There was a lot of excellent science presented and all the participants learned a lot. A principle goal of the conference was accomplished, which is extremely relevant to the AFOSR mission. As stated in the original proposal to AFOSR, we brought together top people in academic research condensed matter dynamics community, with experts in shock waves and energetic materials. For example, Marvin Ross (LLNL), Yogi Gupta (Washington State), James Belak (LLNL), and Craig Tarver (LLNL) talked about shock waves and initiation phenomena, introducing the most interesting and relevant results in these fields to the academic scientists. A high point of the meeting was Prof. Suslick's talk about material synthesis using shock wave via sonochemistry. Many of the academic scientists commented to me how interesting were the problems in these fields and how nice an introduction the meeting proved to be. They are keenly interested in the possibilities of making a practical impact with their theoretical models and technologies. Conversely, the shock people were extremely pleased to be provided an introduction to the state of the art in condensed matter dynamics.
1996 FINAL REPORT

submitted to

Dr. Michael R. Berman
Air Force Office of Scientific Research
AFOSR/NL
110 Duncan Avenue, Suite B115
Bolling AFB, DC 20332-0001

"FOURTH CONFERENCE ON MOLECULAR REACTION DYNAMICS IN CONDENSED MATTER"

Principal Investigator: Charles A. Wight
Professor of Chemistry

Institution: University of Utah
Office of Sponsored Projects
1471 Federal Way
Salt Lake City, UT 84102

Grant Number: F49620-96-1-0010

Period Covered: 15OCT95 through 14OCT96
SUMMARY

The conference was a big success. The site was beautiful and everything was well managed. More than 40 scientists attended. Everybody worked very hard because the sessions ran all day and half the night, which let us present a large amount of material in a short time frame. The talks were without exception exciting and stimulating, and discussion persisted late into the night. A copy of the program with all the titles of the presentations is included.

There was a lot of excellent science presented and all the participants learned a lot. A principle goal of the conference was accomplished, which is extremely relevant to the AFOSR mission. As stated in the original proposal to AFOSR, we brought together top people in academic research condensed matter dynamics community, with experts in shock waves and energetic materials. For example, Marvin Ross (LLNL), Yogi Gupta (Washington State), James Belak (LLNL), and Craig Tarver (LLNL) talked about shock waves and ignition phenomena, introducing the most interesting and relevant results in these fields to the academic scientists. A high point of the meeting was Prof. Suslick’s talk about material synthesis using shock waves via sonochemistry. Many of the academic scientists commented to me how interesting were the problems in these fields and how nice an introduction the meeting proved to be. They are keenly interested in the possibilities of making a practical impact with their theoretical models and technologies. Conversely, the shock people were extremely pleased to be provided an introduction to the state of the art in condensed matter dynamics.

A particularly exciting feature of the conference was the opportunities for participation by younger scientists, postdocs and students. We provided fellowships for approximately 12 young people to attend. Six of them were from UC Irvine, in Benny Gerber’s and Ara Apkarian’s group. They were provided with conference registration only. The other six were from Illinois, Utah, Princeton, Rochester, Stanford, and Virginia. They were provided with conference registration, local expenses and partial travel support. All student fellowships were awarded on a competitive basis, using recommendation letters from the students’ advisors, publication record, and subject material provided by the applicants. Eight of the talks were given by students and postdocs. The “Gordon Conference” style of the meeting let these students meet and dine with the more established participants in a comfortable and informal atmosphere in a manner rarely possible at conventional meetings. All the feedback I received showed the students’ talks were exceptionally interesting and well prepared. We have sponsored a group of extremely talented young people who all have great futures in science.

Except for a small amount targeted for administrative costs (mailing, secretarial, etc..), the funding provided by AFOSR was used to directly cover costs of running the meeting (reimburse participant costs and pay the Balboa Bay Club for use of its facilities). AFOSR support was acknowledged verbally at the meeting, in the published program, and along with travel reimbursements.
FOURTH SYMPOSIUM ON MOLECULAR REACTION DYNAMICS IN CONDENSED MATTER

Newport Beach, CA

Program Chairs: C. Wight (Utah) and D. Dlott (Illinois)
Program sponsors: Air Force Office of Scientific Research, Army Research Office, Office of Naval Research

Wednesday, Feb. 7

Arrival and check in
6:00 - 8:00 pm  Dinner
8:00 - 10:00 pm  Condensed phase dynamics I -- chair C. Wight

