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Collective Thomson Scattering Diagnostics of Laser Produced Plasmas for EUV Light Sources KENTARO TOMITA, YASUHISA HYAKUTA, KOTA OHARA, KIICHIRO UCHINO, Kyushu University, UCHINO LABORATORY TEAM — Extreme ultraviolet (EUV) lights are going to be used for semiconductor lithography after the 32 nm half-pitch technology node. For EUV light sources, high density (electron density n_e=10^{24} - 10^{26} m^{-3}) and high temperature (electron temperature T_e= 10 - 30 eV) plasmas should be generated using Xe or Sn atoms. In order to produce required EUV lights efficiently, plasma parameters such as n_e, T_e and averaged ionic charge $\bar{Z}$ should be optimized. We have tried to apply the LTS measurement to EUV plasmas. When we use a visible laser as a probing laser, the LTS spectra from the EUV plasmas are in the collective regime. The spectrum of the collective Thomson scattering consists of an ion term and an electron term. Taking account of the strong background radiation from the plasma, we determined to measure the ion term, for which we could expect enough SN ratios against the background radiation. One problem to measure the ion term is that the spectral resolution of 10 pm is needed, and the other problem is that the intense wall-scattered laser lights easily overwhelm the ion spectra. In order to overcome these problems, we constructed a newly designed LTS measurement system whose spectral resolution and stray light rejection were enough to resolve fine feature of the ion term.

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