Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Soft X-Ray Absorption Spectroscopy at an X-ray Free Electron Laser DANIEL HIGLEY, Stanford University/SLAC National Accelerator Laboratory, WILLIAM SCHLOTTER, JOSHUA TURNER, STEFAN MOELLER, ANKUSH MITRA, SLAC National Accelerator Laboratory, ARATA TSUKAMOTO, Nihon University, ROBERT MARVEL, RICHARD HAGLUND, Vanderbilt University, HERMANN DURR, JOACHIM STOHR, GEORGI DAKOVSKI, SLAC National Accelerator Laboratory — X-ray free electron lasers, providing coherent, ultrafast, high intensity x-ray pulses, have enabled groundbreaking scattering experiments to probe the atomic structure of materials on femtosecond timescales. Nonetheless, x-ray absorption spectroscopy (XAS), one of the most fundamental and common x-ray techniques practiced at synchrotron light sources, has proven challenging to conduct with satisfactory signal-to-noise levels at soft x-ray energies using free electron laser sources. The ability to routinely collect high quality XAS spectra, especially in a time-resolved manner, will open many new scientific possibilities in the areas of ultrafast demagnetization, phase transitions and chemical dynamics to highlight a few. Here, we report how XAS using total fluorescence yield detection yields high signal-to-noise x-ray absorption spectra at an x-ray free electron laser source. Data were collected over multiple absorption edges on technologically relevant materials. These measurements were recorded on the Soft X-Ray Materials Science instrument at the Linac Coherent Light Source. The results are easily extendable to time-resolved measurements.

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Date submitted: 14 Nov 2014 Electronic form version 1.4