Workshop on
Understanding Condensed Matter Dynamics at the Microscopic Level
Advanced Photon Source, Argonne National Laboratory
Technical Program

June 23, 2008

8:00 – 8:20 Registration, Logistics and Posters (Coffee and Refreshments)
Room A1100, Building 401

8:20 – 10:00 Session I: Chair – **Christian Mailhiot**

- **Dennis Mills** (APS) – Welcome and APS Overview
- **David Crandall** (NNSA) – The Future Role of NNSA's Laboratories in Science and Technology for National Security
- **John Vetrano** (BES) – Materials under Extreme Conditions
- **Howard Grimes** (WSU) – Academic Perspective
- **Yogendra Gupta** (WSU) – Dynamic Response of Solids: Challenges and Needs

10:00 – 10:15 Morning Break

10:15 – 12:00 Session II: Chair – **Yogendra Gupta**

- **Roger Falcone** (UC -Berkeley) – High Energy Density Material Science using Next Generation Light Sources
- **Rip Collins** (LLNL) – Evolution of Structure and Bonding at Ultra-High Compression and the Need for a New Generation of Diagnostics
- **Rusty Gray** (LANL) – Material Response to Shock Loading: Windows into Shock-Induced Processes in Bulk Materials
- **Choong-Shik Yoo** (WSU) – Forefront High-Pressure Science using Third-Generation Synchrotron

12:00 – 1:30 Poster Session and Hosted Working Lunch (Building 401 Gallery)

1:30 – 3:10 Session III: Chair – **Dennis Mills**

- **Ann Mattsson** (SNL) – The Importance of Electrons for Understanding Microscopic Processes: What Experiments Can Do for Theory and Vice Versa
- **Larry Fried** (LLNL) – Transient Metallization of Shocked Low Z materials
- **Bill Nellis** (Harvard) – Phase Transitions, Damage, Roughness of Shock Fronts, and their Dynamics in Strong Materials at Shock Pressures of 20-200 Gpa (0.2-2 Mbar)
- **Carl Greef** (LANL) – Some issues in the Modeling of Dynamic Phase Transitions

3:10 – 3:25 Afternoon Break

3:25 – 5:45 Session IV: Chair – **Robert Hanrahan**

- **William Evans** (LLNL) – Time Resolved X-Ray Diffraction of Pressure Induced Phase Transitions: Scientific Studies using the Dynamic DAC
- **Sarah Stewart-Mukhopadhyay** (Harvard) – Microstructural Deformation in Brittle Minerals: Results from Pyrrhotite
- **Clint Hall** (SNL) – Dynamic Compression Experiments
- **David Funk** (LANL) - MaRIE (Matter-Radiation Interactions in Extremes) and DC-CAT: Towards Multi-scale Understanding in Compression Science
- General Comments

5:45 Adjourn for the first day

6:00 – 8:00 Hosted Dinner at the Guesthouse

June 24, 2008

7:45 – 8:00 Coffee and Refreshments
Room A1100, Building 401

8:00 – 10:05 Session V: Chair – **David Funk**

- **Bill Goldstein** (LLNL) – Fourth Generation Light Sources (like LCLS)
- **Ray Smith** (LLNL) – Laser-Driven Ramp Compression for Accessing High P Low T States
- **Jennifer Ciezak** (ARL) – Materials Research under Thermomechanical Extremes at the Army Research Laboratory
- **Guoyin Shen** (HPCAT) – HPCAT Collaboration
- **Frank Merrill** (LANL) – pRad Experiments

10:05 – 10:20 Morning Break

10:20 – 11:45 Session VI: Path Forward: Chair – **Yogendra Gupta**

- **Chi-Chang Kao** (NSLS) – Conceptual Design of DC-CAT Beamlines
- Panel Discussion **– Gupta, Mailhiot, Mills**

11:45 – 12:30 APS Tour **(Dennis Mills)**

12:30 Adjourn

Posters:

WSU

- The Institute for Shock Physics: An Overview
- ISP Compact Pulsed Power Facility
- Mesoscale Simulations of Shocked Solids: Elastic-Plastic Deformation and Tensile Fracture
- Optical Studies of Shocked III-V Semiconductors
- Real-time X-ray Diffraction to Understand Shock-Induced Solid-Solid Phase Transformations
- Photoacoustic Measurements to Determine Elastic Constants of Condensed Materials under High Pressures
- Response of Energetic Crystals to Shock Wave Loading
- Real-time Determination of Shock Induced Microstructure using Synchrotron X-rays

Others

- **Jim Belak** (LLNL) – Kinetics of Phase Evolution
- **Donald Brown** (LANL) – Interplay of Deformation Slip and Twinning in Beryllium as a Function of Strain Rate
- **Ray Gamache** (NSWC-Indian Head) – Gun System Development for the Application of X-ray Diffraction in Inert and Energetic Crystalline Materials
- **Otto "Nino" Landen** (LLNL) – X-ray Thompson Scattering in the High Energy Density Physics Regime
- **Tsutomu Mashimo** (Kumamoto) – Phase Transition of Bulk Metallic Glass under Shock Compression
- **Tadashi Ogitsu** (LLNL) – First-Principles Simulations of Quantum-Dots Under Pressure
- **Toshimori Sekine** (NIRIM) – Hugoniot Elastic Limit of Basalt Measured by VISAR
- **Sarah Stewart-Mukhopadhyay** (Harvard**) –** Thermal Emission from Shocked H_2O Ice