A. M. Wodtke, University of California, Santa Barbara, CA
- 2:45** **Break**

Tuesday, 20 May 2003-Continued

- 3:15** **Program Status**
M. R. Berman, Air Force Office of Scientific Research, Arlington, VA
- 3:30** **Azolide Anion Chemistry and Energetics**
W. C. Lineberger, University of Colorado, Boulder, CO
- 4:00** **Light Emission from Hot and Compressed Matter: Simulations and
Characterization of the Thermal-like Collision-Induced Emission Spectrum
Using Sum Rules**
R. D. Levine, Hebrew University, Jerusalem, Israel
- 4:30** **Ultrafast Heterodyne Detected Infrared Multidimensional Vibrational Echo:
Hydrogen Bond Dynamics and Beyond.**
M. D. Fayer, Stanford, CA
- 5:30** **Dinner Buffet (Cabo Garden)**

AFOSR BioInspired Concepts (BIC) Review
The Loews Annapolis Hotel
1-3 June 2003

1 June (Sunday)

1800-1930 Informal Social Mixer at Loews (Thomas Point)

2 June (Monday) Windmill Point

0730 Continental Breakfast (Windmill Point Foyer)

800-830 Introduction
 Walt Kozumbo & Paul Trulove, AFOSR

830-900 Nanobiohybrids: New Model Systems for Bio-Membranes and Sensors
 Emmanuel Giannelis, Cornell University (Trulove)*

900-930 Supramolecular Engineering of New Lithium Ion Conducting
 Polymer Electrolytes
 John Arnold, University of California, Berkeley (Trulove)

930-1000 Coffee Break

1000-1030 Development of Artificial Hair Cells – Polymer and Multi-Modal Sensing
 Chang Liu (PI) and Fred Delcomyn, University of Illinois
 (Trulove)

1030-1100 Bio-Inspired Integration Efforts with AFRL/MLP in Thermal Sensors
 Morley Stone, Air Force Research Lab, WPAFB, OH (De Long)

1100-1130 Protein-Based Thermal Sensors From Snakes and Mammals
 Todd Pappas (PI), J. Garcia, B. Christensen and M. Motamedi,
 University of Texas, Galveston (De Long)

1130-1300 Lunch (on your own)

1300-1330 Chemically Tailored 3-D Nanoparticle Structures by the BaSIC Process
 F. Zalar, R. Unocic, C. Gaddis, J. Zhao, P. Sarosi and
 Ken Sandhage (PI), OSU; R. Naik, G. Agarwal and M. Stone,
 Air Force Research Lab, WPAFB (De Long)

1330-1400 Engineering of Thermally and Mechanically Activated Nanosensors
 Paul Blount, University of Texas, SW Medical Center, Dallas
 (De Long)

1400-1430 Bio-Inspired Organic/Inorganic Hybrid Electronic and Photonic
 Materials and Structures

Alex K-Y Jen (PI) and Mehmet Sarikaya, University of Washington
(Lee)

1430-1500 Coffee Break

1500-1530 BioHarvesting: Use of Natural Forms for Photonics
Richard Vaia (PI) and B. Farmer, Air Force Research Lab, WPAFB
Edwin Thomas, MIT (Lee)

1530-1600 DNA-Assisted Photonic Crystal Fabrication
Fotios Papadimitrakopoulos, University of Connecticut (Lee)

1600 Meeting adjourns for the day (dinner on your own)

3 June (Tuesday) Windmill Point

0730 Continental Breakfast (Windmill Point Foyer)

800-830 Nanosecond, Megawatt, Millijoule Pulses Selectively Perturb But Do Not
Porate Mammalian Cells,
P. Vernier, L. Marcu, C. Craft and Martin Gunderson (PI)
University of Southern California (Barker)

830-900 Experimental and Modeling Studies of Cell Response to Ultrashort, High-
Intensity Electric Fields – Implications for Intracellular Manipulation
Ravindra Joshi (PI), K. Schoenbach and S. Beebe,
Old Dominion University (Barker)

900-930 Cell Fates as Attractors in Genomic Regulatory Networks,
Sui Huang, Harvard (Kozumbo)

930-1000 Coffee Break

1000-1030 Simulating the Interactions of Genes, Proteins and Metabolites in
Cell-Like Entities
Brent Foy, Wright State University (Kozumbo)

1030-1100 New Platform of Molecular Reagents for Altering the Proteome
Harold Smith, University of Rochester (Kozumbo)

1100-1130 The Complexity and Robustness of Biological Networks,
John Doyle, Caltech (King)

1130-1300 Lunch (on your own)

1300-1330 Three Dimensional Flapping Flight,
Z. Jane Wang, Cornell University (King)

1330-1400	Sensing, Stimulation and Signal Transduction (Retinal Processing in Polarization Vision in Teleosts Fishes)
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Craig Hawryshyn (PI) and J. Plant, University of Victoria (Larkin)

1400-1430 Coffee Break

1430-1500 Bio-Inspired Techniques for Representation of Polarization Information and Enhancement of Target Detection in Polarization-Based Imaging and Vision, Nader Engheta (PI) and E. Pugh, University of Pennsylvania (Larkin)

1500-1530 Novel Optical Materials from Marine DNA for Optical Memory and Light Amplification Systems,
Naoya Ogata, Chitose Institute of Science and Technology, Japan (Lee)

1530-1600 · Wrap-up Discussion

1600 End of Meeting

* Names in Parentheses are those of AFOSR program managers of task

**2004 AFOSR Biomimetic, Biomaterial and Biointerfacial Sciences Program
Review**

**Hawk's Cay Resort
Duck Key, FL**

19-23 January 2004

Sunday, 18 January 2004 Registration and Reception, 5:00 to 7:00 PM

Monday, 19 January 2004

- 0830 Opening Remarks – Hugh De Long
 Air Force Office of Scientific Research, AFOSR/NL
- 0845 Directed/Self Assembly
 Self-Assembling Biological Structures with Engineered Functionalities
 Rajesh R. Naik, Air Force Research Laboratory, MLPJE
- 0925 Self-Assembly of Bio-Inspired Nanostructures
 C. Jeffrey Brinker, University of New Mexico
- 1005 Break
- 1035 *Design and Development of Nanoscale Biomotor Power Units*
 Richard C. Holz, Utah State University
- 1115 *Surface Templated, Bio-Inspired Synthesis and Fabrication of
Functional Materials*
 Chad Mirkin, Northwestern University
- 1215 **Lunch**
- 1930 *Ultra-Sensitive and Selective Chip-Based Detection of DNA*
 Chad Mirkin, Northwestern University
- 2030 *Front-End Processing of Cell Lysates for Enhanced Chip-Based
Detection and Analysis*
 James W. Schneider, Carnegie Mellon University

Tuesday, 20 January 2004

- 0830 *Biomimetic Lubrication Schemes: Molecular-level Studies*
 Scott Perry, University of Houston
- 0910 *Biological and Biomimetic Lubrication Schemes: Molecular-level and
Macro-level Studies*
 Nicholas D. Spencer, Swiss Federal Institute of Technology

0950 **Break**

1020 *DNA-DNA and DNA-surface Interactions Measured Using
Homo-oligonucleotides*
Lloyd J. Whitman, Naval Research Laboratory

Title
Angela Belcher, MIT

1140 **Combinatorial Analysis of Functional Interfaces and Surfaces
Generated Via Dip-Pen Nanolithography**
Thomas B. Higgins, Harold Washington College

1220 **Lunch**

1930 *S-layer Templated Nanoparticle and Carbon Nanotube Arrays*
Dietmar Pum, Universitat fur Bodenkultur

2010 *Nanocomposite Compliant Nanomembranes for Thermal Sensing*
Vladimir V. Tsukruk, Iowa State University

Wednesday, 21 January 2004

0830 Direct Nanoscale Conversion of Bio-Molecular Signals into
Electronic Information
Jimmy Xu, Brown University

Silk

0930 Processing and Structural Analysis of Silk Films
Rajesh R. Naik and David M. Phillips, Air Force Research
Laboratory, MLPJE

1005 **Break**
1035 Processing and Structural Analysis of Silk Films
Robert A. Mantz and Lawrence F. Drummy, Air Force Research
Laboratory, MLPJE

1115 Biomimetic Microstructure Formation of High Performance Silk
Films and Fibers
Margaret E. Roylance, Foster-Miller, Inc.

1215 **Lunch**

1930 **Silk Protein Assembly and Function – A Model for Polymer Design**
David Kaplan, Tufts University

2010 Silken Webs: The Secret of the Spider's Success?
Fritz Vollrath, Oxford University

Thursday, 22 January 2004

0830 Spider Silk as a Biomaterial
Randolph Lewis, University of Wyoming

0910 Optical Limiting Silk Membranes and Coatings
Ronald K. Eby, The University of Akron

0950 Break

1020 Nanomechanics of Biopolymers
Kathryn J. Wahl, Naval Research Laboratory

Biomaterialization

1100 Biological Templates for Inorganic Synthesis and Its Applications
Rajesh Naik, Air Force Research Laboratory, MLPJE

1140 Lunch

1320 Studies of Biosilicification: The Role of Proteins, Carbohydrates and
Model Compounds in Structure Control
Carole C. Perry, The Nottingham Trent University

1400 Chemically-Tailored 3-D Nanoparticle Structures by the BaSIC Process
Kenneth H. Sandhage, Georgia Institute of Technology

1440 Break

Friday, 23 January 2004

Thermal Sensors

0830 The Role of Differential Near-Infrared Light Scattering of Mammalian
Cells in their Differentiation and Social Behavior
Guenter Albrecht-Buehler, Northwestern University

0910 Toward the Engineering of a Mechanically Activated Nanosensor
Paul Blount, University of Texas

0950 Break

1020 Infrared Sensory Systems in Pyrophilous Beetles
Helmut Schmitz, Bonn University

Chromophores

1100

Biological Chromophores for Potential DoD Applications
Morley O. Stone, Air Force Research Laboratory, MLPJE

AFOSR WORKSHOP

Culture and Personality in Models of Adversarial Decision-Making

13-14 November 2003

Hilton McLean Tysons Corner
7920 Jones Branch Drive
McLean VA 22102

703-761-5200
www.mclean.hilton.com

13-Nov-03 Thursday

- 7:30 Continental Breakfast (Outside the Amphitheater on Lower Level)
- 7:45 Registration and Speaker Set-Up (Amphitheater on Lower Level)
- 8:15 **Introduction**
John Tangney, AFOSR

GOVERNMENT PROGRAMS

- 8:25 **NASIC's Behavioral Influences Analysis Concept**
Greg Jannarone or Eric Braeden, NASIC
- 8:55 **DMSO Programs on Cultural Effects**
Michael Young, AFRL/HE
- 9:15 **DARPA Program: Wargaming the Asymmetric Environment**
Ruth Willis, NRL
- 9:35 **NSF Programs in Decision, Risk, and Management Sciences**
Jonathan W. Leland, NSF
- 9:55 BREAK
- 10:15 **Social Network Analysis of Terror Networks: Perspectives from the ONR Research Program**
Rebecca Goolsby, ONR
- 10:35 **Affordability in Behavior Modeling**
Ruth Willis, NRL
- 10:55 **AFRL/IF Initiatives in Adversarial Decision Modeling**
Paul Bello, AFRL/IF
- 11:15 **Cognitive Engineering for Adaptable Leaders and Teams**
Linda Pierce, ARL

CULTURAL RESEARCH

- 11:35 **AFRL/HE Research on Culture**
Timothy Gameros and Gilbert Kuperman, AFRL/HE
- 11:55 NO-HOST LUNCH AT HOTEL RESTAURANT
- 13:00 **Culture and Resource Conflict**
Doug Medin, Northwestern University
- 13:20 **Decision Making in Cultural Contexts**
Scott Atran, University of Michigan
- 13:40 **Crossing Cognitive Borders: Working with Differences**
Helen Altman Klein, Wright State University
- 14:00 BREAK
- 14:20 **Cross-Cultural Variations in Economic Decision-Making**
Joe Henrich, Emory University
- 14:40 **Culture and Conflict**
Peter Carnevale, NYU
- 15:00 **Psychometric Approaches to Identifying Cultural Differences**
Patrick Kyllonen and Lazar Stankov, Educational Testing Service
- 15:20 **Culture and Reasoning**
Ara Norenzayan, Univ British Columbia
- 15:40 BREAK
- 16:00 **Modeling Covert Networks**
Kathleen Carley, CMU

PERSONALITY RESEARCH

- 16:20 **Personality Traits and Decision-Making: Making the Most of Limited Diagnosticity**
Gerry Matthews, University of Cincinnati
- 16:40 **The Role of Personality in Cooperative and Adversarial Group Contexts**
John Hollenbeck, Michigan State
- 17:00 **Basic Processes in Judging Personality Accurately**
David Funder, University of California, Riverside
- 17:20 DAY ADJOURNS (No-host dinner at local restaurants)

14-Nov-03 Friday

7:15 Continental Breakfast (Outside the Amphitheater on Lower Level)

MODELING

8:00 **Effects Based Operations and Cultural Modeling: A Needed Synthesis**

Alex Levis, Air Force

8:20 **Culturally Sensitive Modeling for Intelligent-Agent-Based Decision Support**

Alexander D. Stoyen, 21st Century Systems Inc; Sun-Ki Chai, Univ Hawaii at Manoa

8:40 **Anticipating a Leader's Decision**

Dennis Buede, Innovative Decisions Inc; Richard Rees, CIA; Paul Sticha, HumRRO

9:00 BREAK

9:15 **Extracting Data from Online Sources**

Craig Knoblock, USC

9:35 **Representationally Complete Language Systems: Benefits and Obstacles**

Patrick Winston, MIT

9:55 **Agent-Based Models of Culture**

Scott E. Page, University of Michigan

10:15 **Analytic Modeling of Adversaries**

Thomas Murray, SAI

10:35 BREAK

10:50 **Agent-Based Modeling of Recruiting**

Wendell Jones, Sandia

11:10 **Organizational Strategies and Structures: Taking into Account the Adversary**

Krishna Pattipati, University of Connecticut

11:30 **Modeling Agents' Beliefs and Decision-Making Processes in Games**

Avi Pfeffer, Harvard University

11:50 **Putting Domain-Specific Knowledge into Domain-General Rational Models of Human Inference**

Josh Tenenbaum, MIT

12:10 NO-HOST LUNCH AT HOTEL RESTAURANT

DISCUSSION

13:15 What Future **Capabilities** Are Envisioned?

13:35 What Future **Technologies** Might Enable These Capabilities?

13:55 What New **Knowledge** Might Foster Desired Technology Developments?

14:15 How Do Existing Research **Programs** Tile the Space of Desired Knowledge?

14:35 Are Programmatic **Gaps** Evident?

14:55 Are Identified Gaps **Significant** for Capabilities Envisioned?

15:15 MEETING ADJOURNS



AGENDA

TUESDAY, 17 June 2003

- 0800-0810 **Welcome**
Dr. John Frazier-AFRL
- 0810-0855 **Keynote Speaker**
Systems Architecture of the Bacterial Cell Cycle Control System
Dr. Harley McAdams Professor, Developmental Biology Department, Stanford Univ. School of Medicine
- 0900-0910 **Break**
- 0910-0950 **Modeling and Analysis Issues in Biophysical Networks**
Dr. Frank Doyle-UCSB
- 0950-1030 **2D-Protein Arrays (S-layers) as Patterning Element in Bionanotechnology and Biomimetics**
Dr. Uwe Steyer-Professor at U. fur Bodenkultur, Austria
- 1030-1040 **Break - Welcome**
Dr. Ruck
- 1040-1120 **The Genesis of Engineered Intelligent systems from the Machinery of Life**
Dr. C. Montagnano-UCLA
- 1120-1200 **Genetically Encoding Novel Amino Acids in Cells**
Dr. Lei Wang, Research Associate, Department of Pharmacology, University of California, San Diego
- 1200-1330 **Lunch**
- 1330-1410 **Assembling Protocells: Rational and Evolutionary Design**
Dr. Steen Rasmussen, Self-Organizing Systems, Team Leader (Acting), PhD Physics, Los Alamos National Laboratory
- 1410-1450 **Peptide-Amphiphiles as Biomimetic Materials**
Dr. J. Schneider—Carnegie Mellon University, Assistant Professor, Department of Chemical Engineering
- 1450-1500 **Break**
- 1500-1540 **Dr. Fuqua, Assistant Professor, Dept. of Biology—Indiana University**
- 1540-1620 **Biological Strategies for Control of the Inorganic-Organic Interface: Preventing/Encouraging Cell Adhesion**
Dr. Messersmith Professor, Biomedical Engineering Department Northwestern University
- 1620-1630 **Wrap Up**

WEDNESDAY, 18 June 2003

- 0800-0900 **Cell-Like Entity**
Dr. Frazier
- 0900-1200 **Brainstorming Session**
- 1200-1300 **Lunch**
- 1300-1630 **Strategy Business Meeting**
AFRL Members

2004 AFOSR Dip-Pen Nanolithography Workshop
Hawk's Cay Resort
Duck Key, FL
January 26-27, 2004

Monday, January 26, 2004

- 0800 - 0830 Registration/Continental Breakfast
- 0830 - 0930 **Plenary Talk - Dip-Pen Nanolithography:
State-of-the-Art Applications and Future Challenges**
Chad A. Mirkin, Northwestern University, Evanston, IL
- 0930 - 1000 **Fabrication and Modification of Nanostructures Using Dip-Pen Nanolithography**
Jie Liu, Duke University, Durham, NC
- 1000 - 1030 **Massively Parallel and High Density DPN Probes**
Chang Liu, Microelectronics Laboratory, University of Illinois, Urbana, IL
- 1030 - 1045 Break
- 1045 - 1115 **Teaching "Old" Materials "New" Tricks: Site-Specific Nanopatterning of
Functional Inorganics**
Vinayak P. Dravid, Northwestern University, Evanston, IL
- 1115 - 1145 **Semiconductor Surfaces with Nanometer Features Composed of TAT Peptides**
Albena Ivanisevic, Purdue University, West Lafayette, IN
- 1145 - 1215 **Enzyme Kinetics Measured from Nanoscale Arrays of Horseradish
Peroxidase Formed by Dip-Pen Nanolithography**
Patrick C. Collier, California Institute of Technology, Pasadena, CA
- 1215 - 1330 Lunch Break
- 1330 - 1400 **Theoretical Studies of Dip Pen Nanolithography**
George Schatz, Northwestern University, Evanston, IL
- 1400 - 1430 **Heated Atomic Force Microscope Cantilevers for Temperature-Activated
DPN**
William King, Georgia Institute of Technology, Atlanta, GA
- 1430 - 1500 **Fabrication of "Smart" Biomolecular Nanostructures using Dip-Pen
Nanolithography**
Stefan Zauscher, Duke University, Durham, NC
- 1500 - 1530 **Design and Development of Nanoscale Biomotor Power Units**
Richard C. Holz, Utah State, Logan, UT
- 1530 - 2000 Afternoon Break

2000 - 2150 **Poster Session/Mixer**

Study of Electrical Characteristics of Au Nano-Wires Drawn by Dip Pen Nanolithography

Loveleen Brar, Indian Institute of Science, Bangalore, AK

Massively Parallel and High Density DPN Probes

David Bullen, University of Illinois/Urbana-Champaign, Urbana, IL

Nanoscale Precision Coating for Nanomechanical Sensors by Dip-Pen Technique

Ida Lee, University of Tennessee, Oak Ridge, TN

Nano-Immunoassays for Ultrahigh Sensitive/Selective Detection of HIV

Ki-Bum Lee, Northwestern University, Evanston, IL

AFM Study of Water Meniscus Formation Between an AFM Tip and NaCl Substrate

Sergey Rozhok, Northwestern University, Evanston, IL

From Random Attachment to Single Cell Specified Arrangements

Sergey Rozhok, Northwestern University, Evanston, IL

Electrochemical Control of DPN-generated Nanostructures

Khalid Salaita, Northwestern University, Evanston, IL

Tuesday, January 27, 2004

0800 - 0830 Continental Breakfast

0830 - 0915 **Plenary Talk – Scanning Probe Cantilevers Operating in New Modes**

Cal F. Quate, Stanford University, Stanford, CA

0915 - 0945 **Nanoscale Patterning of Semiconductor Surfaces with Scanning Probe Microscopy**

Jillian M. Buriak, University of Alberta, Edmonton, Alberta, Canada

0945 - 1015 **Dip-Pen Nanolithography for Nanoscale Biosensing and Photonic Applications**

David Ginger, University of Washington, Seattle, WA

1015 - 1030 Break

1030 - 1100 **Examining and Controlling Molecular Flow in DPN**

Paul Sheehan, Naval Research Laboratory, Washington, DC

1100 - 1130 **Rapid Prototyping of Hybrid Nanoscale Devices via Dip-Pen Nanolithography**

Seunghun Hong, Seoul National University, Seoul, Korea

1130 - 1200 Controlled Deposition of Bio-Inorganic Catalyzing Molecules Via Electrostatic Dip-Pen Nanolithography

Morley O. Stone, AFRL/ML, Wright-Patterson AFB, OH

1200 - 1330 Lunch Break

1330 - 1400 Using Dip-Pen Nanolithography and Two-step Nanografting to Investigate Assembly of Virus Nanostructures at Chemoselective Templates

James J. DeYoreo, Lawrence Livermore National Laboratory, Livermore, CA

1400 - 1430 Building an Interface to Biomolecular Processes

Jeff M. Byers/David Pena, Naval Research Laboratory, Washington, DC

1430 - 1500 Dip-Pen Nanolithography: Towards Industrial Nanofabrication

Joe Fragala, NanoInk, Inc.