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Affiliation</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>Prof. Ara Apkarian</td>
<td>U. C. Irvine</td>
<td>Dynamical Spectroscopy of Many-Body Interactions</td>
</tr>
<tr>
<td>9:00</td>
<td>Prof. Michael D. Fayer</td>
<td>Stanford University</td>
<td>Vibrational Photon Echo Studies of Liquids, Glasses, and Proteins</td>
</tr>
</tbody>
</table>

Thursday, Feb. 8

7:30 - 8:50 am  Breakfast
8:50 -12:00 noon  Shock waves and high pressure I --Chair M. D. Fayer

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
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</tr>
</thead>
<tbody>
<tr>
<td>8:50</td>
<td>Prof. Y. Gupta</td>
<td>Washington State University</td>
<td>Shock-induced chemical reactions in high explosives</td>
</tr>
<tr>
<td>9:40</td>
<td>Dr. Marvin Ross</td>
<td>Lawrence Livermore</td>
<td>Physical chemistry of shock-compressed liquids</td>
</tr>
<tr>
<td>10:30</td>
<td>Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:50</td>
<td>Jens Franken</td>
<td>University of Illinois</td>
<td>Ultrafast coherent Raman Spectroscopy of Shocked Energetic Materials</td>
</tr>
<tr>
<td>11:10</td>
<td>Prof. Kenneth Suslick</td>
<td>University of Illinois</td>
<td>The Cavitation Hot Spot</td>
</tr>
<tr>
<td>Time</td>
<td>Speaker</td>
<td>Institution</td>
<td>Topic</td>
</tr>
<tr>
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</tr>
<tr>
<td>2:00</td>
<td>Prof. Paul Barbara</td>
<td>University of Minnesota</td>
<td>Spatially and Temporally Resolved Spectroscopy of Molecular Crystals and Aggregates</td>
</tr>
<tr>
<td>2:50</td>
<td>Prof. Paul Hansma</td>
<td>UC Santa Barbara</td>
<td>Observing the motion of individual protein molecules</td>
</tr>
<tr>
<td>3:40</td>
<td>Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00</td>
<td>Dr. Jay Trautman</td>
<td>AT&amp;T Bell Labs</td>
<td>Time Resolved Spectroscopy of Single Molecules</td>
</tr>
<tr>
<td>4:50</td>
<td>John Higgins</td>
<td>Princeton University</td>
<td>Excited State Chemical Reactions of High-spin Alkali Trimers on the Surface of Helium Clusters</td>
</tr>
<tr>
<td>5:10</td>
<td>Prof. Charles Harris</td>
<td>UC Berkeley</td>
<td>Femtosecond studies of electrons on surfaces and at interfaces</td>
</tr>
</tbody>
</table>

6:00 - 8:00 pm   Dinner

8:00 - 10:00 pm  Condensed Phase Dynamics II--Chair Ara Apkarian

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Institution</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>Prof. Robin Hochstrasser</td>
<td>University of Pennsylvania</td>
<td>Energy and coherence relaxation of highly excited diatomic molecules in liquids</td>
</tr>
<tr>
<td>9:00</td>
<td>Prof. James Skinner</td>
<td>University of Wisconsin</td>
<td>Vibrational relaxation in Liquids</td>
</tr>
</tbody>
</table>
### Friday, Feb. 9

**7:30 - 9:00 am**

**Breakfast**

**9:00 - 12:00 noon**

*Condensed Phase Dynamics III*—Chair Eric Chronister

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Institution</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00</td>
<td>Prof. Thomas Brill</td>
<td>University of Delaware</td>
<td>Spectroscopy, Kinetics and Mechanisms of Hydrothermal Reactions</td>
</tr>
<tr>
<td>9:50</td>
<td>Prof. John Kauffman</td>
<td>University of Missouri</td>
<td>Rotational relaxation and kinetics of diphenyl polyenes in the compressible region of CO₂</td>
</tr>
<tr>
<td>10:10</td>
<td>Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30</td>
<td>Kevin Gunde</td>
<td>University of Virginia</td>
<td>Dynamics of Chirality-dependent Intermolecular Energy Transfer in Solution</td>
</tr>
<tr>
<td>10:50</td>
<td>Prof. Herb Strauss</td>
<td>UC Berkeley</td>
<td>Vibrational Energy Transfer in Hydrogen-Bonded Crystals by Spectral Hole Burning</td>
</tr>
<tr>
<td>11:40</td>
<td>Tatanya Smirnova</td>
<td>University of Illinois</td>
<td>Measurements of Picosecond Rotational Dynamics in Liquids by EPR at 95 GHz</td>
</tr>
</tbody>
</table>

