

Abstract Submitted
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Ultrafast Photoinduced Solid State Phase Transitions Probed by Femtosecond Electron Diffraction R. ERNSTORFER, M. HARB, C.T. HEBEISEN, T. DARTIGALONGUE, R.E. JORDAN, G. SCIAINI, R.J.D. MILLER, INSTITUTE FOR OPTICAL SCIENCES AND DEPARTMENTS OF CHEMISTRY AND PHYSICS, UNIVERSITY OF TORONTO TEAM — Femtosecond Electron Diffraction harbors great potential for providing atomic resolution of structural changes as they occur, essentially watching atoms move in real time. It combines temporal resolution on the hundreds of femtoseconds scale – a time scale typically only accessible by time-resolved optical spectroscopy – with real-space structural information on the atomic scale. We applied this technique to study the structural response of thin free-standing metal and semiconductor [1] films upon ultrafast electronic photo-excitation within a wide range of excitation levels. These studies distinguish the different mechanisms, thermal vs. non-thermal, of energy transfer from electronic to vibrational degrees of freedom resulting in different melting mechanisms for both classes of materials. In addition, we discuss a technique we recently established to determine the duration of the electron pulses by using the ponderomotive force of an intense femtosecond laser pulse to sequentially scatter parts of the electron pulse and found the electron pulse duration to be about 400 fs [2]. [1] M. Harb *et.al.*, *J. Phys. Chem. B*, in print. [2] C.T. Hebeisen *et al.*, *Opt. Lett* **31**, 3517 (2006).

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