1530 - 1545 Break

1545 - 1715 Panel Discussion – Future Directions and Applications of DPN

1715 - 1730 Closing Remarks

SUMMARY OF REVIEWS
AFOSR Molecular Dynamics/Theoretical
Chemistry Review Panel Meeting
20 June 2003

**03-NL-072 Simulation of Reactions for the Design of Energetic Materials,
Resistant Coatings and Laser Protection Devices**

-Sharon Hammes-Schiffer, Pennsylvania State University

Bruce C. Garrett, Pacific Northwest National Laboratory (A / 2)

James T. Hynes, Ecole Normale Supérieure (A / 1)

John Tully, Yale University (A+ / 1)

Albert F. Wagner, Argonne National Laboratory (/)

03-NL-074 Multi-Scale Simulation of High Energy Density Ionic Liquids

-Gregory A. Voth, University of Utah

Bruce C. Garrett, Pacific Northwest National Laboratory (A- / 2 - 3)

Nancy Makri, University of Illinois (A / 2)

John W. Mintmire, Oklahoma State University (A / 1)

James L. Skinner, University of Wisconsin (no grade)

03-NL-075 Model Chemistry of Reactive Species Based on Electron Geminals

-Vitaly A. Rassolov, University of South Carolina

John W. Mintmire, Oklahoma State University (A / 1)

Albert F. Wagner, Argonne National Laboratory (/)

Martin Head-Gordon, University of California, Berkeley (B+ / 1)

**03-NL-078 Oxide-Supported Metal Nanoclusters: Structure, Dynamics, and
Chemical Properties**

-Gyeong S. Hwang, The University of Texas at Austin

James B. Adams, Arizona State University (B / 1)

Bruce C. Garrett, Pacific Northwest National Laboratory ()

Jens K. Nørskov, Technical University of Denmark (A- / 1)

**03-NL-087 New Tools for the Study of Combustion Chemistry and complex
Gas-Surface Interactions from First Principles**

-Andrew M. Rappe, University of Pennsylvania

Bruce C. Garrett, Pacific Northwest National Laboratory ()

Mei-Yin Chou, Georgia Institute of Technology (A- / 2)

John W. Mintmire, Oklahoma State University (A / 1)

James B. Adams, Arizona State University (A- / 2 (3 for QMC part))

- 03-NL-089 Rovibrational Dynamics and Energy Transfer Mechanisms in Bulk Solid Hydrogen and Surface-Adsorbed Hydrogen Layers**
 -Robert J. Hinde, University of Tennessee
- Nancy Makri, University of Illinois (A / 2)
 Bruce C. Garrett, Pacific Northwest National Laboratory (A / 1 - 2)
 John W. Mintmire, Oklahoma State University (A- / 2)
 James L. Skinner, University of Wisconsin (no grade)
- 03-NL-095 Innovative Methodology for Accelerated Quantum Molecular Dynamics**
 -Michael Johnson, CogniTech Corporation
- John W. Mintmire, Oklahoma State University (B+ / 1)
 Peter J. Rossky, University of Texas (C / 1)
 Nancy Makri, University of Illinois (B / 2)
- 03-NL-101 Accurate Thermochemistry From Group Additivity and Ab Initio Methods via Response Reactions**
 -Ravindra Datta, Worcester Polytechnic Institute
- Bruce C. Garrett, Pacific Northwest National Laboratory (B / 2 - 3)
 Karl K. Irikura, National Institute for Standards & Technology (B+ / 1)
 Albert F. Wagner, Argonne National Laboratory ()
- 03-NL-103 Metastable Molecules in the Ground and in Excited States: Theory Development, Implementation and Application**
 -Rodney J. Bartlett, University of Florida
- Martin Head-Gordon, University of California, Berkeley (A- / 1)
 John Stanton, University of Texas at Austin (A / 1)
 Albert F. Wagner, Argonne National Laboratory (/)
- 03-NL-121 Theoretical Studies of Gas Phase Elementary Reactions**
 -Keiji Morokuma, Emory University
- Albert F. Wagner, Argonne National Laboratory (/)
 Todd J. Martinez, University of Illinois (A / 1)
 Donald Truhlar, University of Minnesota (A+ / 1)
- 02-NL-357 Coherent Quantum Control of Multidimensional Vibrational Spectroscopy**
 -Shaul Mukamel, University of Rochester
- John W. Mintmire, Oklahoma State University (A- / 4)
 Warren S. Warren, Princeton University (no grade)
 John Wright, University of Wisconsin (no grade)

- 03-NL-006 Hole Catalyzed Aromatization of Small Organic Molecules**
 -Paul G. Wenthold, Purdue University
- Kit H. Bowen, John Hopkins University (A- / 4-5)**
 Kent M. Ervin, University of Nevada (A- / 2)
 Mark Johnson, Yale University (B / 4)
- 03-NL-067 Ultrafast Soft X-Ray Probing of Core Level Molecular Dynamics**
 -Stephen R. Leone, University of California, Berkeley
- Kit H. Bowen, John Hopkins University (A+ / 2)**
 Erwin Poliakoff, Louisiana State University (A / 2)
 Arthur Suits, State University of New York at Stony Brook (A+ / 2)
 Robert L. Whetten, Georgia Institute of Technology (A- / 3)
- 03-NL-073 Electro-optic Materials based upon Inorganic Semiconductor Nanorod Liquid Crystals**
 -A. Paul Alivisatos, University of California, Berkeley
- Sanford Asher, University of Pittsburg (A / 3)**
Kit H. Bowen, John Hopkins University (A+ / 3)
Robert L. Whetten, Georgia Tech (B / 3)
- 03-NL-076 Photoabsorption Spectroscopy of Free Silver and Gold Nanoclusters as a Probe of their Surface Electronic Structure**
 -Vitaly V. Kresin, University of Southern California
- Pat Collier, California Institute of Technology (A- / 3)**
James M. Lisy, University of Illinois (B - C / 2)
Robert L. Whetten, Georgia Institute of Technology (A / 1)
- Lukas Novotny, University of Rochester (no grade)**
- 03-NL-079 Development of a Miniaturized Hadamard Transform Time-of-Flight Mass Spectrometer**
 -Richard N. Zare, Stanford University
- Kit H. Bowen, John Hopkins University (A / 2-3)**
James M. Farrar, University of Rochester (A / 2)
James M. Lisy, University of Illinois (B+ / 2)
David Lubman, University of Michigan (A+ / 1)

- 03-NL-080 Experimental and Theoretical Investigation of Collisional Energy Transfer in Free Radicals of Atmospheric Importance**
-Paul J. Dagdigan, John Hopkins University
- Mark Johnson, Yale University (A- / 1)
H. Floyd Davis, Cornell University (B+ / 3)
Piergiorgio Casavecchia, Universita' di Perugia (A / 1)
- 03-NL-082 Cluster Dynamics: Laying the foundations for developing Nanoscale materials**
-A. W. Castleman, Pennsylvania State University
- Kit H. Bowen, John Hopkins University (A+ / 1)
Mark B. Knickelbein, Argonne National Laboratory (A / 1)
Michael Morse, University of Utah (B+ - A- / 3)
Robert L. Whetten, Georgia Institute of Technology (A / 1)
- 03-NL-085 Quenching Dynamics of Electronically Excited Hydroxyl Radicals**
-Marsha I. Lester, University of Pennsylvania
- H. Floyd Davis, Cornell University (B+ / 2)
Mark Johnson, Yale University (A+ / 2)
Piergiorgio Casavecchia, Universita' di Perugia (/)
- 03-NL-090 The Chemistry of Cyclic All-Nitrogen Molecules**
-Alec M. Wodtke, University of California, Santa Barbara
- Mark Johnson, Yale University (A / 3)
Arthur Suits, State University of New York at Stony Brook (B+ / 1)
Paul L. Houston, Cornell University (A / 1)
Robert L. Whetten, Georgia Institute of Technology (A / 3)
- 03-NL-091 Spectroscopic Characterization of Metastable Radical Nanoclusters in Helium Droplets**
-Roger E. Miller, University of North Carolina at Chapel Hill
- Mark Johnson, Yale University (A / 1)
James M. Lisy, University of Illinois (A / 1)
Andrey Vilesov, University of Southern California (A / 1)
Ken Janda, University of California (no grade)
- 03-NL-098 Time Resolved Energy Transfer and Photodissociation of Vibrationally Excited Molecules in Solution**
-F. Fleming Crim, University of Wisconsin, Madison
- James M. Lisy, University of Illinois (A - A- / 3)
Mark Johnson, Yale University (A / 2)
Philip Reid, University of Washington (A- / 1)
Edwin J. Heilweil, National Institute for Standards & Technology (B+ / 1)

03-NL-118 Atomic and Molecular Manipulation of Chemical Interactions
-Wilson Ho, University of California, Irvine

James M. Lisy, University of Illinois (A- / 4)

Robert L. Whetten, Georgia Institute of Technology (A- / 2)

Paul S. Weiss, The Pennsylvania State University (A – A- / 1)

Flemming Bessenbacher, University of Aarhus (A+ / 1)

02-NL-358 Nucleation and Growth of Hetermolecular Water Clusters in the Gas Phase

-Elliot Bernstein, Colorado State University

Kit H. Bowen, John Hopkins University (no grade)

James M. Lisy, University of Illinois (B / 1)

Mitchio Okumura, California Institute of Technology (no grade)

ANNUAL REPORT

CHEMISTRY AND LIFE SCIENCES RESEARCH PROGRAM

CONTRACT NO. F49620-00-C-0009

Period of Performance: 3/1/02 – 2/28/03

Prepared For:

**AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
CHEMISTRY AND LIFE SCIENCES DIRECTORATE**

Dr. Genevieve Haddad, Program Manager

Presented By:

**UES, Inc.
4401 Dayton-Xenia Road
Dayton, OH 45432-1894**

INTRODUCTION

UES, Inc. is providing research evaluation services to the Directorate of Chemistry and Life Sciences, Air Force Office of Scientific Research (AFOSR), in subareas that include Neurosciences (e.g., Neurochemistry, Biology, Electrophysiology, Neuroanatomy, Multisensory Integration/Spatial Orientation, Cardiovascular Physiology, and Bioenvironmental Hazards; Psychophysics, Psychophysiology, Physiological Psychology, Sensation, Perception, Cognition); Computer Sciences (e.g., Vision and Robotics); Otolaryngology; Meteorology, Chemistry (e.g., computational chemistry, polymeric and organic materials, photonic materials, inorganic and surface chemistry, high density materials); Biotechnology (e.g., materials and processes); and Fuels (e.g., petroleum and synthetic); and in related programs under development.

The services provided by UES, Inc. include: selecting qualified scientists to evaluate proposals, assembling scientific groups to evaluate, analyze and advise on content and direction of Chemistry and Life Sciences Programs; organizing workshops to assist in the definition of new basic research areas proposed by the Chemistry and Life Sciences Directorate; providing advisors to make presentations and assist government personnel with analyzing areas of relevant science; and providing advisors to assist and advise on site visits to research laboratories.

The fifth option year included: 60 Proposals that were reviewed;
6 Program/Contractor Reviews and 3 Workshops.

A. Evaluations of Individual Research Proposals

UES sent out 60 proposals to evaluators during the performance period of 1 March 2002 through 28 February 2003.

UES has been providing the Director of Chemistry and Life Sciences a Summary of Proposals Under Review (SPUR) report on a biweekly basis. This report is now being sent electronically as well as a hard copy. This report is composed of the UES log sheet indicating the proposals sent out, the names of the evaluators to whom the proposals were sent, the dates the proposals were mailed, the tickle date, any necessary comments, and the date the reviews were received. This allows the Program Managers to have a current listing of all proposal activity.

B. Contractor/Program Reviews

1. The first program review was for **Electrochemistry Review**, Lowes Annapolis Hotel, Annapolis, MD, 4-7 March 2002. Lt. Col. Paul Trulove, Program Manager.

Total: 67

speakers :21

posters:23

attendees: 23

2. The second program review was **BioInspired Concepts Theme Review**, Lowes Annapolis Hotel, Annapolis, MD, 29-30 April 2002. Dr. Walter Kozumbo, Program Manager. 37 Attendees

3. The third program review was **Polymer Matrix Composite Program Review**, Hyatt Regency Long Beach, Long Beach, CA, 17-18 May 2002. This program addresses the materials science issues relating to developing improved performance or lower cost polymer matrix composite (PMC) systems and to processing and utilizing these structures for AF systems. UES provided on-site support, abstract booklets and made all arrangements for the meeting. Nineteen of the 46 attendees were speakers. Dr. Charles Lee, Program Manager.

4. The forth program review was **Molecular Dynamics/Theoretical Chemistry (MD/TC) Contractor's Meeting**, The Westin Waltham-Boston Hotel, Waltham, MA, 20-22 May 2002. Dr. Michael Berman, Program Manager
Speakers:31
Attendees: 78
Posters:25

5. The fifth program review was **MURI Program Review**, The Westin Waltham-Boston Hotel, Waltham, MA, 23 May 2002. Dr. Michael Berman, Program Manager. 24 attendees, 12 Speakers

6. The Sixth program review was **Biomimetics, Biomaterials and Biointerfacial Sciences Program Review**, Hawk's Cay Resort, Duck Key, FL, 2-7 February 2003. Dr. Hugh C. De Long, Program Manager.

C. Workshops

1. **Software Systems and Information Fusion Workshop**, Embassy Suites, Syracuse, NY, 3-7 June 2002. Dr. Herklotz and Dr. John Tangney, Program Manager.

2. **Workshop on Nanoscience Approaches to Multifunctional Coatings**, Keystone Resort and Conference Center, Keystone, CO, 12-17 August 2002. Lt. Col. Paul Trulove, Program Manager.

3. **Workshop on Energetic Ionic Liquids**, Executive Conference and Training Center at Dulles, Dulles, VA, 9-10 October 2002. Dr. Michael Berman, Program Manager.

E. Advisors

In addition to advisors provided for Program Reviews, Workshops and Panel Meetings, UES provided travel, per diem and in many cases, honorarium for the following advisors:

Garth L. Wilkes and Madhu S. Madhukar, **Polymer Matrix Composite Program Review**, Long Beach, CA, 16 May 2002.

Jeffery Fisher, Gerdine Grant, Ivan L. Cameron, Terence Risby, and Errol Zeiger, **JP-8 Jet Fuel**, Brooks AFB, TX, 15 May 2002.

Mark Hildebrand, Nancy J. Halas, Uwe B. Sleytre, Martin W. Kendig, Joseph Osborne, H. Garry Pippin, Jonathan W. Martin, Ray Taylor, Steven Sibener, Mehmet Sarikaya, Jeffrey Brinker, Don Baer, Ras Pandey, and Arun Yethiraj, **Nanoscale Approaches to Multifunctional Coatings Workshop**, Keystone, CO, 12-16 August 2002.

Eduardo Salas, **MURI Third Year Review**, Fairborn, OH, 26 September 2002.

James V. Bruckner, Jeff Fisher, Rory Conolly, Deborah Keys, and Sayed Hassan, **JP-8 Jet Fuel**, 21 November 2002.

J. D. Kelley, **AIAA Meeting**, Reno, NV, 6-9 January 2003.

Ronald Eby and Nicholas Spencer, **Biomimetics, Biomaterials, and Biointerfacial Sciences Program Review**, Hawks Cay, FL, 3-7 February 2003.

SUMMARY

UES is pleased to continue to perform the specific tasks assigned to them in accordance with provisions of the contract. Participants will continue to be Dr. Thomas Eggemeier as Program Manager, Judith M. Flory, Program Administrative Manager and Amiee Nichols as Program Assistant. UES personnel appreciate the opportunity to be of service to AFOSR in this interesting and worthwhile program.

LIST OF APPENDICES

Breakdown of Research Proposals by Program Manager

Program for Biomimetics and Biotechnologies Program Review, Philadelphia Airport Marriott, Philadelphia, PA, 4-6 March 2001.

Program for Polymer Matrix Composite Program Review, Hyatt Regency Long Beach, Long Beach, CA, 11-12 May 2001.

Program for Molecular Dynamics/Theoretical Chemistry (MD/TC) Contractor's Meeting, The Beckman Center, Irvine, CA, 21-24 May 2001.

Program for Tribology Program Review, Hawk's Cay, Duck Key, FL, 4-8 June 2001.

Program for Photorefractive Polymer Program Review, Hilton Gaslamp Quarter, San Diego, CA, 27-28 July 2001.

Program for Tri-Service Corrosion Conference, La Mansion Del Rio, San Antonio, TX, 14-18 January 2002.

