Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Study of fast electron transport and ionization in isochorically heated solid foil HIROSHI SAWADA, YASUHIKO SENTOKU, Univ of Nevada - Reno, RISHI PANDIT, Southern Illinois University, TOSHINORI YABUUCHI, RIKEN SPring-8 Center, ULF ZASTRAU, European XFEL, ECKHART FOERSTER, IOQ, Friedrich-Schiller University of Jena, Helmholtz Institute at Jena, FARHAT BEG, University of California San Diego, HARRY MCLEAN, HUI CHEN, J-B PARK, PRAV PATEL, ANTHONY LINK, YUAN PING, Lawrence Livermore National Laboratory — Interaction of a high-power, short-pulse laser with a solid target generates a significant number of relativistic MeV electrons, subsequently heating the target isochorically in the transport process. Fast electron driven ionization of a solid titanium foil was studied by measuring Ti K-alpha x-rays and performing 2-D particle-in-cell simulations. The experiment was performed using the 50 TW Leopard short-pulse laser at UNR's Nevada Terawatt Facility. The 15 J, 0.35 ps laser was tightly focused on to a various sized, 2-μm thick Ti foil within a 8 μm spot to achieve the peak intensity of ~210^{19} W/cm^2. The transport of the fast electrons produced 4.51 keV Ti K-alpha x-rays. The yields and 2-D monochromatic images were recorded with a Bragg crystal spectrometer and a spherically bent crystal imager. The ionization degree of the heated foil was determined to be ~15 from the ionized K-alpha lines and the missing emission in the images. 2-D PIC simulations using a PICLS code with a radiation transport module were performed to calculate the K-alpha profiles and spectra. Details of the experiment and comparison will be presented.

Hiroshi Sawada
Univ of Nevada - Reno

Date submitted: 15 Jul 2016 Electronic form version 1.4