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Laser- driven protons and electrons leave X-ray fluorescence signatures in Cu foam J KIM, C MCGUFFEY, Univ of California - San Diego, C KRAULAND, General Atomics, F BEG, Univ of California - San Diego, M WEI, General Atomics, Y UEMATSU, Y YOSHIDA, S NOMA, D NII, S NAKAGUCHI, H HABARA, K TANAKA, A MORACE, Osaka University, Y ARIKAWA, S LEE, H SHIRAGA, Institute of Laser Engineering, P GRABOWSKI, Lawrence Livermore National Laboratory — Rapid energy delivery and local deposition make intense ion beams appealing for fundamental studies and their heating applications including creation of warm dense matter (WDM) samples in a controllable laboratory setting. The LFEX laser with ˜kilojoule energy and 1.5 ps pulse duration was used to direct an intense proton and electron beam into a copper foam sample. While they deposit energy, protons and electrons traveling in the Cu foam induce Cu K-alpha emissions, which are imaged to visualize the beam transport and spatial energy deposition throughout the foam. Simulations using a hybrid particle-in-cell (PIC) code clearly show that electrons stop rapidly while protons travel to a deeper depth in the foam. The modeled K-alpha generation spatial profile along the foam presents good agreement with experimental measurement. Detailed experimental results including proton spectrum for different target conditions and simulations explaining beam transport and energy deposition will be presented. This work was supported by the U.S. AFOSR under Contract FA9550-14-1-0346 and the Japanese NIFS project No. #NIFS13KUGK069

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