BREAKDOWN OF RESEARCH PROPOSALS BY PROGRAM MANAGER

<u>PROGRAM MANAGER</u>	<u>NO. OF PROPOSALS</u>
Berman	24
De Long	1
Kozumbo	4
Larkin	4
Lee	15
Sorkin	3
Tangney	1
Trulove	5

AFOSR/ONR Electrochemistry Science and Technology Review
Lowes Annapolis Hotel
Annapolis, MD

4-6 March 2002

Monday, 4 March 2002

1245 – 1300 Introduction and Remarks

1300 – 1330 *Thermal Stability and Compatibility Studies of Imidazolium and POSS Layered Silicates and Imidazolium Graphite*
Jeffrey W. Gilman – National Institutes of Standards and Technology,
Gaithersburg, MD

1330 – 1400 *Advanced Materials for Rechargeable Li Batteries*
Donald R. Sadoway and Anne Mayes – Massachusetts Institute of
Technology, Cambridge, MA

1400 – 1430 *Lithium-Ion Conducting Channels*
Lawrence G. Scanlon – Air Force Research Laboratory, AFRL/PRPS,
Wright-Patterson AFB, OH

1430 – 1500 *Sol-Gel Electrochemical Materials and Electrode Structures*
Bruce S. Dunn – UCLA, Los Angeles, CA

1500 – 1530 Break

1530 – 1600 *Three-Dimensional Architectures for Charge Storage*
Debra R. Rolison and Jeffrey W. Long – Naval Research Laboratory,
Washington, DC

1600 – 1630 *Applications of Dendrimer-Encapsulated Metal Nanoparticles to Lithium Battery Technology*
Richard M. Crooks – Texas A&M University, College Station, TX

1630 – 1730 Oral synopses of presentations in Poster Session I

Monday, 4 March 2002 Continued

1800 – 2100 Poster Session I/Reception

Nanogel Electrolytes

Emmanuel P. Giannelis – Cornell University, Ithaca, NY

Bioinspired Materials for Compact Power Structures

Chad Mirkin – Northwestern University, Evanston, IL

Creation of Metal and Semiconductor Nanostructures using DPN Nanolithography Techniques

Jie Liu – Duke University, Durham, NC

Three-Dimensional Architectures for Electrochemical Power Sources

Bruce Dunn – UCLA, Los Angeles, CA

Electrochemical Kinetics and Transport at Nanoscale Dimensions

Henry S. White – University of Utah, Salt Lake City, UT

NMR Studies of Ion Transport in Polymer Electrolytes

Steve Greenbaum – Hunter College/CUNY, New York, NY

Room Temperature Ionic Liquids as Supporting Electrolytes in Electroactive Polymer Based Supercapacitors

John D. Stenger-Smith – China Lake NAWCWD, China Lake, CA

Surface Electrochemistry of Catalytic Reactions at 25-80 °C

Carol Korzeniewski – Texas Tech University, Lubbock, TX

Direct-Oxidation Fuel Cells

R. J. Gorte, J. M. Vohs, and W. L. Worrell – University of Pennsylvania, Philadelphia, PA

Fuel Cell Plant Modeling and Simulation

Roger Dougal and Ralph White – University of South Carolina, Columbia, SC

Nanotubule Membranes – Fundamentals and Applications in Electrochemical Energy and Stochastic Sensing

Charles R. Martin – University of Florida, Gainesville, FL

Tuesday, 5 March 2002

0730 – 0800 Continental breakfast

0800 – 0830 *Charge Transfer Reaction Inverse Photoemission Spectroscopy*
Rudolph A. Marcus – California Institute of Technology, Pasadena, CA

0830 – 0900 *Redox Cycling of Manganese on Metal Surfaces and Its Consequences for Material Performance*
Zbignew Lewandowski – Montana State University, Bozeman, MT

0900 – 0930 *Electrodeposition of Transition Metal Aluminum Alloys*
Charles L. Hussey – The University of Mississippi, University, MS

0930 – 1000 Break

1000 – 1030 *Surface Reaction Fundamentals in Direct Oxidation Hydrocarbon Fuel Cells*
Eric M. Stuve – University of Washington, Seattle, WA

1030 – 1100 *New Binary and Ternary protonated Glasses: Preparation and Characterization*
Steve W. Martin – Iowa State University, Ames, IA

1100 – 1130 *Electrochemical Membrane Separation of H₂S*
Jack Winnick and Meilin Liu – Georgia Institute of Technology, Atlanta, GA

1130 – 1300 Lunch

1300 – 1330 *Vapor Sensing Using Dynamics of Electron Transfers Between Nanoparticles*
Royce W. Murray – The University of North Carolina-Chapel Hill, Chapel Hill, NC

1330 – 1400 *Hybrid Core-Shell Nanoparticles-Synthesis and Applications*
SonBinh T. Nguyen – Northwestern University, Evanston, IL

1400 – 1430 *Properties of Fuel Cell and Battery Materials*
J. J. Fontanella and C. A. Edmondson – US Naval Academy, Annapolis, MD

1430 – 1530 Oral synopses of presentations in Poster Session II

Tuesday, 5 March 2002 Continued

1530 – 1800 Break and Poster Session II

Microsensor Design

Daniel G. Nocera – MIT, Cambridge, MA

Solid State NMR of Polymer Nanocomposites

Steve Greenbaum – Hunter College of CUNY, New York, NY

Supramolecular Engineering of Lithium Ion Conducting Electrolytes

John Arnold – University of California, Berkeley, CA

Nanobiohybrides: Models for Biomembranes and Sensors

Emmanuel P. Giannelis – Cornell University, Ithaca, NY

Spectro-Electrochemical Studies of Nanophase Vanadium Oxides

Azzam N. Mansour – NSWC, Carderock Division, West Bethesda, MD

Reactivity Mapping of Catalyst Gradients and Arrays with Scanning Electrochemistry and Mass Spectrometry

Andrew C. Hillier – University of Virginia, Charlottesville, VA

Preparation and Characterization of Nanostructured Materials for Solid-State Electrochemical Applications

Maryanne M. Collinson – Kansas State University, Manhattan, KS

New Solid Acids for Fuel Cells

Sossina M. Haile – California Institute of Technology, Pasadena, CA

Carbon Microfiber High Electrolyte Penetration (HEIP) Electrodes

Russel R. Bessette – University of Massachusetts Dartmouth, Dartmouth, MA

Intermetallics as Electrocatalysts and Logistic Fuels for Fuel Cell Applications

Héctor D. Abruña – Cornell University, Ithaca, NY

Electrochemical Membrane Separation of H₂S

Alan Burke, Jack Winnick, and Meilin Liu – Georgia Institute of Technology, Atlanta, GA

Wednesday, 6 March 2002

0730 – 0800 Continental breakfast

0800 – 0830 *Nanostructured Electrochemically Active Systems for Li-Ion Batteries*

P. N. Kumta – Carnegie Mellon University, Pittsburgh, PA

0830 – 0900 *Development of Electrochemical Capacitor Technology for DoD Applications*

Allen W. Apblett – Oklahoma State University, Stillwater, OK

0900 – 0930 *Templated Macroporous Solids as Potential Nanostructured Electrode Materials*

Kenneth R. Poeppelmeier – Northwestern University, Evanston, IL

Andreas Stein – University of Minnesota, Minneapolis, MN

0930 – 1000 Break

1000 – 1030 *Improved Performance of Energy Storage Devices: Potential Areas for Dendritic Chemistry Involvement*

George R. Newkome – University of Akron, Akron, OH

1030 – 1100 *Smart Polymeric Gels as an Environment for Electrochemistry*

Maggie Ciszewska – Brooklyn College, CUNY, Brooklyn, NY

1100 – 1130 *Ionic Liquid/Polymer Electrolytes*

Thomas E. Sutto and Hugh C. De Long – US Naval Academy, Annapolis, MD

1130 Closing Remarks/Meeting Ends

**2002 Polymer Matrix Composite Review
Hyatt Regency Long Beach
Long Beach, CA**

Friday, 17 May 2002- (Beacon B Conference Room)

- 0830 – 0840 Welcoming And Introduction**
C. Lee, Air Force Office of Scientific Research
- 0840 – 0910**
R.A. Pethrick and D. Hayward, University of Strathclyde, UK
- 0910 – 0940 Dielectric Spectroscopy as a Non-Destructive Inspection Tool to Assess Ageing of Adhesively Bonded Structures**
J. Mijovic & H. Zhang, Polytechnic University, Brooklyn, NY
- 0940 – 1010 Development, Processing and Characterization of Electron Beam Cured Polymers and Composites**
R.J. Morgan, Texas A&M University, College Station, TX
- 1010 – 1030 BREAK**
- 1030 – 1100 Cryogenic Cycling of Polymeric Composites: Processing and Matrix Modification Effects on Transverse Microcracking**
J.C. Seferis, University of Washington, Seattle, WA
- 1100 – 1130 Development of Processible, Low Cure Shrinkage Adhesives for Aerospace Applications**
C. Leung, PolyComp Technologies, Inc., Del Mar, CA
- 1130 – 1200 Hydrostatic Stress Development in Composite Resins: Modeling, Measurement and Mitigation Strategies**
G.B. McKenna and S.L. Simon, Texas Tech University, Lubbock, TX
- 1200 – 1300 LUNCH**
- 1300 – 1330 Investigation of Adhesive Joints for Nano-Engineering and Modeling**
C.H. Jenkins & R.M. Winter, South Dakota School of Mines & Technology, Rapid City, SD
- 1330 – 1400 Development of High Temperature Low Viscosity Phenylethynyl(PE)End-capped Fluorinated Polyimides For Adhesive Applications**
D.A. Scola, University of Connecticut, Storrs, CT
- 1400 – 1430 High Performance Composites Processing and Durability**
D.B. Curliss, US Air Force Research Laboratory, Wright-Patterson AFB, OH
- 1430 – 1450 BREAK**
- 1450 – 1520 High Performance Thermoset/Layered Silicate Nanocomposites**
D.R. Dean, Tuskegee University, Tuskegee, AL
- 1520 – 1550 Chemically Functionalized Clay Epoxy Nanocomposites for Aerospace Applications**
D. Raghavan, Howard University, Gaithersburg, MD
- 1550 – 1620 Composites Containing Carbon Nanofibers and/or Polyhedral Oligomeric Silsesquioxanes**
C.U. Pittman Jr., Mississippi State University, Starkville, MS
- 1620 – 1650 Characterization of Variability in Prepreg Microstructures**
G. Dillon, The Pennsylvania State University, State College, PA

1650 End of Day

Saturday, 18 May 2002

0815 – 0845 FAST Center Research on Cryogenic and High Temperature Cycling of Advanced Composites and their Effects on the Mechanical, Microstructure, and Permeability of the Composites

P.O. Biney, FAST Center at Prairie View A&M University, Prairie View, TX

0845 – 0915 Model-Based Design for Polymer Matrix Composites Thermal Fatigue Life

G.A. Schoeppner, Materials and Manufacturing Directorate, Structural Materials Branch (MLBC), Wright-Patterson AFB, OH

0915 – 0945 Fiber/Matrix Interphase Development During Processing of Thermosetting-Matrix Composites

R. Pitchumani, University of Connecticut, Storrs, CT

0945 – 1000 BREAK

1000 – 1030 Polymer Nanocomposite Ablatives: Synthesis and Characterization

J. Koo, Systems and Materials Research Consultancy, Spicewood, TX

1030 – 1100 Perfluorocyclobutane (PFCB) polyaryl ethers for Space-based Applications

A. Gavrin, J. Nebo, and N. Rice, Triton Systems, Inc., Chelmsford, MA

1100 – 1130 Direct Formation of Silane Coupling Agents on Continuous Fiber SiO₂ Surfaces for Improved Composite Performance

D. Boyles, W. Cross and J. Kellar, South Dakota School of Mines and Technology, Rapid City, SD

1130 End of Day

2002 AFOSR Molecular Dynamics Contractors Review

The Westin Waltham-Boston Hotel
Waltham, MA

20 – 22 May 2002

Sunday, 19 May 2002

5:00-7:00 PM Registration

Monday, 20 May 2002

8:00 AM **Registration and Continental Breakfast**

Session Chair: TBD

8:30 Hyperthermal Dynamics in the Space Environment
R. A. Dressler, Hanscom AFB, MA

9:00 Potential Energy Surfaces for Ion-Molecule, Chemical Laser and
Photodissociation Processes
*K. Morokuma, S. Irle, P. Zhang, G. P. Phillips, D. V. Khoroshun
and Q. Wang, Emory University, Atlanta, GA*

9:30 Spectroscopy and Dynamics of Transient Energetic Species and
Dissociative Recombination Dynamics of Molecular Cations
R. E. Continetti, University of California, San Diego, La Jolla, CA

10:00 **Break**

Session Chair: TBD

10:30 Solvent Effects in Transition State Spectroscopy
D. M. Neumark, University of California, Berkeley, Berkeley, CA

11:00 The Chemical Dynamics of Highly Vibrationally Excited Diatomic Ions of
Aerospace Relevance
C-Y. Ng¹ and R. A. Dressler²
¹*Department of Chemistry, Iowa State University, Ames*
²*Air Force Research Laboratory, Hanscom AFB, MA*

11:30 Studying the Gas/Surface Interface Under Hyperthermal Energy Conditions
D. C. Jacobs, University of Notre Dame, Notre Dame, IN

12:00 **Lunch Buffet in Restaurant**

Monday, 20 May 2002 – Continued

Session Chair: TBD

- 1:30 Rate Constants and Product Distributions for Dissociative
Recombination of Hydrocarbon Ions
*A. A. Viggiano¹, M. Larson², S. T. Arnold¹, S. Kalhori², S. Rosen², J. Semaniak⁴,
A. Derkatch² and M. af. Ugglas³*
¹*AFRL Space Vehicles Directorate, Hanscom AFB, MA*
²*Department of Physics University of Stockholm, Stockholm, Sweden*
³*Manne Siegbahn Laboratory, Stockholm, Sweden*
⁴*Institute of Physics, Swietokrzyska Academy, Kielce, Poland*
- 2:00 Femtosecond Soft X-Ray Pump-Probe Dynamics
S. R. Leone and V. M. Bierbaum,
University of Colorado, Boulder, CO
- 2:30 Interrogating Superfluidity on Molecular Scales: Experiment and Theory
V. A. Apkarian, University of California, Irvine, Irvine, CA
- 3:00 **Break**
- 3:30 Ultrafast Multi-dimensional Infrared Spectroscopy of Gases at Low and High Pressures
M. Fayer, Stanford University, Stanford, CA
- 4:00 Fast Vibrational Spectroscopy of Shock Compression and Combustion
D. D. Dlott, University of Illinois at Urbana Champaign, Urbana, IL
- 4:30 Energy Transfer and Vibrationally Mediated Photodissociation in
Gases and Liquids
F. F. Crim, University of Wisconsin – Madison, Madison, WI
- 7:30 PM **Poster Session and Reception**

Tuesday, 21 May 2002

- 8:00 AM **Registration and Continental Breakfast**

Session Chair: TBD

- 8:30 Oxidation of Alkyl Ions, $C_nH_{2n+1}^+$ (n=1-5), in Reactions with
 O_2 and O_3 in the Gas Phase
*S. Williams, T. M. Miller, † W. B. Knighton, A. J. Midey, † and A. A. Viggiano Air
Force Research Laboratory, Hanscom AFB, MA*
- 9:00 IR Laser Studies of State-to-State Reaction Dynamics
*D. J. Nesbitt, University of Colorado and National Institute of
Standards and Technology, University of Colorado, Boulder, CO*

Tuesday, 21 May 2002 – Continued

9:30 Predissociation and Quenching Dynamics of Electronically
Excited Hydroxyl Radicals
M. I. Lester, University of Pennsylvania, Philadelphia, PA

10:00 **Break**

Session Chair: TBD

10:30 Interactions of Hydrocarbon Fuels with Thermospheric Oxygen Atoms
S. J. Lipson, S. M. Miller, J. A. Dodd, R. D. Sharma, K. J. Castle¹,
J. B. Lipson² and E. S. Hwang²
Air Force Research Laboratory, Space Vehicles Directorate, Hanscom AFB, MA
¹*National Research Council Postdoctoral Research Associate*
²*Stewart Radiance Laboratory, Bedford, MA*

11:00 Molecular Triplet States: Excitation, Evolution, Unintended
Diagnostics, and Detection
R. W. Field, S. Altunata, R. L. Thom and A. P. Mishra,
Massachusetts Institute of Technology, Cambridge, MA

11:30 Molecular Beam Studies of Collisions of Protic Gases with
Stratospheric Sulfuric Acid
G. M. Nathanson, University of Wisconsin, Madison, WI

12:00 PM **Lunch Buffet in Restaurant**

Session Chair: TBD

1:30 Hadamard Transform Time-Of-Flight Mass Spectrometry
R. N. Zare, Stanford University, Stanford, CA

2:00 Kinetics and Dynamics Related to Chemical Laser Systems
M. C. Heaven, Emory University, Atlanta, GA

2:30 Velocity Map Imaging Investigations of ClN₃ Photochemistry
A. Wodtke, University of California, Santa Barbara, Santa Barbara, CA.

3:00 **Break**

3:30 Program Status
M. R. Berman, Air Force Office of Scientific Research, Arlington, VA

4:00 **Discussion Session:** Molecules for Quantum Computation
Guest Speaker: Isaac Chuang, Massachusetts Institute of Technology

Tuesday, 21 May 2002 – Continued

- 7:30 PM FTIR Studies of Water Adsorbed on MgO(100)
H. Reisler and C. Wittig, University of Southern California, Los Angeles, CA
- 8:00 PM Cluster Dynamics: Foundations for Developing Nanoscale Materials
A. W. Castleman, Jr., Pennsylvania State University, University Park, PA
- 8:30 PM Infrared Laser Spectroscopy of Gas Phase Metal Ion Complexes
M. A. Duncan, University of Georgia, Athens, GA

Wednesday, 22 May 2002

- 8:00 AM **Registration and Continental Breakfast**

Session Chair: TBD

- 8:30 Studies on the Production of the Pentazole Anion and Singlet-Delta Molecular Oxygen
K. O. Christe, Air Force Research Laboratory, Edwards AFB, CA
- 9:00 Optimizing the Growth and Properties of Al₂O₃/W Nanolaminates Fabricated Using Atomic Layer Deposition Techniques
S. M. George, University of Colorado, Boulder, CO
- 9:30 Insights into Ceramic Coating Adhesion on Nickel
E. A. Jarvis, A. Christensen and E. A. Carter
University of California, Los Angeles, Los Angeles, CA
- 10:00 **Break**
- Session Chair: TBD**
- 10:30 Virtual Design and Testing of Materials: A Multiscale Approach
W. Curtin, Brown University
- 11:00 Catalytic Activity by Metal Nanoclusters Supported on Oxide Surfaces
H. Metiu, University of California, Santa Barbara, CA
- 11:30 Multidimensional Surface-Enhanced Sensing and Spectroscopy
*R. P. Van Duyne¹, G. C. Schatz¹ and K. G. Spears¹, D. M. Jonas², K. L. Rowlen²,
P. W. Bohn³, A. Campion⁴, S. Nie⁵ and L. E. Brus⁶*
¹Northwestern University
²University of Colorado, Boulder, CO
³University of Illinois Urbana-Champaign,
⁴University of Texas at Austin, Austin, TX
⁵University of Indiana
⁶Columbia University
- 12:00 PM Closing Remarks, Adjourn

MURI Program Review

Virtual Design and Testing of Materials: A Multiscale Approach

May 23, 2002

Westin Hotel, Waltham, MA

Supported by U.S. Air Force Office of Scientific Research, Dr. M. Berman, Program Monitor

Participants:

MURI Investigators:

E. Carter (UCLA), G. Cedar (MIT), W. Curtin (Brown, PI), E. Kaxiras (Harvard),
A. Needleman (Brown), M. Ortiz (Cal Tech), R. Phillips (Cal Tech)

Invited Participants (tentative):

A. Voter (LANL), T. Arias (Cornell), R. Miller (Carleton U.), W. E (Princeton)

Draft Schedule

7:30 am	Continental Breakfast
8:00 am	Intro to the MURI Program: Goals and Structure of the Review (Curtin)
8:30 am	<u>Progress in "Basic Methods":</u>
8:30 am	Orbital-free Density Functional Methods (Carter; Kaxiras/Choly)
9:00 am	First-principles Models of Decohesion (Ceder; Kaxiras)
9:30 am	Discrete Dislocation Modeling of Fatigue (Needleman)
10:00 am	<u>Progress in "Informing Higher-scale Models":</u>
10:00 am	Dislocation Phenomena from First-Principles (Lu/Kaxiras)
10:30 am	Break
10:45 am	Quantum/Continuum Coupling via Cohesive Zones (Carter and Ortiz)
11:15 am	Stress-dependent Diffusion and Dislocation Dynamics (Olmsted/Curtin/Phillips)
11:45 am	Modeling 3d Dislocation Phenomena in 2d (Benzerga/Needleman)
12:15 pm	Lunch
1:15 pm	<u>Progress in "Direct Scale Coupling (Length and Time)":</u>
1:15 pm	Quantum/Atomistic Coupling (Choly/Kaxiras)
1:45 pm	Quantum/Atomistic Coupling in the Quasicontinuum Method (Carter and Ortiz)
2:15 pm	Bridging Atomistic and Continuum Models of Defects (Curtin)
2:45 pm	Coarse Graining of Dynamics: Bridging Time Scales (Ceder)
3:15 pm	Molecular Dynamics and the Quasicontinuum Model (Phillips)
3:45 pm	Break
4:00 pm	Discussion of Future Directions
5:00 pm	Adjourn

**2003 AFOSR Biomimetic, Biomaterial and Biointerfacial Sciences
Program Review**

**Hawk's Cay Resort
Duck Key, FL**

3-7 February 2003

Sunday, 2 February 2003 Registration and Reception, 5:00 to 7:00 PM

Monday, 3 February 2003

- 0815 Opening Remarks – Hugh De Long**
Air Force Office of Scientific Research, AFOSR/NL
- Directed/Self Assembly**
- 0830 *Evolving Biomolecular Control and Assembly of Semiconductor and
Magnetic Nanostructures***
Angela Belcher, Massachusetts Institute of Technology
- 0910 *Self-Assembly of Bio-Inspired Nanostructures***
Jeffrey Brinker, University of New Mexico
- 0950 Break**
- 1020 *Design and Development of Nanoscale Biomotor Power Units***
Richard Holtz, Utah State University
- 1320 *Ultra-sensitive and Selective Chip-Based Detection of DNA***
Chad Mirkin, Northwestern University
- 1140 Lunch**
- 1320 *Surface Templated, Bio-Inspired Synthesis and Fabrication of
Functional Materials***
Chad Mirkin, Northwestern University
- 1400 *Bio-Inspired Aqueous Lubrication Schemes Probed on the
Molecular Level***
Scott Perry, University of Houston
- 1440 Break**
- 1500 *How to Lubricate with Water: Biomimetic Approaches***
Nicholas Spencer, Swiss Federal Institute of Technology

