

Workshop on high-pressure time-resolved synchrotron techniques

September 25-27, 2014, Advanced Photon Source

Comprehensive Program

Wednesday, September 24, 2014

17:00 Registration and Reception (cash bar + finger food; concludes at 19:30) – Argonne Guest House

Thursday, September 25, 2014

7:30 Poster setup – in the Gallery, lower level APS Conference Center (Building 402)

7:30 Registration, Continental Breakfast – APS Auditorium (Building 402)

Note: All talks will be held in APS Auditorium

Session 1: Introduction

Chair: Guoyin Shen

8:30 Welcome, Stas Sinogeikin (HPCAT)

8:40 Overview of HPCAT and future perspectives for time-resolved experiments, Ho-Kwang (Dave) Mao (HPCAT, CIW)

9:10 MBA upgrade and effect on time-resolved experiments, Dennis Mills (APS)

9:40 Coffee break

Session 2: Time-resolved high-pressure x-ray imaging

Chair: Nenad Velisavljevic

10:00 High-pressure x-ray imaging experiments at HPCAT, Yoshio Kono (HPCAT)

10:25 Study of liquid-liquid immiscibility (silicate melt- water) by x-ray imaging in large volume press, Kenji Mibe (U. Tokyo)

10:50 X-ray fast tomography for dynamic phenomena studies, Xianghui Xiao (APS)

11:15 Dynamics of high-speed liquid jets by high-pressure injection, Jin Wang (APS)

11:40 Discussion

11:50 Group photo - Front steps

12:00 Lunch - Gallery, lower level APS Conference Center (Building 402)

Session 3: X-ray micro-diffraction with fast compression and decompression

Chairs: Choong-Shik Yoo and Jesse Smith

- 1:00 Fast (de)compression capabilities and first experimental results at HPCAT, *Jesse Smith (HPCAT)*
- 1:25 Time-resolved XRD and electrical resistance measurements on metals at high P-T, *Nenad Velisavljevic (LANL)*
- 1:50 Rate dependent pathways for the high pressure synthesis of novel metastable phases in Group IV elements, *Bianca Haberl (ANU/ORNL)*
- 2:15 Dynamic response of materials by oscillatory deformation experiment + X-ray imaging, *Don Weidner (Stony Brook)*
- 2:40 Discussion
- 2:50 Coffee break
- 3:10 Modeling phase transition kinetics under dynamic compression, *Carl Greeff (LANL)*
- 3:35 Kinetics of structural phase transitions and fast x-ray diffraction, *John Tse (USASK)*
- 4:00 X-ray transient absorption spectroscopy for solar energy research, *Lin Chen (NU/ANL)*
- 4:25 Challenges and opportunities in analysis of massive data from time resolved experiments, *Przemek Dera (UH)*
- 4:50 Discussion
- 5:00 **Poster session** – *in the Gallery, lower level APS Conference Center (Building 402)*
Chair: Stanislav Sinogeikin
- 6:30 **Workshop Dinner** – *Gallery, lower level APS Conference Center (Building 402)*

Friday, September 26, 2014

- 7:30 Continental Breakfast – *APS Conference Center (Building 402)*

Session 4: Pulsed/ramped laser heating and x-ray micro-diffraction

Chairs: Tom Duffy and Yue Meng

- 8:30 Laser heating in reduced time scale for high-pressure studies: an overview of HPCAT capabilities, on-going development and near future plans, *Yue Meng (HPCAT)*
- 8:55 High-pressure melting of metals using pulsed laser heating, *Ross Hrubiak (HPCAT)*
- 9:20 Time-resolved x-ray diffraction of solids under dynamic loadings, *Choong-Shik Yoo (WSU)*

- 9:45 **Melting measurements using XAS at megabar pressures, Reini Boehler (CIW)**
- 10:10 **Discussion**
- 10:20 **Coffee break**
- 10:40 **Time-domain experiments at extreme conditions at GSECARS, Vitali Prakapenka (GSECARS)**
- 11:05 **Single-pulse laser heating in diamond anvil cells: Probing material under planetary interior conditions, Alex Goncharov (CIW)**
- 11:30 **Fast temperature readout spectrometer for atomic dynamics measurement, Dongzhou Zhang (APS/Caltech)**
- 11:55 **Laser pump/X-ray probe experiments at Sector 7 of the APS, Don Walko (APS)**
- 12:20 **Discussion**
- 12:30 **Lunch - Gallery, lower level APS Conference Center (Building 402)**

Session 5: New time-resolved high-pressure X-ray techniques and directions and related topics

Chairs: John Tse and Yuming Xiao

- 1:30 **Laue capabilities at HPCAT - towards time-resolved studies, Dmitry Popov (HPCAT)**
- 1:55 **Mechanisms of pressure-induced phase transitions using time-resolved Laue diffraction, Joel Bernier (NNLN)**
- 2:20 **100 ps time-resolved white beam diffraction at BioCARS, Keith Moffat (UC)**
- 2:45 **Time-resolved XES, Tsu-Chien Weng (SSRL)**
- 3:10 **Discussion**
- 3:20 **Coffee break**
- 3:40 **Fast detectors for time resolved studies – current status and new developments, Robert Bradford (APS)**
- 4:05 **Laser-based dynamic compression of solids, Tom Duffy (Princeton)**
- 4:30 **Ultrafast x-ray scattering measurements from dynamically compressed solids, Siegfried Glenzer (LCLS)**
- 4:55 **A first laser shock experiment at the ESRF to probe Warm Dense Iron, Florent Occelli (DPTA/SPMC)**
- 5:20 **Discussion**
- 5:30 **Posters / free time (take down posters between 6-6:30)**
- 6:30 **Workshop Dinner – Gallery, lower level APS Conference Center (Building 402)**

Saturday, September 27, 2014

8:00 Continental Breakfast – *HPCAT / Building 434C*

Parallel hands-on / demonstration sessions

Note: Hands-on / demonstration sessions A, B, and C will be held at HPCAT beamlines; session D will be held in 434C Conference room.

9:00 **A: Fast de/compression and cyclic pressure generation and control in DAC,** *Stas Sinogeikin and Chuanlong Lin*

9:35 **B: Pulsed and ramped laser heating in DAC,** *Yue Meng and Ross Hrubciak*

10:10 **C: Fast imaging,** *Yoshio Kono and Curtis Kenny-Benson*

10:45 **D: Large-volume data reduction and analysis,** *Przemek Dera, Jesse Smith and Clemens Prescher*

11:20 **Tour of HPCAT facilities**

12:00 **Lunch – HPCAT / Building 434C**

13:00 **Adjourn**