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Quantitative Kα line spectroscopy for energy transport in ultra-intense laser plasma interaction Z. ZHANG, H. NISHIMURA, T. NAMIMOTO, S. FUJIOKA, Y. ARIKAWA, M. NAKAI, M. KOGA, H. SHIRAGA, S. KOJIMA, H. AZECHI, Institute of Laser Engineering, Osaka University, 2-6 Yamada-oka, Suita, Osaka 565-0871, Japan, T. OZAKI, National Institute for Fusion Science, LHD, High Temperature Plasma G. 322-6 Oroshi Toki, Gifu 509-5292, Japan, H. CHEN, J. PAKR, G.J. WILLIAMS, Lawrence Livermore National Laboratory, Livermore, California 94550, USA, M. NISHIKINO, T. KAWACHI, A. SAGISAKA, S. ORIMO, K. OGURA, A. PIROZHKOV, A. YOGO, H. KIRIYAMA, K. KONDO, Quantum Beam Science Directorate, Kansai Photon Science Institute, JAEA, Kyoto 619-0215, Japan, Y. OKANO, Laser Research Center for Molecular Science, Institute for Molecular Science, National Institute of Natural Science 38 Nishigo-Naka, Myodaiji, Okaza — X-ray line spectra ranging from 17 to 77 keV were quantitatively measured with a Laue spectrometer, composed of a cylindrically curved crystal and a detector. The absolute sensitivity of the spectrometer system was calibrated using pre-characterized laser-produced x-ray sources and radioisotopes, for the detectors and crystal respectively. The integrated reflectivity for the crystal is in good agreement with predictions by an open code for x-ray diffraction. The energy transfer efficiency from incident laser beams to hot electrons, as the energy transfer agency for Au Kα x-ray line emissions, is derived as a consequence of this work. By considering the hot electron temperature, the transfer efficiency from LFEX laser to Au plate target is about 8% to 10%.

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