Tuesday, 4 February 2003

- 0815 Opening Remarks – Hugh De Long**
Air Force Office of Scientific Research, AFOSR/NL
- 0830 *Front-End Processing of Cell Lysates for Enhanced Chip-Based Detection and Analysis***
James Schneider, Carnegie Mellon University
- 0910 *Biologically-Based Nanostructures for Catalysis and Optics***
Morley Stone, Air Force Research Laboratory, AFRL/MLPJE
- 0950 Break**
- 1020 *S-Layer Templated Nanoparticle Arrays and Carbon Nanotubes***
Uwe B. Sleytr, University of Natural Resources and Applied Life Sciences
- 1100 *Bio-Hybrid Surface Assemblies at Engineering Interfaces: Mechanosensitive Proteins at Silicon Surfaces with Controlled Surface Energy***
Maryna Ornatska and Vladimir Tsukruk, Iowa State University
- 1140 Lunch**
- Silk**
- 1320 *Recombinant Engineering and Structural Analysis of Silk Films***
Morley Stone, Air Force Research Laboratory, AFRL/MLPJE
- 1400 *Structure and Phase Behavior of Fibrous Proteins Related to Materials Engineering***
David Kaplan, Tufts University
- 1440 Break**
- 1500 *Biomimetic Microstructure Formation of High Performance Silk Films and Fibers***
Margaret Roylance, Foster-Miller

Wednesday, 5 February 2003

- 0815 Opening Remarks – Hugh De Long**
Air Force Office of Scientific Research, AFOSR/NL
- 0830 *Optical Limiting Silk Membranes***
Ronald Eby, University of Akron
- 0900 *Designing Spider Silk Genes for Materials Applications***
Randy Lewis and Michael Hinman, University of Wyoming
- 0950 Break**
- 1020 *The Beginning of Silk***
Ann Terry and Fritz Vollrath, Oxford University
- 1100 *Nanomechanics of Biopolymers***
Kathryn Wahl, Naval Research Laboratory
- 1140 Lunch**
- Biomaterialization**
- 1320 *The Interface Between Biology and Inorganics***
Rajesh Naik, Air Force Research Laboratory, AFRL/MLPJE
- 1400 *Studies of Biosilicification; The Role of Proteins, Carbohydrates and Model Compounds in Structure Control***
Carole Perry, University of Nottingham-Trent
- 1440 Break**
- 1500 *Chemically-tailored 3-D Nanoparticle Structures by the BaSIC Process***
Ken Sandhage, Ohio State University

Thursday, 6 February 2003

0815 Opening Remarks – Hugh De Long
Air Force Office of Scientific Research, AFOSR/NL

0830 *Biological Processing of Nanostructured Silica in Diatoms*
Mark Hildebrand, Scripps Institute of Oceanography

Thermal Sensors

0910 *The Creation of a Hybrid Protein/Conductive Polymer Thermosensor*
Morley Stone and Lawrence Brott, Air Force Research Laboratory,
AFRL/MLPJ

0950 Break

1020 *The Role of Mitochondria in the Sensing and Emission of*
Cellular Infrared Signals
Guenter Albrecht-Buehler, Northwestern University

1100 *Toward the Engineering of a Mechanically Activated Nanosensor*
Paul Blount, University of Texas Southwestern Medical Center at Dallas

1140 Lunch

1320 *High Resolution Temperature Sensing in Snakes:*
From Biomimetics To Biosensors
Massoud Motamedi, University of Texas Medical Branch

1400 *Progress Towards Engineering Protein-Based Thermosensors*
Todd Pappas, University of Texas Medical Branch

1440 Break

1500 *Infrared Reception in Pyrophilous Insects*
Horst Bleckmann and Helmut Schmitz, University at Bonn

Friday, 7 February 2003

0815 **Opening Remarks – Hugh De Long,**
Air Force Office of Scientific Research, AFOSR/NL

0830 ***The Capillary Bed of Boid and Crotaline Pit Organs:***
Comparison of Morphology and Function
Richard Goris, Yokohama City University

Chromophores

0910 ***Biological Chromophores and Potential DoD Applications***
Morley Stone and Rajesh Naik, Air Force Research Laboratory,
AFRL/MLPJE

0950 **Break**

1020 ***Photoproteins and Chromophores as Biosensors***
Fredrick Tsuji and Mark Hildebrand, University of California, San Diego

1100 **Wrap-up**

FINAL AGENDA--SOFTWARE & SYSTEMS 2002 ANNUAL MEETING--3-7 JUNE 02

MONDAY --- 3 JUNE 02

0900-1100 REGISTRATION/DISCUSSION

1100-1215 LUNCH
1215-1230 HERKLOTZ
1230-1300 LYNCH
1300-1345 KNOBLOCK
1345-1415 GIL
1415-1430 BREAK
1430-1500 BURGOON
1500-1530 METAXAS
1530-1600 BREAK
1600-1630 SHIN
1630-1700 VESTAL
1700-1730 FRANK

TUESDAY --- 4 JUNE 02

0800-0900 REGISTRATION/DISCUSSION

0900-0915 HERKLOTZ
0915-0945 HEXMOOR
0945-1015 GAMBLE
1015-1030 BREAK
1030-1100 LINDERMAN
1100-1130 SANDERS

1140-1300 LUNCH

1300-1330 PERLIS
1330-1400 SANTOS
1400-1415 BREAK
1415-1445 TECUCI
1445-1515 SHEN
1515-1530 BREAK
1530-1600 SHEN
1600-1630
1630-1700

WEDNESDAY ---5 JUNE 02

0800-0900 REGISTRATION/DISCUSSION

0900-0915 TANGNEY
0915-0945 WAXMAN
0945-1015 SYCARA
1015-1030 BREAK
1030-1100 LLINAS
1100-1130 BHANU

LUNCH

1140-1300
1300-1330 MANGASARIAN
1330-1400 CYBENKO
1400-1415 BREAK
1415-1445 JACOBS
1445-1515 RODRIGUEZ
1515-1530 BREAK
1530-1600 REEVES
1600-1630
1630-1700

THURSDAY --- 6 JUNE 02

0800-0830 REGISTRATION/DISCUSSION

0830-0845 HERKLOTZ
0845-0915 YE
0915-0945 SCHNEIDER
0945-1015 MORRISETT
1015-1030 BREAK
1030-1100 FRIDRICH
1100-1130 MEMON

LUNCH

1140-1300
1300-1330 BAZZI/SELCUK
1330-1400 YE
1400-1415 BREAK
1415-1445 FREEMAN
1445-1515 VEMURI
1515-1530 BREAK
1530-1600 PANDA
1600-1620 KWIAT
1620-1640 POPYACK
1640-1700 JABBOUR
1700-1730 HALPERN

FRIDAY --- 7 JUNE 02

0800-0830 REGISTRATION/DISCUSSION

0830-0845 HERKLOTZ
0845-0915 POLLOCK
0915-0945 GUNSCH
0945-1015 LI
1015-1030 BREAK
1030-1100 HUMPHREY
1100-1130

LUNCH

1140-1300

***Workshop on Nanoscale
Approaches to
Multifunctional Coatings***

Keystone II Workshop

Sunday, 11 August 2002

No-host Reception & Registration

Keystone Lodge Terrace

5:00 to 7:30PM

Agenda

Monday, 12 August 2002

Nanoscience Based Approaches to Materials

- 7:30-8:30** Continental Breakfast & Registration
- 8:30-8:45** Opening Remarks – Dr. Michael Donley
- Session N1** **Dr. Michael Donley, Conference Organizer and Session Chair**
- 8:45-9:45** Keynote Address – **Using Nanoscience-based Approaches and Concepts to Expand the Range of Coating Functionality**
Dr. Donald R. Baer, Pacific Northwest National Laboratory
- 9:45-10:15** **Investigation of Nanostructured Al-based Quasicrystal Thin Films for Corrosion Protection**
Dr. Seva N. Balbyshev, Universal Technology Corp.
- 10:15-10:30** Break
- Session N2** **Dr. Jeffrey Brinker, Session Chair**
- 10:30-11:15** **Electrochemical Synthesis: A Novel Technique for Processing Multi-Functional Coatings**
Prof. Jude O. Iroh, University of Cincinnati (NRC - AFRL/MLBT)
- 11:15-11:45** **Epoxy Layered-Silicate Nanocomposites**
Dr. Chenggang Chen, University of Dayton Research Institute
- 11:45-12:15** **Nanoparticle-filled Silane Films as Chromate Replacements for Aluminum Alloys**
Prof. Wim J. van Ooij, University of Cincinnati
- 4:30-5:15** Editor's Room Open
- 5:30-6:45** **Dinner** – Crab & Asparagus Bisque, Spinach & Radicchio Salad, Wild Berry
Granita, Grilled New York Steak, Chocolate Decadence
- Session N3** **Dr. Don Baer, Session Chair**
- 7:00-7:50** **Opportunities for Nano-structured "Sol-Gel-Derived" Materials in Corrosion Inhibition**
Prof. C. Jeffrey Brinker, University of New Mexico
- 7:50-8:20** **The Self-assembled Nano-phase Particle (SNAP) Process: A Nanoscience Approach to Coatings**
Dr. Michael Donley, AFRL/MLBT
- 8:20-8:50** **Nanostructured Sol-Gel Approach for Corrosion Protection**
Dr. Natasha Voevodin, University of Dayton Research Institute
- 7:00-10:00** Editor's Room Open
- 8:50** End of Session
- NOTE:** The Editor's Room will be open during all sessions of the Workshop, in addition to the hours specially annotated.

Agenda

Tuesday, 13 August 2002

Bio-Inspired Approaches to Coatings/Materials

- 7:30-8:30** **Continental Breakfast & Registration**
- Session B1** **Dr. Hugh De Long, Session Chair**
- 8:30-8:40** **Opening Remarks**
- 8:40-9:40** **Bio-Inspired and Biologically-Derived Materials for Coatings**
Dr. Morley Stone, AFRL/MLPJ
- 9:40-10:20** **Biological Processing of Nanostructured Silica in Diatoms**
Dr. Mark Hildebrand, Scripps Institute of Oceanography
- 10:20-10:40** **Break**
- Session B2** **Dr. Hugh De Long, Session Chair**
- 10:40-11:30** **Molecular Biomimetics: Genetic Engineering of Proteins for Inorganic Surfaces**
Prof. Mehmet Sarikaya, University of Washington
- 11:30-12:10** **Nanoshell-based Particles: Bioinspired Elements for Multifunctional Coatings**
Prof. Naomi Halas, Rice University
- 4:30-5:15** **Editor's Room Open**
- 5:30-6:45** **Dinner** – Roasted Tomato Bisque, Boston Bibb Salad, Blueberry Granita,
Breast of Chicken and Crab Stuffed Shrimp,
Chocolate Frangipane Pear Tart
- Session B3** **Dr. Morley Stone, Session Chair**
- 7:00-7:40** **Biomolecular Nanotechnology and Biomimetics with 2D-Protein Crystals**
Prof. Uwe Sleytr, Ludwig Boltzmann Institute for Molecular Nanotechnology, University of Agricultural Sciences, Vienna, Austria
- 7:40-8:20** **Synthetic and Bio-hybrid Nanoscale Coatings with Tailored Surface Functionalities**
Prof. Vladimir V. Tsukruk, Iowa State University
- 7:00-10:00** **Editor's Room Open**
- 8:20-8:35** **Break**
- 8:35-9:35** **Poster Session**

NOTE: **The Editor's Room will be open during all sessions of the Workshop, in addition to the hours specially annotated.**

Agenda

Wednesday, 14 August 2002

Nanoscience Approaches to Aircraft Coatings I

- 7:30-8:30** Continental Breakfast & Registration
- Session A1** Dr. Paul Trulove, Session Chair
- 8:30-8:40** Opening Remarks
- 8:40-9:30** The Development of a Multi-Functional Coating for Aerospace Applications Using Molecular- and Nano-engineering Methods
Prof. S. Ray Taylor, University of Virginia
- 9:30-10:00** Active Corrosion Protection and Corrosion Sensing in Organic Coatings
Prof. Rudy G. Buchheit, Ohio State University
- 10:00-10:15** Break
- Session A2** Prof. Gordon Bierwagen, Session Chair
- 10:15-11:00** Smart Corrosion Inhibiting Coatings
Dr. Martin Kendig, Rockwell Scientific Company, LLC
- 11:00-11:30** Nanograin Magnetoresistive Manganite Coatings for Signature Reduction and Shielding Against Directed Energy Pulses
Prof. Chhiu-Tsu Lin, Northern Illinois University
- 11:30-12:00** Dispersion and Film Properties of Multi-Walled Carbon Nanotube Pigmented Conductive Coatings
Dr. Joel A. Johnson, AFRL/MLBT
- 4:30-5:15** Editor's Room Open
- 5:30-6:45** Dinner – White Bean Tomato Soup, Smoked Salmon, Pomegranate Granita, Roast Colorado Lamb, Chocolate Crepe al Orange
- Session A3** Prof. Rudy Buchheit, Session Chair
- 7:00-7:40** Nanostructured Sol-Gel Derived Conversion Coatings Based on Epoxy- and Amino-Silanes
Dr. Alexander Khramov, Universal Technology Corp.
- 7:40-8:10** Surface Analytical Study of Self-Assembled Nano-phase Particle (SNAP) Surface Treatments
Linda S. Kasten, University of Dayton Research Institute
- 8:10-8:40** Molecular Design of In-situ Phosphatizing Coatings for Aerospace Primers
Prof. Chhiu-Tsu Lin, Northern Illinois University
- 7:00-9:30** Editor's Room Open
- 8:40** End of Session
- NOTE:** The Editor's Room will be open during all sessions of the Workshop, in addition to the hours specially annotated.

Agenda

Thursday, 15 August 2002 The Space Environment and Space Coatings

- 7:30-8:30** Continental Breakfast & Registration
- Session S1** Dr. Joe Osborne, Session Chair
- 8:30-8:40** Opening Remarks
- 8:40-9:30** Space Environments and Induced Damage Mechanisms in Materials
Dr. Gary Pippin, The Boeing Company
- 9:30-10:00** A Multiple Scattering Model Analysis of ZnO Pigment for Spacecraft Thermal Control Coatings
Dr. Joel Johnson, AFRL/MLBT
- 10:00-10:15** Break
- Session S2** Dr. Joel Johnson, Session Chair
- 10:15-11:05** Molecular Beam and Scanning Probe Microscopy Studies of Interfacial Reactivity and Collisional Energy Exchange
Prof. Steven Sibener, University of Chicago
- 11:05-11:35** Protective Space Coatings: A Ceramer Approach to Nanoscale Materials
Prof. Mark Soucek, University of Akron
- 11:35-12:05** On-Orbit Testing of Space Environment Interactions With Materials
Dr. Joseph Osborne, The Boeing Company
- 4:30-5:15** Editor's Room Open
- 5:30-7:00** Dinner – Jumbo Shrimp Cocktail, Five Onion Soup, Passion Fruit Sorbet, Tenderloin of Beef and Spice Rubbed Salmon, Kiwi Wild Berry Mille Feuille

Nanoscience Approaches to Aircraft Coatings II

- Session A4** Dr. Seva Balbyshev, Session Chair
- 7:15-7:45** Use of a Scanning Thermal Microscope to Examine Corrosion Protective Coatings in Exposure
Prof. Gordon Bierwagen, North Dakota State University
- 7:45-8:15** Electrochemical Processing of High Temperature Conducting Polyimide Nanocomposites
Prof. Jude O. Iroh, University of Cincinnati (NRC – AFRL/MLBT)
- 8:15-8:45** Cerium/Water Equilibrium for Precipitation of Cerium Oxide Nanoparticles
Prof. James Stoffer, University of Missouri – Rolla
- 7:00-9:30** Editor's Room Open
- 8:45** End of Session

Agenda

Friday, 16 August 2002

Modeling Approaches to Coatings/Materials

- 7:30-8:30** Continental Breakfast
- Session M1** Dr. Barry Farmer, Session Chair
- 8:30-8:40** Opening Remarks
- 8:40-9:30** **Advances in the Implementation of a Reliability-based Methodology for Predicting the Service Life of Coating Systems**
Dr. Jonathan Martin, NIST
- 9:30-10:00** **Multiparameter Models of the Viscoelastic/Plastic Mechanical Properties of Coatings via a Combined Nanoindentation and Non-linear Finite Element Modeling**
Prof. Timothy Ovaert, University of Notre Dame
- 10:00-10:15** Break
- Session M2** Dr. Barry Farmer, Session Chair
- 10:15-11:05** **Interface Changes in Electrophoretic Polymer Deposition**
Prof. Ras Pandey, University of Southern Mississippi
- 11:05-11:35** **Computer Simulation Study of Polyelectrolyte Adsorption and Multi-Layer Formation**
Prof. Arun Yethiraj, University of Wisconsin
- 11:35-12:05** **Modeling the Nonequilibrium Process in Nano-sized Silane-based Macromolecule Formation in The SNAP Coating Process**
Dr. Seva Balbyshev, Universal Technology Corporation
- 12:05** End of Conference

AGENDA
Workshop on Energetic Ionic Liquids
9-10 October 2002
Dulles, VA

9 October 2002

8:45 Michael Berman, Air Force Office of Scientific Research

9:00 Greg Drake, Air Force Research Laboratory

9:30 John Wilkes, US Air Force Academy

10:00 Robin Rogers, University of Alabama

10:30 Break

11:00 Alan Katritzky, University of Florida

11:30 Open Discussion – Synthesis and Properties

Participants will be invited to speak for 5-10 minutes with vugraphs to stimulate discussion.

12:15 Lunch

1:30 C. K. Ed Law, Princeton University

2:00 Ed Maginn, University of Notre Dame

2:30 Mark Gordon, Iowa State University

3:00 Open Discussion – Combustion and Modeling

Participants will be invited to speak for 5-10 minutes with vugraphs to stimulate discussion.

3:45 Working Group Sessions

10 October 2002

9:00 Working Group Sessions

10:30 Discussion and recommendations

12:00 Adjourn

ANNUAL REPORT

RESEARCH EVALUATION MANAGEMENT SERVICES FOR THE CHEMISTRY AND LIFE SCIENCES PROGRAM

CONTRACT NO. F49620-00-C-0009

Period of Performance: 3/1/01 – 2/28/02

Prepared For:

**AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
CHEMISTRY AND LIFE SCIENCES DIRECTORATE**

Dr. Genevieve Haddad, Program Manager

Prepared By:

**UES, Inc.
4401 Dayton-Xenia Road
Dayton, OH 45432-1894**

RESEARCH EVALUATION MANAGEMENT SERVICES FOR
THE CHEMISTRY AND LIFE SCIENCES PROGRAM

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INTRODUCTION

UES, Inc. is providing research evaluation services to the Directorate of Chemistry and Life Sciences, Air Force Office of Scientific Research (AFOSR), in subareas that include Neurosciences (e.g., Neurochemistry, Biology, Electrophysiology, Neuroanatomy, Multisensory Integration/Spatial Orientation, Cardiovascular Physiology, and Bioenvironmental Hazards; Psychophysics, Psychophysiology, Physiological Psychology, Sensation, Perception, Cognition); Computer Sciences (e.g., Vision and Robotics); Otolaryngology; Meteorology, Chemistry (e.g., computational chemistry, polymeric and organic materials, photonic materials, inorganic and surface chemistry, high density materials); Biotechnology (e.g., materials and processes); and Fuels (e.g., petroleum and synthetic); and in related programs under development.

The services provided by UES, Inc. include: selecting qualified scientists to evaluate proposals, assembling scientific groups to evaluate, analyze and advise on content and direction of Chemistry and Life Sciences Programs; organizing workshops to assist in the definition of new basic research areas proposed by the Chemistry and Life Sciences Directorate; providing advisors to make presentations and assist government personnel with analyzing areas of relevant science; and providing advisors to assist and advise on site visits to research laboratories.

The first option year included: 72 Proposals that were reviewed, 6 Program/Contractor Reviews, 1 Workshop and 1 Panel Meeting.

