THU1 • Ultrafast X-Ray and Electron Diffraction

Auditorium
8:30–10:15
THU1 • Ultrafast X-Ray and Electron Diffraction
Chair: Dwayne Miller, University of Toronto, Canada

THU1.1 • 8:30 **•Invited•**

Ultrafast Structural Dynamics of Polar Solids Studied by Femtosecond X-Ray Diffraction, •*Thomas Elsaesser[1]*, *Clemens von Korff Schmising[1]*, *Nickolai Zhavoronkov[1]*, *Matias Bargheer[1,2]*, *Michael Woerner[1]*, *Markus Braun[3]*, *Peter Gilch[3]*, *Wolfgang Zinth[3]*, *I. Vrejoiu[4]*, *D. Hesse[4]*, and *M. Alexe[4]*; *[1]Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, D-12489 Berlin, Germany, [2]Institut für Physik, Universität Potsdam, D-14469 Potsdam, Germany, [3]Biomolekulare OPtik, Department für Physik, Ludwig-Maximilians-Universität, D-80538 München, Germany, [4]Max-Planck-Institut für Mikrostrukturphysik, D-06120 Halle, Germany*.
We study photoinduced structural dynamics in ferroelectric superlattices and polar molecular crystals. Elongations of coupled phonon modes affecting ferroelectric polarizations and structural changes connected with the solvation of molecular dipoles are determined quantitatively.

THU1.2 • 9:00
Atomic Motion in Laser Excited Bismuth Studied with Femtosecond X-Ray Diffraction, •*Paul Beaud[1]*, *Steve L. Johnson[1]*, *Chris J. Milne[2]*, *Faton Krasniqi[1]*, *Ekaterina Vorobeva[1]*, and *Gerhard Ingold[1]*; *[1]Swiss Light Source, Paul Scherrer Institut, CH-5232 Villigen, Switzerland, [2]Laboratoire de Spectroscopie Ultrarapide, Ecole Polytechnique Fédérale de Lausanne, CH-1015 Lausanne, Switzerland*.
Asymmetric grazing incidence femtosecond x-ray diffraction is applied to investigate carrier transport, carrier relaxation and phonon coupling in laser excited bismuth crystals.

THU1.3 • 9:15
Ultrafast Heating of Bismuth Observed by Time Resolved Electron Diffraction, *Ping Zhou[1]*, •*Ivan Rajković[1]*, *Manuel Ligges[1]*, *Thomas Payer[1]*, *Frank Meyer zu Heringdorf[1,2]*, *Michael Horn-von Hoegen[1,2]*, and *Dietrich von der Linde[1]*; *[1]Institut für Experimentelle Physik, Universität Duisburg-Essen, Lotharstr. 1, 47048 Duisburg, Germany, [2]Center for Nanointegration Duisburg-Essen (CeNIDE), Universität Duisburg-Essen, Lotharstr. 1, 47048 Duisburg, Germany*.
We describe time resolved electron diffraction on bismuth films. Lattice heating following femtosecond laser excitation is observed via the transient Debye-Waller-effect. Different heating processes with different time constants were observed.

THU1.4 • 9:30
Atomic View of the Photoinduced Collapse of Gold and Bismuth, •*Ralph Ernstorfer[1]*, *Maher Harb[1]*, *Christoph T. Hebeisen[1]*, *German Sciaini[1]*, *Thibault Dartigalongue[1]*, *Ivan Rajkovic[2]*, *Manuel Ligges[2]*, *Dietrich von der Linde[2]*, *Thomas Payer[3]*, *Michael Horn-von-Hoegen[3]*, *Frank-Joachim Meyer zu Heringsdorf[3]*, *Sergei Kruglik[1]*, and *R.J. Dwayne Miller[1]*; *[1]Institute for Optical Sciences and Departments of Chemistry and Physics, University of Toronto, 80 St. George St., Toronto, Ontario M5S 3H6, Canada, [2]Fachbereich Physik, Universität Duisburg-Essen, 47057 Duisburg, Germany, [3]Fachbereich Physik and Center for Nanointegration Universität Duisburg-Essen (CeNIDE), 47057 Duisburg, Germany*.
Two different mechanisms of photoinduced melting were studied by femtosecond electron diffraction. The structural response of gold indicates an electronically-induced increase of the melting temperature. Bismuth was found to disorder within one vibrational period.

THU1.5 • 9:45
Femtosecond X-Ray Diffraction Study of the Ultrafast Coupling between Magnetization and Structure in the Ferromagnet $SrRuO_3$, •*Clemens von Korff Schmising[1]*, *Matias Bargheer[2]*, *Anders Harpoeth[1]*, *Nikolai Zhavoronkov[1]*, *Zunaira Ansari[1]*, *Michael Woerner[1]*, *Thomas Elsaesser[1]*, *Ionela Vrejoiu[3]*, *Dietrich Hesse[3]*, and *Marin Alexe[3]*; *[1]Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, 12489 Berlin, Germany, [2]Institut für Physik, Universität Potsdam, 14469 Potsdam, Germany, [3]Max-Planck-Institut für Mikrostrukturphysik, 06120 Halle, Germany*.
Femtosecond optical excitation of magnetically ordered $SrRuO_3$ nanolayers leads to an ultrafast demagnetization and a concomitant magnetoelastic contractive stress. The resulting ultrafast structural response of the sample is imaged by femtosecond X-ray diffraction.

THU1.6 • 10:00
Four-dimensional Visualization of Transitional Structures in Phase Transformations by Electron Diffraction, •*Peter Baum[1,2]*, *Ding-Shyue Yang[1]*, and *Ahmed H. Zewail[1]*; *[1]California Institute of Technology, 1200 E. California Bld, Pasadena CA 91125, USA, [2]Ludwig-Maximilians-Universität München, Oettingenstr. 67, 80538 München, Germany*.
Imaging with ultrashort electron pulses allows visualizing atomic-scale motions in all four dimensions of space and time. We report the transitional structures and mechanism of the ultrafast insulator-to-metal phase transformation in crystalline vanadium dioxide.