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Opacity Effect on Extreme Ultra-Violet Radiation from Laser Produced Tin Plasmas SHINSUKE FUJIOKA, TSUYOSHI ANDO, HIROAKI NISHIMURA, KATSUNOBU NISHIHARA, KEIJI NAGAI, TAKAYOSHI NORIMATSU, NORIAKI MIYANAGA, YASUKAZU IZAWA, KUNIOKI MIMA, Institute of Laser Engineering, Osaka University, ATSUSHI SUNAHARA, YOSHINORI SHIMADA, Institute for Laser Technology, AKIRA SASAKI, APR, Japan Atomic Energy Research — Opacity effects on the extreme ultra-violet (EUV) emission from laser-produced tin (Sn) plasmas have been experimentally investigated. EUV light source for a microlithography is getting a lot of attention as a challenging application of the laser-produced high-Z plasmas. Laser produced Sn plasma is an attractive 13.5 nm light source due to its compactness and its high emissivity. Opacity as well as emissivity of the laser-produce Sn plasma is quite high for the 13.5 nm light, therefore the 13.5 nm light from deep inside region of the Sn plasma is absorbed strongly during transporting through a surrounding plasma, and is unavailable. The opacity is a critical parameter to investigate optimum conditions for the EUV generation, however no reliable database had been available. Absolute opacity structure of a uniform Sn plasma, whose electron temperature is 30 - 40 eV, has been measured in the EUV range (10 - 20 nm of wavelength) for the first time. Experimental results indicate that control of optical thickness of the laser-produced Sn plasmas is essential to obtain high efficient and narrow band EUV radiation from the laser-produced tin plasmas.

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