A. Evaluations of Individual Research Proposals

UES received 72 proposals for review by evaluators during the performance period of 1 March 2001 through 28 February 2002.

UES has been providing the Director of Chemistry and Life Sciences a Summary of Proposals Under Review (SPUR) report on a biweekly basis. This report is now being sent electronically as well as a hard copy. This report is composed of the UES log sheet indicating the proposals sent out, the names of the evaluators to whom the proposals were sent, the dates the proposals were mailed, the tickle date, any necessary comments, and the date the reviews were received. This allows the Program Managers to have a current listing of all proposal activity.

B. Contractor/Program Reviews

1. The first program review was for the **Biomimetics and Biotechnologies** Program Review, Philadelphia Airport Marriott, Philadelphia, PA, 4-6 March 2001. (\$6,119.20) This meeting was a combined review and technical exchange involving researchers from all AFOSR biomimetics programs. Specifically, presentations were given for AFOSR internally funded programs, AFOSR externally funded programs, and AFOSR managed MURI/URI programs. The purposes of this meeting was to formally review the technical merit and scientific relevance of current efforts, to discuss opportunities for closer collaborations and scientific exchanges with the

MURI/URI participants and to establish a future direction and priority for this program. UES provided on-site support, printed abstract booklets and coordinated all arrangements for the program review. Speakers: 22, Attendees: 10

Dr. Robert Cohn, Program Manger

2. The second program review was the **Polymer Matrix Composite** Program Review, Hyatt Regency Long Beach, Long Beach, CA, 11-12 May 2001. (\$7,805.43) This program addresses the materials science issues relating to developing improved performance or lower cost polymer matrix composite (PMC) systems and to processing and utilizing these structures for AF systems. UES provided on-site support, abstract booklets and made all arrangements for the meeting. Thirty of the 51 attendees were speakers. Dr. Charles Lee, Program Manager
3. The third program review was **Molecular Dynamics/Theoretical Chemistry (MD/TC)** Contractor's Meeting, The Beckman Center, Irvine, CA, 21-24 May 2001. (\$3,449.03) The objectives of the molecular dynamics program are to understand, predict, and control the reactivity and flow of energy in molecules. Twenty-five scientists gave presentations regarding their grant proposals in this area. UES provided on-site support, abstract booklets and made all arrangements for the meeting. There were 77 in attendance including speakers. (25 Speakers and 52 Attendees) Dr. Michael Berman, Program Manager
4. The fourth program review was **Tribology** Program Review, Hawk's Cay, Duck Key, FL, 4-8 June 2001. (\$8,731.68) This meeting was a combined review and technical exchange involving researchers from AFOSR, ONR, and NSF Tribology programs. This program involves the solid, liquid, and vapor states of the tribochemistry program and is designed to provide the Air Force with improved novel lubricants, lubrication systems, and wear-resistant coatings for current-and future-generation aircraft engines. Speakers: 46 Attendees: 26 Dr. Paul C. Trulove, Program Manager
5. The fifth program review was **Photorefractive Polymer** Program Review, Hilton Gaslamp Quarter, San Diego, CA, 27-28 July 2001. (\$4,883.54) The objective of this research is to create new properties through combinations of properties, such as generating photorefractivity through the combination of photoconductivity and electro-optic properties. UES provided on-site support, abstract booklets and made all arrangements for the meeting. There were 10 speakers and 4 attendees. Dr. Charles Lee, Program Manager
6. The Sixth program review was **Tri-Service Corrosion Conference**, La Mansion del Rio, San Antonio, TX, 14-18 January 2002. (\$23,152.53) The Tri-Service Corrosion Conference has been hosted biennially by one of the services since being initiated by the Air Force in 1967. The purpose of the Conference is to promote interaction among the military services through a forum wherein the Federal Government's corrosion technologists and interested defense contractors have an open exchange of the latest corrosion

issues relevant to military systems. Moreover, these conferences provide increased visibility of DOD corrosion control and prevention efforts and promote novel and innovative solutions to DOD corrosion problems.

This exchange of information encourages cooperative efforts aiding in the development of integrated corrosion prevention and control technologies. Furthermore, the conferences provide DOD the benefit of feedback, assessments, and recommendations from recognized experts in the corrosion field. The overall goal of these interactions between DOD, private industry, academia, and other Government agencies is to reduce life cycle costs through advances in corrosion control and prevention.

Attendance at the Tri-Service Conference was limited to U.S. Government Employees, DOD Contractors/Grantees, others with approval of service representative. There were 216 in attendance.

C. Workshops

1. **Predictive Toxicology Workshop**, Holiday Inn Fairborn, Dayton, OH, 15-16 May 2001. (\$1,179.12) UES made arrangements for meeting room, refreshments and audio-visual equipment. There were 20 attendees at this workshop

D. Panel Meetings

1. **Molecular Dynamics/Theoretical Chemistry Review Panel Meeting**, Marriott Crystal Gateway, Arlington, VA, 22 June 2001. (\$691.68) Five panel members reviewed 11 proposals and their evaluations.

E. Advisors

In addition to advisors provided for Program Reviews, Workshops and Panel Meetings, UES provided travel, per diem and in some cases, honorarium for the following advisors:

Paul Blount, Paul Calvert and Steve Clarson, **Biomimetic and Biotechnology Program Review**, Philadelphia, PA, 4-6 March 2001. (\$3,323.79)

Madhu Madhukar, Lee McKague and Norm Johnston, **Polymer Matrix Composite Program Review**, Long Beach, CA, 11-12 May 2001. (\$1,876.23)

Allen Tannenbaum, **Predictive Toxicology Workshop**, Dayton, Oh, 15 May 2001. (\$326.10)

Manuel Martinez-Sha, **Molecular Dynamics Contractor's Review**, Irvine, CA, 21-23 May 2001. (\$1,104.14)

Steven Patton, Hugh De Long, Jorn Larsen-Basse, Kathryn Wahl and Andrey Voevodin, **AFOSR/ONR/NSF Tribology Program Review**, Duck Key, FL, 4-8 June 2001. (\$6,802.63)

James Coe, Bruce Garrett, James Muckerman, Mitchio Okumura and Arthur Suits, **Molecular Dynamics/Theoretical Chemistry Panel**, Arlington, VA, 22 June 2001. (\$5,059.14)

Joe Hager, **Edwards AFB, CA**, 25-27 June 2001. (\$1,114.49)

Jeffery Fisher, Gerldine Grant, Shawna Jackman and Errol Zeiger, **JP-8 Jet Fuel**, Brooks AFB, TX, 7-10 August 2001. (\$6,279.75)

Robert Steinman, **Cognitive Engineer**. – Advise AFOSR/NL about Cognitive Science and Cognitive Engineering Systems Sciences in Europe, 12 October – 19 November 2001. (\$10,000.00)

Randall Engle, **University of Pennsylvania**, PA, 10-11 October 2001.

John Flach and Thomas Moore, **Brooks AFB, TX**, 20 November 2001. (\$1,976.77)

David Carroll, **Materials Research Society and Nanocomposite Kick-Off Meeting at MIT**, Boston, MA, 26-30 November 2001. (\$1,795.80)

Paras Prasad, **AFRL Workshop on Polymer Photonics**, Dayton, OH, 5-6 December 2001. (\$972.76)

F. **Management of the Proposal Evaluation Process**

1. UES has complied with Part III, Para.2.3.7.2 of the contract by providing a complete Database of Reviewers (including reviewers used and suggested reviewers), their contact information, titles of proposals reviewed, and program manager. This information is available on our secured Peer Review Web Site (<http://peer.ues.com:81>). To provide this information in a printed/bound format required three separate documents entitled:
 - 1) Reviewers Addresses
 - 2) Recommended Reviewers with Contact Information
 - 3) Reviewer List with Proposal Titles

SUMMARY

UES is pleased to continue to perform the specific tasks assigned to them in accordance with provisions of the contract. Participants will continue to be Dr. Mike Livingston as Program Manager, Judith M. Flory, Program Administrative Manager and Ann Corbitt as Program Assistant. UES personnel appreciate the opportunity to be of service to AFOSR in this interesting and worthwhile program.

LIST OF APPENDICES

Breakdown of Research Proposals by Program Manager

Program for **Biomimetics and Biotechnologies Program Review**, Philadelphia Airport Marriott, Philadelphia, PA, 4-6 March 2001.

Program for **Polymer Matrix Composite Program Review**, Hyatt Regency Long Beach,
Long Beach, CA, 11-12 May 2001.

Program for **Molecular Dynamics Contractor's Review**, The Beckman Center, Irvine, CA,
21-23 May 2001.

Program for **AFOSR/ONR/NSF Tribology Program Review**, Hawk's Cay, Duck Key, FL,
4-8 June 2001.

Program for **Photorefractive Polymer Program Review**, Hilton Gaslamp Quarter, San Diego, CA, 27-28 July 2001.

Program for **Tri-Service Corrosion Conference**, La Mansion del Rio Hotel, San Antonio, TX,
14-18 January 2002.

BREAKDOWN OF RESEARCH PROPOSALS BY PROGRAM MANAGER

<u>PROGRAM MANAGER</u>	<u>NO. OF PROPOSALS</u>
Berman	11
Cohn	0
Kozumbo	11
Larkin	13
Lee	14
Tangney	8
Trulove	15

2001 AFOSR Biomimetics & Biotechnologies Program Review
Philadelphia Airport Marriott
Philadelphia, PA
4-6 March 2001

Sunday, 4 March 2001

4:30pm - 6:30pm Meeting Registration

6:30pm - 8:30pm Social & Poster Session

Inkjet Printing of Biological and Biomimetic Materials

P. Calvert, Materials Science and Engineering, University of Arizona, Tucson, AZ

Advances in the Knowledge of Structure and Function in Snake Infrared Receptors

R. Goris, R. Kishida, M. Nakano, Y. Atobe, T. Hisajima, Yokohama City University School of Medicine, Yokohama, Japan

Engineering Altered Receptor Properties into a Heat Sensing Protein

T. Pappas, *B. Christensen, M. Motamedi, Center for Biomedical Engineering,
*Department of Physiology and Biophysics, University of Texas Medical Branch,
Galveston, TX

Structure and Function of VR1: A Thermal Receptor Activated by a Capsaicin

V. Moiseenkova, B. Bell, M. Motamedi, B. Christensen, Center for Bioengineering,
Department of Physiology and Biophysics, University of Texas Medical Branch,
Galveston, TX

Bloodsucking Bugs as Biosensors for Tracking People Buried Alive – A Concept

S. Trenner, H. Bleckmann, H. Schmitz, University of Bonn, Institute for Zoology,
Bonn, Germany

A New Type of Infrared Receptor in the Australian “Fire-Beetle” *Merimna atrata* (Coleoptera, Buprestidae)

H. Schmitz, A. Schmitz, H. Bleckmann, University of Bonn, Institute for Zoology,
Bonn, Germany

Monday, 5 March 2001

7:30am *Continental Breakfast*

8:00am **Welcome & Admin Details**

8:15am **Program Overview**
R. Cohn, Air Force Office of Scientific Research, Arlington, VA

Monday, 5 March 2001 (Continued)

8:30am **STTR Overview**
J. Evers, Air Force Research Laboratory, Eglin AFB, FL

- 9:15am **MURI Overview**
A. J. Welch, University of Texas, Austin, TX
- 10:00am *Break*
- 10:15am **Infrared Sensory Systems in Pyrophilous Beetles**
H. Schmitz, University of Bonn, Bonn, Germany
- 10:45am **The Role of Capillary Bloodflow in Regulating Afterimage in Pit Vipers**
R. Goris, Yokohama City University School of Medicine, Yokohoma, Japan
- 11:15am **Reversible, Excitation Light-Induced, Enhancement of Fluorescence (RELIEF)**
G. Albrecht-Buehler, Northwestern University Medical School, Chicago, IL
- 11:50am *Lunch (Social)*
- 1:00pm **Integration and Advances in Biomimetics**
L. Brott, S. Kirkpatrick, R. Naik, M. Stone, Air Force Research Laboratory, Wright-Patterson AFB, OH
- 2:30pm *Break*
- 2:45pm **Luminescence, Fluorescence, and Energy Conversion in Photoproteins –**
A New Example in the Brittlestar, *Ophiopsila californica*
D. Deheyn, M. Hildebrand, F. Tsuji, Scripps Institution of Oceanography,
University of California at San Diego, La Jolla, CA
- 3:15pm **Inspiration from Nature: The Control and Synthesis of the Silicified Cell Wall in Diatoms**
M. Hildebrand, Scripps Institution of Oceanography, University of California
at San Diego, La Jolla, CA
- 3:45pm *Break*
- 4:00pm **Cooperative Control**
R. Wehling, AFRL/MN, Eglin AFB, FL
- 4:20pm **Biomaterials**
M. Stone, AFRL/MLPJ, Wright-Patterson AFB, OH

Monday, 5 March 2001 (Continued)

- 4:40pm **Bioelectronics**
M. Wilcox, U. S. Air Force Academy, USAF Academy, CO

5:10pm

Program Summary

R. Cohn, Air Force Office of Scientific Research, Arlington, VA

6:15pm

Dinner (Social)

Tuesday, 6 March 2001

- 7:30am *Continental Breakfast*
- 8:00am **MURI Project Overview**
A. J. Welch, University of Texas, Austin, TX
- 8:20am **MURI: Biological Detection Systems for Electromagnetic Spectral Signatures**
M. Motamedi, B. Christensen, The University of Texas Medical Branch, Galveston, TX
- 8:40am **Exploration of Transduction Mechanism in the Infrared-Sensitive Pit**
Organ of *Melanophila acuminata*
D. Hammer, University of Texas, Austin, TX
- 9:00am *Break*
- 9:20am **Numerical Models of Pit Viper IR Sense Organ**
J. Pearce, The University of Texas, Austin, TX
- 9:40am **Project Goals and Overview**
H. Bayley, The Texas A&M University Systems Health Science Center, College Station, TX
- 10:00am **Microprobing Biological IR Receptors: Materials Approach**
V. Tsukruk, Iowa State University, Ames, IA
- 10:20am *Break*
- 10:40am **Infrared Wavelength – Selective Microbolometers**
S-J. Yoo, D. Hammer, A. J. Welch, D. Niekirk, The University of Texas, Austin, TX
- 11:00am **Biological Detection Systems for Electromagnetic Spectral Signatures**
J. McDevitt, University of Texas, Austin, TX
- 11:20am **Biological Detection Systems for Electromagnetic Spectral Signatures**
A. J. Welch, The University of Texas, Austin, TX
- 11:45am *Lunch (Working) / Discussion Groups*
- 2:00pm Discussion Groups Summaries
- 2:30pm **Wrap-Up**
R. Cohn, Air Force Office of Scientific Research, Arlington, VA
- 2:55pm *Adjourn*

AGENDA
AFOSR Polymer Matrix Composite Program Review
11-12 May 2001

Hyatt Regency
Long Beach, CA

Friday, 11 May 2001

- 7:30 Registration/Continental Breakfast
- 8:00 Opening Remarks – *Charles Lee, AFOSR/NL, Arlington, VA*
- 8:10 Developments in Dielectric Techniques for Non-Destructive Examination
William Banks, David Hayward, Richard Pethrick, University of Strathclyde, Scotland, UK; Robert Crane, Wright Patterson Laboratory, Wright-Patterson AFB, OH
- 8:40 Local Dynamics of Adhesive Joints by Dielectric Relaxation Spectroscopy
Jovan Mijovic, Polytechnic University, Brooklyn, NY
- 9:25 Laboratory for Research on Electron Beam Curing of Composites: A Review of Current Research and Capabilities
Don Klosterman, University of Dayton, Dayton, OH
- 9:40 Liquid Crystal Adhesives
Patrick Hood, Cornerstone Research Group, Inc., Dayton, OH;
Richard Chartoff, University of Dayton, Dayton, OH
- 10:25 Break
- 10:45 The Structure - Property Relations and Durability of Polymers and Their Composites for Future Air Force Applications
Roger J. Morgan, Texas A&M University, College Station, TX
- 11:30 High Temperature Polymer Matrix Composites Performance Characterization in Aerospace Environments
E. Eugene Shini¹, Roger J. Morgan², James K. Sutter³, and Mary Ann Meadors³
¹OAI-NASA Glenn Research Center, Cleveland, OH
²Texas A&M University, College Station, TX
³NASA Glen Research Center, Cleveland, OH
- 12:00 Interphase Engineering in Carbon Fiber/BMI Composites to Improve Fiber-Matrix Adhesion and Composite Shear Strength
Lawrence T. Drzal, Michigan State University, East Lansing, MI;
Donghwan Cho, Kumoh National University of Technology, Korea

Friday, 11 May 2001 (Cont'd)

- 12:30 Lunch

13:30 Durability Characterization of High Temperature Polymer Matrix Composites
for

Air Force Applications: Structure-Property Relationships;
Development of Low Cure Shrinkage Adhesives for Structural Applications
Chuk Leung, PolyComp Technologies, Inc., Del Mar, CA

14:00 Residual Stresses in Thermosets: Modeling and Long Term Performance
*Mataz Alcoutlabi, Sindee L. Simon, Gregory B. McKenna, Texas Tech
University,
Lubbock, TX*

14:30 Polymer Volume Change, Fiber Stress, and Stress Relaxation During a Cure
Cycle
Madhu S. Madhukar, The University of Tennessee, Knoxville, TN

15:00 Cryogenic Cycling Behavior of Polymeric Composite Materials: Matrix and
Fiber
Influences on Microcracking
James C. Seferis, University of Washington, Seattle, WA

15:30 Break

15:45 Environmental Durability of High Performance Polymer Matrix Composites
*David Curliss, AFRL/MLBC, Air Force Research Laboratory, Wright-Patterson
AFB, OH*

16:15 Innovative Manufacturing and Structural Analysis of Composite Isogrid
Structures for Space Applications, Phase I: Structure-Property Relationships of
Organically Modified Layered Silicate/Thermoset Nanocomposites
Derrick Dean, Tuskegee University, Tuskegee, AL

16:45 Next Generation Aerospace Composites Through Nanotechnology
D. Raghavan, Howard University, Washington, DC

17:15 Phenolic-Clay Nanocomposites for Rocket Nozzles
J. H. Koo¹, H. Stretz¹, A. Bray², W. Wootan¹, S. Mulich¹, B. Powell³, and
J. Weispfenning⁴
¹Southwest Texas State University, San Marcos, TX
²Systems and Materials Research Consultancy, Austin, TX
³Southern Clay Products, Gonzales, TX
⁴Cytec Fiberite, Winona, MN

17:45 End

Saturday, 12 May 2001

7:30 Continental Breakfast

8:00 Development of Low Viscosity High Temperature Polyimide Adhesives
Hongbo Liu, Daniel A. Scola, University of Connecticut, Storrs, CT

- 8:30 Thermosetting Polyarylene Resins for High-Temperature Structural Composite Applications
Farshad Joseph Motamedi, Maxdem, Inc., San Dimas, CA
- 9:00 Organic Matrix Nanocomposites of Vapor Grown Carbon Fibers (VGCF) and Polyhedral Oligomeric Silsesquioxanes (POSS)
Charles U. Pittman, Jr., Mississippi State University, Mississippi State, MS
- 9:30 Space-Ready Polymer Nanocomposites
D. Gerald Glasgow, Elliot B. Kennel, Applied Sciences, Inc., Cedarville, OH
- 10:00 Break
- 10:15 Structural Foams of Improved Strength and Thermal Stability from Random-Coil
and Rigid-Rod Polymers
Seng Tan, Wright Materials Research Company, Dayton, OH;
James Mark, University of Cincinnati, Cincinnati, OH
- 10:45 Review of Research in the Year 2000 at PVAMU FAST Center
Paul O. Biney, Prairie View A&M University, Prairie View, TX
- 11:15 Novel Surface Treatments for Glass Fillers
David A. Boyles, Jon J. Kellar, William M. Cross, South Dakota School of Mines & Technology, Rapid City, SD
- 11:45 Novel Multifunctional Space Durable Fluoropolymers and Composites
Huaibing Liu, Allan Shepp, Bob Mojazza, Triton Systems, Inc., Chelmsford, MA;
Dennis Smith, Clemson University, Clemson, SC
- 12:15 Investigation of Adhesive Joints for Nano-Engineering and Modeling
Chris H. Jenkins, Robb M. Winter, South Dakota School of Mines & Technology, Rapid City, SD
- 12:45 End