**12:00 - 2:00 pm**

**Lunch**

**2:00 - 6:00 pm**

*Condensed Phase dynamics IV*—Chair J. Michael Brown

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Institution</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00</td>
<td>Prof. Keith Nelson</td>
<td>MIT</td>
<td>Single-pulse and multiple-pulse femtosecond spectroscopy of solids</td>
</tr>
<tr>
<td>2:50</td>
<td>Dr. Craig Tarver</td>
<td>Lawrence Livermore National Laboratory</td>
<td>Shock-induced detonation</td>
</tr>
<tr>
<td>3:10</td>
<td>Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:30</td>
<td>Dr. Jeffrey Hill</td>
<td>University of Illinois</td>
<td>Vibrational Relaxation at the Active Sites of Myoglobin, its Mutants and Model Heme Compounds</td>
</tr>
<tr>
<td>3:50</td>
<td>Kristin Weidemaier</td>
<td>Stanford University</td>
<td>Solvent Structure and Hy-</td>
</tr>
<tr>
<td>Time</td>
<td>Speaker</td>
<td>Institution</td>
<td>Presentation Title</td>
</tr>
<tr>
<td>-------</td>
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</tr>
<tr>
<td>4:10</td>
<td>Prof. Craig Martens</td>
<td>UC Irvine</td>
<td>Ultradynamic Effects in Intermolecular Photoinduced Electron Transfer: Theory and Experiment</td>
</tr>
<tr>
<td>5:00</td>
<td>Alexander V. Benderskii</td>
<td>University of Utah</td>
<td>Influence of solid state environment on conformational isomerization kinetics</td>
</tr>
<tr>
<td>5:20</td>
<td>Dr. Alan Johnson</td>
<td>University of Rochester</td>
<td>Observation of solvent phonons in resonance Raman spectroscopy</td>
</tr>
<tr>
<td>5:40</td>
<td>Dr. Leonardo Martinez</td>
<td>UC Davis</td>
<td>Characterization of Solvent Clusters in a Supercritical Lennard Jones Fluid</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>6:00 - 8:00 pm</strong> Dinner</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>8:00 - 10:00 pm</strong> Clusters</td>
</tr>
<tr>
<td>8:00</td>
<td>Prof. Benny Gerber</td>
<td>U. C. Irvine</td>
<td>Dynamics of Photodissociation and Recombination in Clusters and in Solids</td>
</tr>
<tr>
<td>9:00</td>
<td>Prof. Carl Lineberger</td>
<td>University of Colorado</td>
<td>Dynamics of Energy transfer in Size Selected Cluster Ions: A View from the Perspective of the Solvent</td>
</tr>
</tbody>
</table>
Saturday, Feb. 10

7:30 - 8:50 am    Breakfast

8:50 - 12:00 noon  *Shock waves and high pressure II*--Chair Dana Dlott

<table>
<thead>
<tr>
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<th>Speaker</th>
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<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:50</td>
<td>Prof. J. Michael Brown</td>
<td>University of Washington</td>
<td>Impulsive stimulated scattering studies of molecular solids, fluids and solutions at high pressure</td>
</tr>
<tr>
<td>9:40</td>
<td>Prof. Eric Chronister</td>
<td>UC Riverside</td>
<td>Vibrational dynamics in molecular solids under high pressure</td>
</tr>
<tr>
<td>10:30</td>
<td>Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:50</td>
<td>Dr. James Belak</td>
<td>Lawrence Livermore</td>
<td>Effects of voids and defects on shock induced energy transfer in molecular crystal</td>
</tr>
<tr>
<td>11:40</td>
<td>Dr. Mike McQuaid</td>
<td>US Army Research Lab</td>
<td>Spectroscopic investigation of shock-loaded XM46</td>
</tr>
</tbody>
</table>

12:00 noon  *Conference ends*
Fourth Symposium on Molecular Reaction Dynamics in Condensed Matter

Eric Altshuler  
Department of Chemistry  
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U.C. Irvine  
Irvine, CA 92717-2025

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Newark, DE 19716

Prof. J. Michael Brown  
Department of Chemistry  
University of Washington  
BG-10  
Seattle, WA 98195

Prof: Eric Chronister  
Department of Chemistry  
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Prof. Y. Gupta
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Berkeley, CA 94720

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Dr. Leonardo Martinez
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Davis, CA 95616

Dr. Mike McQuaid
U.S. Army Research Laboratory
AMSR-WT-PA
Aberdeen Proving Ground, MD
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Dr. William Graham Proud
University of Cambridge
P.C.S. Group Cavendish Laboratory
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Great Britian

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Prof. Herb Strauss  
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Salt Lake City, UT 84112