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Measurement of CO_2 laser absorption by tin plasma emanating extreme ultraviolet light for photo-lithography[1] HIRAKU MATSUKUMA, KENSUKE YOSHIDA, TATSUYA HOSODA, AKIFUMI YOGO, SHINSUKE FUJIOKA, KATSUNOBU NISHIHARA, Osaka University, ATSUSHI SUNAHARA, TOSHIHIRO SOMEKAWA, Institute of Laser Technology, HIROAKI NISHIMURA, Osaka University — Laser-driven tin plasma has been studied as a light source of extreme ultraviolet (EUV) at 13.5 nm (+/- 1% in-band width) for the next-generation semiconductor manufacturing. By using CO_2 laser as a driver, high conversion efficiency (CE) has been attained in previous works by optimizing optical thickness for EUV radiation. Radiation hydrodynamic simulation predicts, however, that absorption coefficient for CO_2 laser is as high as 50% for a tin plasma generated with a single laser pulse mainly due to short plasma scale. The relatively low absorption is a crucial problem for efficient generation of EUV light. In order to solve this problem and to increase the energy absorption, a double pulse method has been proposed where plasma scale length is extended by pre-pulse irradiation. Therefore, it is important to measure CO_2 laser absorption rate precisely in order to optimize plasma conditions. For this purpose we designed an integrating sphere for CO_2 laser. Laser absorption was measured for tin plasmas generated under various conditions including target geometries. We will show experimental results and discuss on guidelines for getting higher CE.

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