**2001 AFOSR Molecular Dynamics
Contractor's Review
Beckman Center
Irvine, CA
21 – 23 May 2001
Sunday, 20 May 2001**

5:00-7:00 PM Registration at the Four Seasons Hotel

Monday, 21 May 2001

8:00 AM Registration and Breakfast Buffet

Session Chair: Michael Berman, AFOSR/NL

- 9:00 Using Cavity Ring-Down to Probe the Spectroscopy and Reaction Dynamics of Ions and Radicals
R. Zare, J. Flad, Y. Rhee and M. Gupta
Stanford University, Stanford, CA
- 9:30 Molecular Dynamics on Multiple Electronic States: The $K + CH_3I$? $KI + CH_3$ Reaction Cross Section and Its Energy and Orientation Dependence. A Case Study of an Intermolecular Electron Transfer
R. Levine, Hebrew University of Jerusalem, Jerusalem, Israel
- 10:00 Ion Molecule Chemistry at High Temperature and Pressure
A. Viggiano, S. Arnold, S. Williams, A. Midey, J. Seeley and I. Dotan
Air Force Research Laboratory, Hanscom AFB, MA

10:30 Break

Session Chair: Patrick Carrick, SAF/AQRT

- 11:00 Photoelectron Spectroscopy of Si_nC_m anions
G. Davico, University of Idaho, Moscow, ID
T. Ramond and W. Lineberger, University of Colorado, Boulder, CO
- 11:30 Polynitrogen Chemistry and the Pursuit of New High Energy Density Materials
K. Christe, W. W. Wilson, A. Vij, V. Vij, J. Sheehy, J. Boatz, S. Schneider, T. Schroer, R. Wagner, N. Maggiorosa, and R. Haiges
ERC and PRSP/Air Force Research Laboratory, Edwards AFB, CA
Loker Research Institute, University Southern California, Los Angeles, CA
- 12:00 Ab Initio DFT
R. Bartlett, S. Hirata, I. Grabowski and S. Ivanov
University of Florida, Gainesville, FL

12:30 PM Lunch Buffet

Monday, 21 May 2001 – Continued

Session Chair: Edmond Murad, AFRL/VSBX

- 2:00 Advances in Satellite Drag Modeling
F. Marcos, Air Force Research Laboratory, Hanscom AFB, MA
- 2:30 Cluster Deposition Studies of Impact Dynamics and Catalysis Chemistry
M. Aizawa, S. Lee and S. Anderson
University of Utah, Salt Lake City, UT
- 3:00 **Break**
- 3:30 Program Status
M. R. Berman, Air Force Office of Scientific Research, Arlington, VA
- 4:00 Discussion Session: “*Electric Propulsion*”
Discussion Leader: R. A. Dressler
- 7:30 PM Poster Session and Reception
Four Seasons Hotel

Tuesday, 22 May 2001

8:00 AM Registration and Breakfast Buffet

Session Chair: Susan Arnold, AFRL/VSBP

- 9:00 Gas Phase Ion Chemistry Relevant to Hypersonic Vehicle Applications
S. Williams, Air Force Research Laboratory, Hanscom AFB, MA
- 9:30 Anisotropic Impurity-Matrix Interactions Can Be Important in Low Temperature High Energy Density Matter
G. Voth, University of Utah, Salt Lake City, UT
- 10:00 Experimental and Theoretical Study of the Interaction of Aluminum Atoms with Molecular Hydrogen
P. Dagdighian¹, M. Alexander², X. Tan¹, J. Williams² and J. Krumrine²
¹The Johns Hopkins University, Baltimore, MD
²The University of Maryland, College Park, MD
- 10:30 **Break**

Tuesday, 22 May 2001 – Continued

Session Chair: Mario Fajardo, AFRL/PRSP

11:00 Stabilizing Metastable Species in Liquid Helium Droplets: The Road to High Energy Radical Nanoclusters
R. Miller, University of North Carolina, Chapel Hill, NC

11:30 Spectroscopy, Energetics and Dynamics of Intrinsic Electronic Excitations in Bulk Superfluid ^4He
*J. Eloranta¹, V. Ghazarian¹, M. Petterson², A. Benderskii³, A. Vilesov⁴ and V. Apkarian¹, ¹University of California, Irvine, CA
²University of Helsinki, Finland, ³University of Columbia, New York, NY
⁴University of Southern California, Los Angeles, CA*

12:00 Relaxation Dynamics in Quantum Clusters: Lessons Learned and Challenges Ahead
K. Lehmann, Princeton University, Princeton, NJ

12:30 PM Lunch Buffet

Session Chair: Ingrid Wysong, AFRL/PRSA

2:00 The Development and Applications of Hybrid Organic/Inorganic Polymers Using Polyhedral Oligomeric Silsesquioxanes (POSS)
*S. Phillips, T. Haddad, R. Blanski, F. Feher, B. Viers, R. Gonzalez and S. Svejda
Air Force Research Laboratory, Edwards AFB, CA*

2:30 Polyhedral Oligomeric Silsesquioxanes (POSS): Structure, Properties and Mechanisms of Formation
*M. Gordon and B. Tejerina, Iowa State University, Ames, IA
T. Kudo, Gunma University, Kiryu, Japan*

3:00 Break

3:30 Structures and Conformations of POSS Monomers
*J. Gidden, P. Kemper and M. Bowers
University of California, Santa Barbara, CA*

4:00 Nuclear Quantum Effects in Hydrogen Transfer Reactions for the Synthesis of Polyhedral Oligomeric Silsesquioxanes
S. Hammes-Schiffer, Pennsylvania State University, University Park, PA

Wednesday, 23 May 2001

8:00 AM Registration and Breakfast Buffet

Session Chair: Steven Lipson, AFRL/VSBT

- 9:00 Measurement of Rocket Combustion Emissions and Plume Wake Composition in the Stratosphere
M. Ross, The Aerospace Corporation, Los Angeles, CA
- 9:30 The Reaction Probability of OH and HO₂ on Soot Particles
M. Molina, Massachusetts Institute of Technology, Cambridge, MA
- 10:00 Collisions of O Atoms with NO, CO₂, and Hydrocarbons: Atmospheric Implications
J. Dodd, S. Miller, R. Sharma, K. Castle and S. Lipson
Air Force Research Laboratory, Hanscom AFB, MA
E. Hwang and J. Lipson, Stewart Radiance Laboratory, Bedford, MA

10:30 Break

Session Chair: Jeffrey Sheehy, AFRL/PRSP

- 11:00 Collision-Induced Chemical Processes on a Chlorinated Silicon Surface
T. Minton and J. Zhang, Montana State University, Bozeman, MT
- 11:30 The Kinetics of Adsorbate Islands on Normal and Strained Surfaces: Molecular Adsorption, and Island Evaporation, Diffusion and Coarsening
H. Metiu, University of California, Santa Barbara, CA
- 12:00 Degradation of Metal Surfaces: The Chemistry and Physics of Microscopic Stress Fields
A. Rappe, University of Pennsylvania, Philadelphia, PA
- 12:30 PM Closing Remarks, Adjourn**

2001 AFOSR/ONR/NSF Tribology Review
Hawk's Cay Resort
Duck Key, FL
4 – 8 June 2001

Monday, 4 June 2001

- 0730 – 0800 Registration/Continental Breakfast
- 0800 – 0830 Carbon Nanotube Probes: Enabling Fundamental Research and New Technologies at the Nanoscale
Charles Lieber, Havard University
- 0830 – 0900 Dynamic Mechanical Properties at the Nanoscale
Kathryn J. Wahl, S. A. Syed Asif and Richard J. Colton
Naval Research Laboratory
- 0900 – 0930 Dynamic Processes During Tribological Loading of Solid Surfaces
Razil Hariadi, Ryan Leach, Forrest Stevens, Steve Langford, Joe Wasem
and
Tom Dickinson, Washington State University
- 0930 – 1000 Break
- 1000 – 1030 Electrostatic Monitoring of Boundary and Mixed Lubrication
Robert J. K. Wood, T. J. Harvey and S. Morris, University of Southampton
Honor E. Powrie, Stewart Hughes Limited
- 1030 – 1100 An Integrated Study of the Lubrication and Failure Transitions in Conformal Contacts
Jane Wang, Northwestern University
- 1100 – 1130 Superconductivity-Dependent Friction
Alex C. Mayer, Lucas K. Wagner and Jacqueline Krim
North Carolina State University
- 1130 – 1300 Lunch
- 1300 – 1330 Quasicrystalline Coatings for Aerospace Applications
Larry Fahrenbacher, Technology Assessment & Transfer, Inc.
- 1330 – 1400 Nucleation and Growth of Quasicrystalline Thin Films
Laurence D. Marks, Edy J. Widjaja and Christopher S. Own
Northwestern University
- 1400 – 1430 Tribological Properties of Quasicrystals and Quasicrystal Approximants
Andrew J. Gellman and Chris Mancinelli, Carnegie Mellon University
- 1430 – 1500 Confirmation of Phase Transformations in Al-Cu-Fe-Cr Thin Films
Dan Shechtman^{1, 2} and Alan Duckham²
¹Technion, ²National Institute of Standards and Technology

Tuesday, 5 June 2001

0730 – 8000 Continental Breakfast/Registration

0800 – 0830 Studies of Micro-Structured Fluids under Confinement and Shear
Cyrus Safinya, Yuval Golan, Youli Li and Jacob Israelachvili
University of California

0830 – 0900 Hydrodynamic Interactions between Rough Surfaces
Richard F. Salant and Dawei Shen, Georgia Institute of Technology

0900 – 0930 Dynamic Shearing Resistance of Confined Molten Metal Films at
Extremely
High Strain Rates
Makoto Okada, Nai-Shang Liou, and Vikas Prakash
Case Western Reserve University

0930 – 1000 Break

1000 – 1030 Physical Chemistry of Inert Surfaces
Michael Grunze, Angewandte Physikalische Chemie

1030 – 1100 Modeling Dynamic Friction at the Grain Level Including Stochastic
Effects
P. Zavattieri, Francois Barthelat and Horacio D. Espinosa
Northwestern University

1100 – 1130 Boundary Lubrication Modeling with Additive Physiochemical
Protection
Liming Chang, Penn State University

1130 – 1200 Poster Summaries (2 min per poster)

1200 – 1930 Open Afternoon

1930 2130 Poster Session/Mixer

Adaptive Nanocomposite Coatings Made of Yttria Stabilized Zirconia and Gold
*Andrey A. Voevodin, J. J. Hu, T. A. Fritz and Jeffrey S. Zabinski, Air Force Research
Laboratory*

MD Simulations of the Friction and Wear of Amorphous Carbon Coatings
Guangtu Gao and Judith A. Harrison, United States Naval Academy

High Temperature Tribometry of Pressureless Sintered SiC in Vacuum and Low
Pressure
Oxygen Environments
Kurt S. Ketola and Michael N. Gardos, Raytheon Electronic Systems

Spectroscopic and Computational Characterization of Transition Metal Carbide Surface

Chemistry

Peter Frantz and Stephen V. Didziulis, The Aerospace Corporation

Tuesday, 5 June 2001 – Continued

Vacuum Tribology Studies of WC-Ag and TiC-Ag Composite Coatings
Deposited by Sputtering and Laser Ablation

Jose Endrino and James E. Krzanowski, University of New Hampshire

Jose J. Nainaparampril, Systran

Time and Length Scaling in Tribological Processes

Jacob Israelachvili, Delphine Gourdon and Carlos Drummond, University of California

Simulating Thermal-Tribological Contacts

Jane Wang, Northwestern University

Mechanical Behavior of Confined Films: An in-situ study of Silane Monolayers by
Second

Harmonic Generation (SHG)

*Michael Grunze, M. T. Strobel, J. Blümmel, W. Eck, Manfred Buck, University of
Heidelberg*

Dynamic Friction Measurements at Sliding Velocities Representative of High-Speed
Machining Processes

Francois Barthelat, A. J. Patanella and Horacio D. Espinosa, Northwestern University

Chemical-Vibro-Mechanical Polishing of Machine Components

Liming Chang, Penn State University

Kinetics and Energetics of the Desorption of Polyether Lubricants

*Andrew J. Gellman, Kris R. Paserva and Nithya Prashanth, Carnegie Mellon
University*

Scanning Capacitance Microscopy for Thin Lubricant Film Measurements

David T. Lee, Jonathan Pelz and Bharat Bhushan, Ohio State University

TBD, *Steven Danyluk, Georgia Institute of Technology*

TBD, *Lynden A. Archer, Cornell University*

Tribological and Mechanical Characterization of Chemical Mechanical Planarization
Process

*Ashok Kumar, Arun K. Sikder, Frank Giglio, J. Wood and John M. Anthony
University of South Florida*

On Establishing Factor Significance on the Delamination Fracture Toughness of a
Composite Laminate

Assimina Pelegri and Anand Tekkam, Rutgers

Thermomechanical Contact and Wear of Rough Surfaces in Sliding Contact
Andres Soom, SUNY at Buffalo

Effect of Accelerated Aging Protocol on the Oxidation and Resultant Wear
Behavior of Irradiated Polymers
Thierry A. Blanchet, Rensselaer Polytechnic Institute

Wednesday, 6 June 2001

0730 – 8000 Continental Breakfast/Registration

0800 – 0830 Chemistry, Structure, and Tribological Properties of Nanostructured
Lubricant Coatings for Extreme Environments
*Jeffrey S. Zabinski, Andey A. Voevodin, J.J. Hu, J. E. Bultman and H.
Argadine*
Air Force Research Laboratory

0830 – 0900 Micro/Nanotribology of MEMS Materials and Devices: Lubrication
Schemes and Environmental Effects
Steve T. Patton, K.C. Eapen and Jeffrey S. Zabinski
Air Force Research Laboratory

0900 – 0930 Correlation of Tribological and Surface Chemical Properties of Metal
Carbides
*Scott S. Perry, Byung-II Kim, Rebecca L. Guenard, Luis C. Fernandez
Torres,*
Xingju Yang and Shuang Li, University of Houston

0930 – 1000 Break

1000 – 1030 High Hardness, Low Friction Carbide-Based Nanocomposite Coatings
for
Air and Vacuum Environments
*James E. Krzanowski, Todd S. Gross, Carmela Amato-Wierda and Olof
Echt*
University of New Hampshire
Jose J. Nainaparampil, Systan

1030 – 1100 High Temperature Tribometry of Pressure-Assisted Densified SiC in
Vacuum and Low Pressure Oxygen Environments
Kurt S. Ketola and Michael N. Gardos, Raytheon Electronic Systems

1100 – 1130 Synthesis and Characterization of Fatigue-Resistant TiN/SiN_x
Nanolayered
Coatings with Enhanced Microstructure
Yu-Hsia Chen, Yip-Wah Chung and Leon Keer, Northwestern University

1130 – 1300 Lunch

- 1300 – 1330 Effect of Surface Stiffness on the Friction of Sliding Hydroxylated Alumina Surfaces
Bill Hase, Wayne State University
- 1330 – 1400 Reaction of Aromatic Phosphate Esters with Iron and Iron Oxides
Nelson Forster, Propulsion and Power
Costandy Saba, University of Dayton Research Institute
- 1400 – 1430 Mechanistic Surface Chemistry of Vapor Phase Lubrication
Andrew J. Gellman, Daxing Ren and Doug Sung, Carnegie Mellon University
- 1430 – 1500 QCM-STM Studies of the Nanoscale Dynamics of TCP and other Vapor-Phase Lubricants on Metals
M. Abdelmaksoud, B. Borovsky and J. Krim, North Carolina State University

Thursday, 7 June 2001

- 0730 – 8000 Continental Breakfast/Registration
- 0800 – 0830 Prediction Mechanical Properties of Poly- and Nanocrystalline Microstructures
from the Atoms to the Macroscale
Donald W. Brenner and Olga Shenderova, North Carolina State University
Airat Nazarov, Russian Academy of Sciences
- 0830 – 0900 Structure, Forces and Rheology in Nanoscale Devices
Uzi Landman, Georgia Institute of Technology
- 0900 – 0930 Surface Reconstruction of Alumina Surfaces
J. W. Mintmire, U. S. Naval Research Laboratory
- 0930 – 1000 Break
- 1000 – 1030 MD Simulations of the Friction of n-Alkane Monolayers
Judith Harrison and Paul T. Mikulski, U. S. Naval Academy
- 1030 – 1100 Mathematical Modeling of Stress-Induced Lubricant Degradation
Ilya I. Kudish, Kettering University
- 1100 – 1130 Powder Lubrication Modeling
Mike Khonsari, Louisiana State University
- 1130 – 1300 Lunch
- 1300 – 1330 Hyper-Spectral Chemical Imaging hardware and Software: Theory and Applications

Dor Ben-Amotz, Karim Jallad and Dongmao Zhang, Purdue University

1330 – 1400 Non-vibrating Contact Potential Difference Sensors for Condition-based Maintenance
Steven Danyluk, Georgia Institute of Technology

1400 – 1430 Thermoelastic Instability of an Automotive Disk Brake --- Numerical Predictions
and Experiments
Yun-Bo Yi and James R. Barber, University of Michigan

1430 – 1500 TBD

Friday, 8 June 2001

0730 – 8000 Continental Breakfast/Registration

0800 – 0830 Friction and the Continuum Limit –Where is the Boundary?
Steve Granick, University of Illinois

0830 – 0900 Nano-Scale Self-Assembled Coatings
Carolyn Aita, University of Wisconsin

0900 – 0930 *In situ* Raman Tribometry for Condition-based Monitoring of DLC Coated Bearings
Thomas W. Scharf and Irwin L. Singer, U. S. Naval Research Laboratory

0930 – 1000 **Break**

1000 – 1030 TBD, *Juergen Kreuzer, Dalhousie University*

1030 – 1100 A Novel Technology to Synthesize Nano-composite: Solid Lubricant and Hard Material Composite Coating, A Case Study
S. N. Yedave, Ajay P. Malshe and W. D. Brown, University of Arkansas

AFOSR Photorefractive Polymer Program Review
Hilton Gaslamp Quarter
San Diego, CA
27-28 July 2001

Friday, 27 July 2001 (Marina Room)

- 0730 – 0800 **Registration/Continental Breakfast**
- 0800 – 0820 Welcome/ Directions and Initiatives
Charles Lee, AFOSR, Arlington, VA
- 0820 – 0840 Signal Processing
Chuck Woods
- 0840 – 0900 Dynamic Hologram
Fassil Ghebremichael
- 0900 – 0945 AFOSR/MLPJ Initiative on Photorefractive Fibers
T.J. Bunning and S. Guha, AFRL/MLPJ
- 0945 – 1005 **Break**
- 1005 – 1050 AFRL/MLPJ In-house Photorefractive Effort
Dean Evens, TMC/MLPJ
- 1050 – 1135 Developing Photorefractive Glass Composites
Jason P. Duignan, Lesley L. Taylor & Gary Cook*
Defence Evaluation Research Agency, Malvern, U.K.
- 1135 – 1220 Transversely Excited Liquid Crystal Cells
Gary Cook, Jason P. Duignan, Lesley L. Taylor
Defence Evaluation Research Agency, Malvern, U.K.
- 1220 – 1320 **Lunch**
- 1320 – 1405 A Comparison of Point Defects in Undoped Congruent, Iron-Doped
Congruent,
 and Undoped Stoichiometric LiNbO₃ Crystals
Larry Halliburton, West Virginia University
- 1405 – 1450 Photorefractive Polymer Fibers
Mark G. Kuzyk, Washington State University
- 1450 – 1510 **Break**
- 1510 – 1555 Control of Stoichiometry of LiNbO₃ Fibers prepared by Laser Heated
Pedestal
 Growth and Spectroscopy of Fe²⁺/Fe³⁺
Richard S. Meltzer, Uwe Happek, Sergei A. Basun and Michele
Tavernese
University of Georgia
- 1555 – 1625 Image Processing using Photorefractive Polymers
Partha P. Banerjee, University of Dayton

1625 – 1655 Optical Pulsator with Multi-Channel Output
N. Kukhtarev, T. Kukhtareva, Alabama A & M University

Saturday, 28 July 2001

0730 – 8000 **Continental Breakfast**

0800 – 0845 Mechanisms of Photorefractivity in Polymeric Materials
Ulrich Gubler, Daniel Wright, and W.E. Moerner, Stanford University
Meng He and Robert Twieg, Kent State University

0845 – 0930 Photon-gated Photorefractive polymers
N. Peyghambarian and B. Kippelen, University of Arizona

0930 – 1015 Photorefractivity, Photoconductivity, and Charge Transport in Novel
Inorganic
Quantum Dot: Polymer Nanocomposites
Paras Prasad, State University of New York at Buffalo

1015 – 1035 **Break**

1035 – 1120 Functionalized Simple Organic Photorefractive Materials
Luping Yu, University of Chicago

1120 – 1205 Nanostructured Liquid Crystalline Photorefractive and Semiconducting
Materials
K.D. Singer, I. Shiyankovskaya, Case Western Reserve University
V. Percec, M. Obata, Y. Miura, University of Pennsylvania

1205 – 1250 Liquid Crystal Semiconductors
R. Twieg, V. Gettwert, L. Semyonov, L. Sukhomlinova, Kent State University
K. Singer, I. Shiyankovskaya, Case Western Reserve University

1250 – **Lunch**

**Tri-Service Corrosion Conference
14-18 January 2002**

**La Mansion del Rio Hotel
San Antonio, TX**

Monday, 14 January 2002

1000-1200 Registration Desk Open

**1400 Lt.Col. Paul Trulove, Program Manager,
Air Force Office of Scientific Research, Arlington, VA**

**1415 Col. Michael R. Carpenter, Chief,
Planning Division of Aging Aircraft Systems Program Office,
Wright-Patterson AFB, OH**

**1505 MG James R. Snider, Deputy Chief of Staff for Research,
Development and Acquisition,
Headquarters U. S. Army Materiel Command, Alexandria, VA**

**1555 Capt. Jerome L. Budnick, Head of the Air Vehicle Department,
Naval Air Systems Command, Patuxent River, MD**

**1645 Meeting Organization, Maj. Robert A. Mantz, Research Chemist,
Air Force Research Laboratory, Wright-Patterson AFB, OH**

1830 Poster Session 1 and Reception (Veramendi Room)

Registration Desk Open All Times Meeting is in Session

Tuesday, 15 January 2002

0700 Continental Breakfast El Cabildo Room

Session 1: PROGRAM OVERVIEWS / COST / TRAINING

Session Chair: Vinod S. Agarwala

Co-Chair: Joseph M. Argento

0830 Overview of Air Force Corrosion Prevention and Control Program

Major D. Bullock

Air Force Research Laboratory, Robins AFB, GA

0900 The Implementation of Quality Assurance Training in Naval Ship Preservation Work

N. Clayton and J. Duckworth

Naval Surface Warfare Center, Philadelphia, PA

0930 Methodology for Acquiring and Assessing the Cost of Corrosion for U. S. Marine Corps Ground Vehicles and Selected Equipment

M. Gallagher

Naval Surface Warfare Center, Philadelphia, PA

1000 Break

Session 1: PROGRAM OVERVIEWS / COST / TRAINING (continued)

Session Chair: Joseph M. Argento

Co-Chair: Vinod S. Agarwala

1030 Web Design for Information and Training in Corrosion Prevention & Control

P. R. Roberge

Royal Military College of Canada, Kingston, Ontario, Canada

1100 Fatigue Life, Corrosion and Safe-Life Issues

B. Shafiq¹ and V. S. Agarwala²

¹University of Puerto Rico, Mayagüez, Puerto Rico

²Naval Air Systems Command, Patuxent River, MD

Session 1: POLLUTION PREVENTION / CASE STUDIES

Session Chair: Joseph M. Argento

Co-Chair: Vinod S. Agarwala

1130 Green Corrosion Inhibitors

V. S. Agarwala

Naval Air Systems Command, Patuxent River, MD

1200 Lunch

Session 1: POLLUTION PREVENTION / CASE STUDIES (continued)

Session Chair: Lynne M. Pfledderer

Co-Chair: Norm Clayton

1330 Cadmium Replacements for Defense Systems

M. J. Kane

Naval Air Systems Command, Patuxent River, MD

1400 Measurement of Volatile Organic Compounds (VOC'S) in New-Generation Low-VOC Marine Coatings for the U. S. Navy

S. H. Lawrence¹, A.W. Webb¹, R. L. Foster¹, P. M. Bizot² and C. E. Bevans²

¹U. S. Naval Research Laboratory, Washington, DC

²Geo-Centers, Clinton, MD

1430 Pollution Prevention in Aerospace and DoD Painting Operations: Case Studies in Successful Elimination of MEK and Lacquer Thinner

J. A. Lucas

Inland Technology, Inc., Tacoma, WA

Tuesday, 15 January 2002 (continued)

1500 Break

Session 1: POLLUTION PREVENTION / CASE STUDIES (continued)
Session Chair: Norm Clayton Co-Chair: Lynne M. Pfledderer

- 1530 Compressors for the 21st Century**
R. Miles
NCI Information Systems, Inc., Robins AFB, GA
- 1600 An Electronics Connector CPC Treatment that Raised Reliability as Much as 20X Saving Big Bucks**
D. H. Horne
Hill AFB, UT
- 1630 The Operational Testing of the CPC ACF-50 on the U. S. Navy's S-3B Viking Fleet**
E. G. Mullin
Naval Air Depot North Island, San Diego, CA

Session 2: CORROSION CONTROL COATINGS: METALS
Session Chair: Michael S. Donley Co-Chair: Richard C. Kinzie

- 0830 Development of Production-Scale Aluminum-Manganese Electrodeposition Process**
E. Beck, M. J. Kane, C. Matzdorf and J. Green
Naval Air Systems Command, Patuxent River, MD
- 0900 Using Vanadium to Impart Self-Healing to Conversion Coatings for Aerospace Aluminum Alloys**
M. T. Coolbaugh¹, H. P. Groger¹, E. C. Aquino¹, S. E. Morris¹, J. E. Roberts¹ and F. Pearlstein²
¹American Research Corporation of Virginia, Radford, VA
²Philadelphia, PA
- 0930 Optimization of Zn to Ni Ratio in Zn-Ni-Cd Deposits**
H. Kim, B. S. Haran and B. N. Popov
University of South Carolina, Columbia, SC

1000 Break

Session 2: CORROSION CONTROL COATINGS: METALS (continued)
Session Chair: Richard C. Kinzie Co-Chair: Michael S. Donley

- 1030 Corrosion and Adhesive Performance of Anodized Aluminum with Trivalent Chromium Post Treatment**
C. Matzdorf, E. Beck and D. Bellevou
Naval Air Systems Command, Patuxent River, MD
- 1100 Metallizing for Corrosion Protection**
D. H. Neale
NCI Information Systems, Inc., Decatur, GA
- 1130 Development of Corrosion and Hydrogen Permeation Resistant Zn-N-X (X=P, Cd) Ternary Alloys**
B. N. Popov
University of South Carolina, Columbia, SC

1200 Lunch

Session 2: CORROSION CONTROL COATINGS: METALS (continued) AND HEAT TREATMENTS & METALLURGY

Session Chair: John A. Sedriks

Co-Chair: David A. Shifler

- 1330 Cerium-Based Conversion Coatings for Aluminum Alloys**
J. O. Stoffer, T. J. O'Keefe, M. J. O'Keefe, W. G. Fahrenholtz, T. P. Schuman,
P. Yu, E. L. Morris, S. Hayes, S. Patwardhan, A. Williams and B. Rivera
University of Missouri-Rolla, Rolla, MO
- 1400 Low Temperature Retrogression and Re-Aging Heat Treatments for Thick Section Components of Aluminum Alloy 7075 for Aging Aircraft Refurbishment**
C. P. Ferrer, M. G. Koul, B. J. Connolly and A. L. Moran
U. S. Naval Academy, Annapolis, MD
- 1430 Effects of Hydrogen on the K_{IEAC} of High Strength Steel**
S. Grendahl and R. Kilbane
U. S. Army Research Laboratory, Aberdeen Proving Ground, MD

1500 Break

Session 2: CORROSION CONTROL COATINGS: METALS AND HEAT TREATMENTS & METALLURGY (continued)

Session Chair: Daniel A. Shifler

Co-Chair: A. John Sedriks

- 1530 Corrosion Protection Characteristics of New Sol-Gel Based Surface Treatments for AA2024-T3**
N. N. Voevodin¹, V. N. Balbyshev², A. J. Vreugdenhil¹, J. A. Johnson³ and M. S. Donley³
¹University of Dayton Research Institute, Dayton, OH
²Universal Technology Corporation, Dayton, OH
³Air Force Research Laboratory, Wright-Patterson AFB, OH
- 1600 SCC and Corrosion Fatigue of HVOF Coated and Cr Plated AerMet 100 Steel**
E. U. Lee, H. C. Sanders and S. Hartle
Naval Air Warfare Center, Patuxent River, MD
- 1630 SCC and Corrosion Fatigue of Laser Formed Ti-6Al-4V Alloy**
E. U. Lee and H. C. Sanders
Naval Air Warfare Center, Patuxent River, MD

Session 3: AFOSR CORROSION PROGRAM REVIEW

Session Chair: Paul C. Trulove

- 0815 Welcome and Opening Remarks**
Lt. Col. Paul C. Trulove, AFOSR Program Manager, Arlington, VA

OSU MURI Final Review (0830 – 1130)

- 0830 Inhibition of Oxygen Reduction by Chromate on AA2024-T3**
R. McCreery, G. Frankel, R. G. Buchheit, J. Ramsey and W. Clark
The Ohio State University, Columbus, OH
- 0930 Cr(VI) Inhibition of Corrosion of Al Alloys**
M. Kendig, S. Jeanjaquet, R. Addison, J. Waldrop and M. Hon
Rockwell Scientific Company, Thousand Oaks, CA

1000 Break

1030 Mechanism of Al Alloy Corrosion and the Role of Chromate Inhibitors

G. S. Frankel

The Ohio State University, Columbus, OH

1130 Dioxygen Reduction at AA2024: Measurement of the Reaction and Influence of Adsorbates

J. Seegmiller and D. A. Buttry

University of Wyoming, Laramie, WY

1200 Lunch

NDSU URI Annual Review (1330 – 1630)

1330 Aircraft Coatings Testing, Corrosion Sensors in Coatings and Mg-Rich Coatings as Cr-free Primers for Al 2024 T-3

G. P. Bierwagen, S. Mabbutt, L. He, X. Wang, M. Nanna, L. Ellingson and D. Tallman

North Dakota State University, Fargo, ND

1400 Electrodeposition of Conducting Polymer Coatings on Active Metals using Electron Transfer Mediation

D. E. Tallman¹, C. Vang¹, T. Underdahl¹, G. G. Wallace² and G. P. Bierwagen¹

¹North Dakota State University, Fargo, ND

²University of Wollongong, Wollongong, Australia

1430 Quantitative Use of Spectroscopy and Effective Irradiation Dosage During Weathering

S. G. Croll and A. D. Skaja

North Dakota State University, Fargo, ND

1500 Break

1530 Application of Multi-Rate Signal Processing to Electrochemical Instrumentation

D. C. Farden

North Dakota State University, Fargo, ND

1600 Evaluation of Functionalized Polysiloxanes as Aircraft Coating Primers

P. Boudjouk, T. E. Ready and S.-B. Choi

North Dakota State University, Fargo, ND

1630 Local Chemistry, Electrochemistry and Corrosion Topography within Coating Defects

O. M. Schneider, J. M. Williams and R. G. Kelly

University of Virginia, Charlottesville, VA

Wednesday, 16 January 2002

0700 Continental Breakfast El Cabildo Room

Session 1: POLLUTION PREVENTION / CASE STUDIES
Session Chair: Sid Markowitz Co-Chair: E. Dail Thomas

0830 Failure Analysis of a HH-60 Helicopter External Fuel-Tank Pylon

J. A. Newman¹ and R. S. Piascik²

¹U. S. Army Research Laboratory, Hampton, VA

²NASA Langley Research Center, Hampton, VA

0900 Integrated Corrosion and Material Degradation Prevention Solutions-Enhancing Readiness, Protecting Equipment, Preventing Pollution, and Lowering Life-Cycle Cost

J. Martin

Logis-Tech Inc., Alexandria, VA

Session 1: CORROSION DETECTION
Session Chair: Sid Markowitz Co-Chair: E. Dail Thomas

0930 Advanced Preservation Technologies Reduce Unit Workload

E. D. Thomas

Naval Sea Systems Command, Washington Navy Yard, DC

1000 Break

Session 1: CORROSION DETECTION (continued)
Session Chair: E. Dail Thomas Co-Chair: Sid Markowitz

1030 Corrosion Sensing and Monitoring

C. S. Brossia, L. T. Yang, D. S. Dunn and N. Sridhar

Southwest Research Institute, San Antonio, TX

1100 Fluorescent Indicator for the Detection of Corrosion Under Coatings

J. D. Garmany

Systems & Processes Engineering Corporation, Austin, TX

1130 A Microwave Corrosion Detector for Inspecting Under Aircraft Paints and Appliqués

A. V. Bray and G. R. Schmidt

Systems and Materials Research Consultancy, Spicewood, TX

1200 Open Afternoon

Session 2: HEAT TREATMENTS AND METALLURGY
Session Chair: Chris L. Vickers Co-Chair: Stephen L. Szaruga

0830 Corrosion Behavior of Friction Stir Welded High Strength Aluminum Alloys

J. B. Lumsden, M. W. Mahoney and G. A. Pollock

Rockwell Scientific, Thousand Oaks, CA

0900 Strength, Microstructure and Corrosion Behavior of Friction Stir Welded 7075-T6

C. S. Paglia, B. C. Pitts and R. G. Buchheit

The Ohio State University, Columbus, OH

0930 Contributions of Hot Corrosion and Diffusional Processes Towards the Performance of High Temperature Materials

D. A. Shifler

Naval Surface Warfare Center, West Bethesda, MD

1000 Break

Wednesday, 16 January 2002 (continued)

Session 2: HEAT TREATMENTS AND METALLURGY (continued)
Session Chair: Stephen L. Szaruga Co-Chair: Chris L. Vickers

- 1030 The Effect of Artificial Heat Treatment on the Chromate Conversion Performance of Al-Zn-Mg-Cu Alloy**
Y. Yoon and R. G. Buchheit
The Ohio State University, Columbus, OH

Session 2: EVALUATION OF CORROSION CONTROL COATINGS
Session Chair: Stephen L. Szaruga Co-Chair: Chris L. Vickers

- 1100 Evaluation of Technical Performance of Aluminum-Manganese Electrodeposition**
E. Beck, M. J. Kane, C. Matzdorf and J. Green
Naval Air Systems Command, Patuxent River, MD
- 1130 Outdoor Exposure Performance of Non-Chromate Pretreatments on Aluminum Armor Alloys**
J. V. Kelley and B. E. Placzankis
U. S. Army Research Laboratory, Aberdeen Proving Ground, MD

1200 Open Afternoon

Session 3: AFOSR CORROSION PROGRAM REVIEW
Session Chair: Paul C. Trulove

ASU MURI Final Review (0830 – 0930)

- 0830 De-alloying and Corrosion of Al Alloy 2024-T3**
M. B. Vukmirovic, N. Dimitrov and K. Sieradzki
Arizona State University, Tempe, AZ
- 0930 Self-Assembled Nano-phase Particle (SNAP) Sol-Gel Surface Treatments for Aerospace Aluminum Alloys**
M. S. Donley¹, V. N. Balbyshev², L. S. Kasten³ and D. J. Gaspar⁴
¹Air Force Research Laboratory, Wright-Patterson AFB, OH
²Universal Technology Corporation, Dayton, OH
³University of Dayton Research Institute, Dayton, OH
⁴Pacific Northwest National Laboratory, Richland, WA

1000 Break

- 1030 Permanent Foundation Layer Research**
J. Johnson, T. Dang, M. Donley, N. Voevodin, and M. Khobaib
Air Force Research Laboratory, Wright-Patterson AFB, OH 45433-7750
- 1100 Nanophase Silicon Sol-gel Coatings with Variable Organic Content for Corrosion Protection of AL Alloys**
V. N. Balbyshev¹, A. N. Khramov¹, A. J. Vreugdenhil² and M. S. Donley³
¹Universal Technology Corporation, Dayton, OH
²University of Dayton Research Institute, Dayton, OH
³Air Force Research Laboratory, Wright-Patterson AFB, OH
- 1130 Spectroscopic Investigation of SNAP Solution Chemistry**
R. A. Mantz¹, V. N. Balbyshev² and M. S. Donley¹
¹Air Force Research Laboratory, Wright-Patterson AFB, OH
²Universal Technology Corporation, Dayton, OH

1200 Open Afternoon

1830 Poster Session 2 (Veramendi Room)

Thursday, 17 January 2002

0700 Continental Breakfast El Cabildo Room

Session 1: CORROSION DETECTION
Session Chair: James H. Kovanda Co-Chair: Keith E. Lucas

0830 Corrosion Detection and Prioritization using Scanning and Permanently Mountable MWM Eddy Current Arrays

N. Goldfine¹, D. Grundy¹, V. Zilberstein¹, D. Schlicker¹, Y. Sheiretov¹, A. Washabaugh¹, K. LaCivita², V. Champagne³, and P. Sincebaugh³

¹JENTEK Sensors, Inc., Waltham, MA

²Air Force Research Laboratory, Wright-Patterson AFB, OH

³United States Army Material Technology Laboratory, Aberdeen Proving Ground, MD

0900 The Corrosive Environment Monitoring Systems (CEMS): An Innovative Technique for Monitoring and Preventing the Formation of Corrosion on Aircraft Structure

J. G. Moffatt¹, F. S. Malver² and S. Menon²

¹U. S. Army Aviation Applied Technology Directorate, Ft. Eustis, VA

²Honeywell Inc., Minneapolis, MN

0930 New Technological Challenges for Ultrasonic Guided Wave NDE

J. L. Rose and T. Hay

The Pennsylvania State University, University Park, PA

1000 Break

Session 1: CORROSION DETECTION (continued)
Session Chair: Keith E. Lucas Co-Chair: James H. Kovanda

1030 Application of Remote-Field Eddy-Current Technique to Aircraft Corrosion Detection

Y. Sun and T. Ouyang

Innovative Materials Testing Technologies, Inc., Ames, IA

1100 An Approach for Corrosion Classification based on Wavelet Analysis

A. Verma, A. Ibragimov and R. Mayer

Knowledge Based Systems, Inc., College Station, TX

Session 1: CLEANING / TESTING
Session Chair: Keith E. Lucas Co-Chair: James H. Kovanda

1130 The Effects of Chemical Wash Additives on the Corrosion of Aerospace Alloys in Marine Atmospheres

R. H. Heidersbach¹, L. MacDowell², J. Curran³ and R. Barile³

¹California Polytechnic State University, San Luis Obispo, CA

²NASA, Kennedy Space Center, FL

³Dynacs, Inc., Kennedy Space Center, FL

1200 Lunch

Session 1: CLEANING / TESTING (continued)
Session Chair: William P. Hoogsteden Co-Chair: Edward J. Lemieux

1330 Cleaning Chemistries and their Contributions to Corrosion Problems

J. A. Lucas

Inland Technology, Inc., Tacoma, WA

1400 Solving the Aqueous Parts Washer Problem

R. Miles

NCI Information Systems, Inc., Robins AFB, GA

Thursday, 17 January 2002 (continued)

1430 Effects of Testing Tank Geometry and Material on ICCP System Design

S. A. Wimmer¹, V. G. DeGiorgi², E. Hogan² and K. E. Lucas²

¹Nova Research, Alexandria, VA

²Naval Research Laboratory, Washington, DC

1500 Break

Session 1: CORROSION CONTROL COATINGS: POLYMERS

Session Chair: Edward J. Lemieux

Co-Chair: William P. Hoogsteden

1530 New Electroactive Polymers May Replace Hexavalent Chromium and Cadmium in Corrosion Control Coatings

N. Anderson, J. Stenger-Smith, D. Irvin, A. Guenther and P. Zarras

Naval Air Warfare Center, China Lake, CA

1600 Dual Use Interior Direct-To-Metal/Exterior Chemical Agent Resistant Coating Primer

A. Eng, D. Fayocavitz, S. Murray, F. Pilgrim and L. Weiser

Naval Surface Warfare Center, Philadelphia, PA

1630 Polarization Behavior and Corrosion-Initiation Mechanisms of Mo Coated With Amorphous Hydrogenated Silicon Alloy Thin Ceramic Films

L. H. Hihara, A. S. Iwane and R. E. Rocheleau

University of Hawaii at Manoa, Honolulu, HI

1900-2200

Dinner Buffet (included in registration)

Speaker: TBD

Iberian Ballroom

Session 2: EVALUATION OF CORROSION CONTROL COATINGS

Session Chair: John V. Kelley

Co-Chair: Joel A. Johnson

0830 Evaluation of Zinc-Rich Primers for use on Army Vehicle Systems

I. C. Handsy¹ and J. Repp²

¹U. S. Army Tank-Automotive Armaments Command, Warren, MI

²Corpro Companies, Inc., Ocean City, NJ

0900 Painted Corrosion Performance of Non-Chromate Aluminum Pretreatments Exposed to SO₂ Salt Fog

C. Matzdorf

Naval Air Systems Command, Patuxent River, MD

0930 Atmospheric Exposure and Salt Fog Studies of the Corrosion Behavior of Electrodeposited Hard Chromium and HVOF Thermal Spray Coatings

P. M. Natishan¹, S. H. Lawrence¹, R. L. Foster², and B. D. Sartwell¹

¹Naval Research Laboratory, Washington, DC

²Naval Research Laboratory, Key West, FL

1000 Break

Session 2: EVALUATION OF CORROSION CONTROL COATINGS (continued)

Session Chair: Joel A. Johnson

Co-Chair: John V. Kelley

1030 Analysis of Nonchromate Conversion Coatings on Aluminum Alloys 2024, 5083, and 7075 Coated with DoD Coatings using GM 9540P Cyclic Accelerated Corrosion Exposure

B. E. Placzankis¹, C. E. Miller¹, and C. A. Matzdorf²

¹U. S. Army Research Laboratory, Aberdeen Proving Ground, MD

²Naval Air Systems Command, Patuxent River, MD

1100 Low Volatile Organic Compound (VOC) Chemical Agent Resistant Coating (CARC) Application Demonstration/Validation

L. Weiser, A. Eng, D. Fayocavitz and F. Pilgrim

Naval Surface Warfare Center, Philadelphia, PA

Thursday, 17 January 2002 (continued)

Session 2: CORROSION CHARACTERIZATION
Session Chair: Joel A. Johnson Co-Chair: John V. Kelley

- 1130 Corrosion of AA2024-T3 under Protective Coatings**
M. Khobaib¹, A. Mahan¹ and M. S. Donley²
¹University of Dayton Research Institute, Dayton, OH
²Air Force Research Laboratory, Wright-Patterson AFB, OH

1200 Lunch

Session 2: CORROSION CHARACTERIZATION (continued)
Session Chair: Robert A. Mantz Co-Chair: Brian E. Placzanski

- 1330 Galvanic Behavior Database for Titanium-Steel Alloy Couples**
R. P. I. Adler, B. E. Placzankis and C. E. Miller
U. S. Army Research Laboratory, Aberdeen Proving Ground, MD
- 1400 Ion Beam Analysis Techniques for the Study of Material Surface Degradation**
J. D. Demaree and J. K. Hirvonen
U. S. Army Research Laboratory, Aberdeen Proving Ground, MD
- 1430 U. S. Army Experience with Corrosion Assessment and Analysis in Rotorcraft**
K. S. Rees
U. S. Army Aviation & Missile Command, Corpus Christi, TX

1500 Break

Session 2: CORROSION CHARACTERIZATION (continued)
Session Chair: Brian E. Placzankis Co-Chair: Robert A. Mantz

- 1530 The Influence of Fuel Carbon Residue on Hot Corrosion**
D. A. Shifler
Naval Surface Warfare Center, West Bethesda, MD
- 1600 Effect of Orientation on Fatigue Crack Initiation from Corrosion Damage*
M. Khobaib¹, C. Kacmar¹, and M. Donley²
¹University of Dayton Research Institute, Dayton, OH
²Air Force Research Laboratory, Wright-Patterson AFB, OH
- 1630 Role of Thiols in Inhibiting Corrosion of AA2024-T3**
M. Khobaib¹, N. Voevodin¹, L. Kasten¹, J. Grant¹ and M. S. Donley²
¹University of Dayton Research Institute, Dayton, OH
²Air Force Research Laboratories, Wright-Patterson AFB, OH

1900-2200 Dinner Buffet (included in registration) Speaker: TBD Iberian Ballroom

Session 3: AFOSR CORROSION PROGRAM REVIEW
Session Chair: Paul C. Trulove

- 0830 Acoustic and Thermal NDE Techniques for Characterization of Polymeric Coatings and Detection of Localized Corrosion**
N. Meyendorf, J. Hoffmann, M. Khobaib, U. Netzelmann and S. Sathish
University of Dayton Research Institute, Dayton, OH

UVA MURI 1st Annual Review (0900 – 1630)

0900 The Development of a Multi-Functional Coating for Aerospace Applications using Molecular- and Nano-Engineering Methods: A MURI Overview

S. R. Taylor¹, J. R. Scully¹, R. G. Kelly¹, G. J. Shiflet¹, R. G. Buchheit², W. J. van Ooij³, C. J. Brinker⁴, K. Sieradzki⁵ and A. L. Moran⁶

¹University of Virginia, Charlottesville, VA

²The Ohio State University, Columbus, OH

³University of Cincinnati, Cincinnati, OH,

⁴University of New Mexico, Albuquerque, NM

⁵Arizona State University, Tempe, AZ

⁶U. S. Naval Academy, Annapolis, MD

0930 Opportunities for Nano-Structured 'Sol-Gel-Derived' Materials in Corrosion Inhibition

C. J. Brinker

University of New Mexico-Sandia National Laboratories, Albuquerque, NM

1000 Break

1030 Synthesis and Devitrification of New Al-based Metallic Glass Coatings

G. J. Shiflet

University of Virginia, Charlottesville, VA

1100 The Discovery of New Corrosion Inhibitors using Combinatorial Methods,

S. R. Taylor¹, C. A. Marks¹, B. D. Chambers¹ and M. W. Kendig²,

¹University of Virginia, Charlottesville, VA

²Rockwell International, Thousand Oaks, CA

1130 Corrosion Protection of AA 2024-T3 by Organofunctional Silanes

W. J. van Ooij, A. Lamar and D. Zhu

University of Cincinnati, Cincinnati, OH

1200 Lunch

1330 Photonic Crystal Structures as Nanoengineered Coatings

K. Sieradzki

Arizona State University, Tempe, AZ

1430 Organic Coating Pigments for Corrosion Resistance and Corrosion Sensing

H. Guan and R. G. Buchheit

The Ohio State University, Columbus, OH

1500 Break

1530 Thermal Sprayed Aluminum Alloy Cladding for Aircraft Skin Replacements

A. L. Moran¹, B. J. Connolly¹ and R. McCaw²

¹United States Naval Academy, Annapolis, MD

²Naval Surface Warfare Center, Bethesda, MD

1600 Localized Corrosion Resistance of Selected Al-TM-RE Alloys as a Function of the Degree of Crystallinity

J. R. Scully, A. M. Lucente and J. E. Sweitzer

University of Virginia, Charlottesville, VA

1630 The Development of an Admicellar Polymerization Process for Depositing Coatings on Aluminum Alloys and Crevices

O. Matarredona, K. Mach, S. Merchant, E. O'Rear and M. Rieger

University of Oklahoma, Norman, OK

Friday, 18 January 2002

0700 Continental Breakfast El Cabildo Room

Session 1: CORROSION CONTROL COATINGS: POLYMERS
Session Chair: Wayne W. Ziegler Co-Chair: Christopher E. Miller

0830 High-Performance Low Solar Absorbance (LSA) Coatings

A. G. Holder¹ and R. F. Brady, Jr.²

¹Naval Surface Weapons Center, Bethesda, MD

²Naval Research Laboratory, Washington, DC

0900 Corrosion Behavior of Corrosion Resistant Alloys and Zinc Rich Primers

E. J. Lemieux¹, J. R. Martin¹, K. E. Lucas² and A. Webb²

¹Naval Research Laboratory, Key West, FL

²Naval Research Laboratory, Washington, DC

0930 Performance of Direct to Metal Primers in Accelerated Environments

C. Miller and B. Placzankis

Army Research Laboratory, Aberdeen Proving Ground, MD

1000 Break

Session 1: CORROSION CONTROL COATINGS: POLYMERS (continued)
Session Chair: Christopher E. Miller Co-Chair: Wayne W. Ziegler

1030 Advanced Coatings Systems for Corrosion Protection of Air Force Aircraft

J. H. Osborne

The Boeing Company - Phantom Works, Seattle, WA

1100 Advanced Thin Film Fluoropolymers – Versatile Weapons in the Navy and Marine Corps Battle Against Corrosion

T. G. Vargo and A. W. Dalglish

Integument Technologies, Inc., Tonawanda, NY

1130 Cold Spray Technology for Military Applications

W. Ziegler and V. Champagne

Army Research Laboratory, Aberdeen Proving Ground, MD

1200 END

Session 2: CORROSION CHARACTERIZATION
Session Chair: Steven F. Carr Co-Chair: Kevin J. Kovalski

0830 Understanding the Mechanisms of Degradation of Military Coatings using Electrochemical Impedance Spectroscopy (EIS)

K. J. Kovalski, W. Kosik, T. Eng, S. McKnight, C. Clayton, G. Halada, L. Keene and G. Kendall

Naval Air Systems Command, Patuxent River, MD

0900 The Applicability of EIS for Assessing Substrate Metal Mass Loss for Polymer-Coated Metals

D. B. Mitton¹, S. L. Wallace¹, N. J. Cantini¹, N. Eliaz¹, R. M. Latanision¹, F. Bellucci² and G. E. Thompson³

¹Massachusetts Institute of Technology, Cambridge, MA

²University of Naples Federico II, Naples, Italy

³University of Manchester Institute of Science and Technology, Manchester, UK

0930 The Function of Admixed Corrosion Inhibitors in Steel Reinforced Concrete

F. J. Martin and J. Olek

Purdue University, West Lafayette, IN

1000 Break

Session 2: CORROSION CHARACTERIZATION (continued)

Session Chair: Kevin J. Kovalski

Co-Chair: Steven F. Carr

1030 An Examination of Degradation Modes of Constructional Materials for Supercritical Water Oxidation System Fabrication

D. B. Mitton, H. Kim, J. Zhang and R. M. Latanision
Massachusetts Institute of Technology, Cambridge, MA

1100 Rotating Disk Studies of Iron Corrosion in Water under Abiotic and Biotic Conditions

B. Pesic
University of Idaho, Moscow, ID

1130 The Role of Marine Bacteria in Stainless Steel Pitting

R. I. Ray and B. Little
Naval Research Laboratory, Stennis Space Center, MS

1200 END

Session 3: AFOSR CORROSION PROGRAM REVIEW

Session Chair: Paul C. Trulove

UMinn MURI 1st Annual Review (0830 – 1000)

0830 Transient Transport in Flake-filled Coatings used for Corrosion Prevention

N. K. Lape, W. H. Smyrl and E. L. Cussler
University of Minnesota, Minneapolis, MN

0900 Flake Alignment in Composite Coatings

C. Yang¹, A. Crasto² and E. L. Cussler¹

¹University of Minnesota, Minneapolis, MN

²University of Dayton Research Institute, Dayton, OH

0930 Synthesis of Self-assembled NANOparticles (SNAP) from Alkoxysilane Solutions

R. Makote, M. Khobaib and C. Chen
University of Dayton Research Institute, Dayton, OH

1000 Break

1030 Measurement of Localized Corrosion Propagation Rates in Al and Al Alloys

G. S. Frankel
The Ohio State University, Columbus, OH

1100 The Role of Coating Heterogeneities in the Long-Term Performance of Coated Aluminum Alloys

S. R. Taylor, P. Moongkhamklang and A. M. Mierisch
University of Virginia, Charlottesville, VA

1130 The Role(s) of Alloy Heterogeneity and Composition in the Under Paint Corrosion of Aluminum Alloys

J. R. Scully and D. A. Little
University of Virginia, Charlottesville, VA

1200 END

ANNUAL REPORT

CHEMISTRY AND LIFE SCIENCES RESEARCH PROGRAM

CONTRACT NO. F49620-00-C-0009

Period of Performance: 3/1/00 – 2/28/01

Prepared For:

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

CHEMISTRY AND LIFE SCIENCES DIRECTORATE

Dr. Genevieve Haddad, Program Manager

Presented By:

**UES, Inc.
4401 Dayton-Xenia Road
Dayton, OH 45432-1894**

INTRODUCTION

UES, Inc. is providing research evaluation services to the Directorate of Chemistry and Life Sciences, Air Force Office of Scientific Research (AFOSR), in subareas that include Neurosciences (e.g., Neurochemistry, Biology, Electrophysiology, Neuroanatomy, Multisensory Integration/Spatial Orientation, Cardiovascular Physiology, and Bioenvironmental Hazards; Psychophysics, Psychophysiology, Physiological Psychology, Sensation, Perception, Cognition); Computer Sciences (e.g., Vision and Robotics); Otolaryngology; Meteorology, Chemistry (e.g., computational chemistry, polymeric and organic materials, photonic materials, inorganic and surface chemistry, high density materials); Biotechnology (e.g., materials and processes); and Fuels (e.g., petroleum and synthetic); and in related programs under development.

The services provided by UES, Inc. include: selecting qualified scientists to evaluate proposals, assembling scientific groups to evaluate, analyze and advise on content and direction of Chemistry and Life Sciences Programs; organizing workshops to assist in the definition of new basic research areas proposed by the Chemistry and Life Sciences Directorate; providing advisors to make presentations and assist government personnel with analyzing areas of relevant science; and providing advisors to assist and advise on site visits to research laboratories.

The fifth option year included: 107 Proposals that were reviewed;
4 Program/Contractor Reviews and 4 Workshops.

A. Evaluations of Individual Research Proposals

UES sent out 107 proposals to evaluators during the performance period of 1 March 2000 through 28 February 2001.

UES has been providing the Director of Chemistry and Life Sciences a Summary of Proposals Under Review (SPUR) report on a biweekly basis. This report is now being sent electronically as well as a hard copy. This report is composed of the UES log sheet indicating the proposals sent out, the names of the evaluators to whom the proposals were sent, the dates the proposals were mailed, the tickle date, any necessary comments, and the date the reviews were received. This allows the Program Managers to have a current listing of all proposal activity.

B. Contractor/Program Reviews

1. The first program review was **Polymer Matrix Composite** Program Review, Courtyard at Marriott, Long Beach, CA, 19 - 20 May 2000
speakers :
attendees:

2. The second program review was **Photorefractive Polymer** Program Review, Hilton Gaslamp Quarter, San Diego, CA, 27 - 28 July 2000.

Speakers:

Attendees:

3. The third program review was **Corrosion** and **MURI** Program Reviews, Hawk's Cay Resort, Duck Key, FL 28 January – 9 February 2001.

Speakers: 35

Attendees: 78

4. The fourth program review was AFOSR/ONR **Electrochemistry Science & Technology** Program Review, Loews Annapolis Hotel, Annapolis, MD, 19 - 21 February 2001.

Speakers: 23

Attendees: 47

C. Workshops

1. **Biotech** Workshop, Crowne Plaza, Dayton, OH, 11-13 July 2000.

2. **Polymers for AF Lightweight/Affordable Radar System** Workshop, Hyatt Rosemont, Rosemont, IL, 7 - 8 December 2000.

3. **Biologically Based Materials** Workshop, Tradewinds Sandpiper Hotel, St. Petersburg Beach, FL, 18 - 19 January 2001.

4. **Dip-Pen Nanolithography** Workshop, Hawk's Cay Resort, Duck Key, FL 28 January – 9 February 2001. 51 participants

D. Advisors

In addition to advisors provided for Program Reviews, Workshops and Panel Meetings, UES provided travel, per diem and in many cases, honorarium for the following advisors:

Priya Vashinshta and Ann Chaka, **Molecular/Material Modeling**, Washington, DC, 12-14 March 2000.

Madhu Madhukar and John Halpin, **Polymer Composite**, Long Beach, CA, 19-20 May 2000.

George Sperling, Zhong-Lin-Lu, Sylvan Kornblum, Randall Engle, Patrick Cavanagh, Marvin Chun, Ken Nakayama, Jermy Wolfe, Eileen Kowler, Barbara Doshier and D. Martin Regan, **Human Attention Processes**, , 25-26 May 2000.

Mark Berg, Laurie Butler, Steven Bernasek, James Coe, Jimmie Doll, Bruce Garrett, James Liszy, Charles Parmenter and Jack Simons, **Molecular Dynamics/Theoretical Chemistry Panel**, Waltham, Boston, 24-25 May 2000.

Graham Candler and Iain Boyd, **Molecular Dynamics/Theoretical Chemistry Contractor's Review**, Waltham, Boston, 21-24 May 2000.

David Golden, **International Combustion Symposium**, Edinburgh, Scotland, 30 July through 4 August 2000.

Alexander Benderskii, **HEDM Contractor's Conference**, Park City, UT, 24-26 October 2000.

Tim Smith and Joel Smith, **Radiofrequency Bioeffects Workshop**, San Antonio, TX on 20 September 2000.

Cindy Afshari, Antje Baeumner, Evan Steeg, Nicholas Abbott, Thomas Baker, Henry Sze, Roger Ulrich and Brian Halsall, **Biotechnology Workshop**, Dayton, OH, 11-13 July 2000.

James R. Lackner and Willard Larkin, **Spatial Disorientation Workshop**, San Antonio, Texas, 15-17 November 2000.

Lawrence Wolff and Diego Socolinsky, **Symposium for Applications of Human ID**, NIST, Gaithersburg, MD, 19-21 September 2000.

Duane A. Adams, **Information Fusion**, Arlington, VA, 18-20 October 2000.

Willard Larkin, **PRET Review**, University of Pennsylvania Philadelphia October 2000.

John H. Beatty, Bob Racicot, Patrick Moran, Steven McKnight, Patrick Hagans and Hugh De Long, **Corrosion Program Review**, Duck Key, FL, 29 January – 2 February 2001.

SUMMARY

UES is pleased to continue to perform the specific tasks assigned to them in accordance with provisions of the contract. Participants will continue to be Dr. Thomas Eggemeier as Program Manager, Judith M. Flory, Program Administrative Manager and Ann Corbitt as Program Assistant. UES personnel appreciate the opportunity to be of service to AFOSR in this interesting and worthwhile program.

LIST OF APPENDICES

Breakdown of Research Proposals by Program Manager

Program for Polymer Matrix Composite Program Review, Courtyard at Marriott, Long Beach, CA, 19-20 May 2000

Program for Molecular Dynamics/Theoretical Chemistry Contractor's Meeting, The Westin Waltham-Boston, Waltham, MA, 21-24 May 2000.

Program for Biotechnology Workshop, Crowne Plaza, Dayton, OH, 11-13 July 2000.

Program for Photorefractive Polymer Program Review, Hilton Gaslamp Quarter, San Diego, CA, 27-28 July 2000.

Program for Forum on Information Fusion, Four Points Sheraton, Arlington, VA, 18-20 October 2000.

Program for High Energy Density Matter Contractor's Meeting, The Yarrow Hotel, Park City, UT, 24-26 October 2000.

Program for Polymers for AF Lightweight/Affordable Radar System Workshop, Hyatt Rosemont, Rosemont, IL, 7-8 December 2000.

Program for Biologically Based Materials Workshop, Tradewinds Sandpiper Hotel, St. Petersburg Beach, FL, 18-19 January 2001.

Programs for Corrosion and MURI Program Reviews and Dip-Pen Nanolithography Workshop, Hawk's Cay Resort, Duck Key, FL 28 January – 9 February 2001.

Programs for AFOSR/ONR Electrochemistry Science & Technology Program Review, Loews Annapolis Hotel, Annapolis, MD, 19-21 February 2001.

BREAKDOWN OF RESEARCH PROPOSALS BY PROGRAM MANAGER

<u>PROGRAM MANAGER</u>	<u>NO. OF PROPOSALS</u>
Berman	31
Cohn	6
Kozumbo	15
Larkin	21
Lee	14
Tangney	10
Trulove	10