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Measurement of multiphoton ionization efficiency for reliable laser Thomson scattering diagnostics YUKITAKA MATSUDA, MITSUTOSHI ARAMAKI, AKIHIRO KONO, Nagoya University — In laser Thomson scattering diagnostics for low temperature plasmas, the laser energy density in the focal region is very high. The gases in plasma may be ionized via multiphoton ionization process and we should be careful about the process. To clarify the effect of multiphoton ionization quantitatively in Thomson scattering diagnostics, we are carrying out systematic measurements of multiphoton ionization efficiency for various gases. A frequency-doubled Nd:YAG laser beam (532nm, 150∼240 mJ) was focused with a spherical lens (f=400 mm) into the space between dc-biased parallel plates and the current induced via multiphoton ionization of ground-state Xe, Kr, Ar, N_2 and O_2 atoms was recorded. The laser-beam profile in the focal region was also measured using a knife edge to obtain the absolute ionization efficiency. The results indicates that multiphoton ionization efficiency for Xe and O_2 is relatively large and may affect Thomson scattering diagnostics for low-pressure conditions; for Xe, the electron density produced via multiphoton ionization could reach $10^{12}\mathrm{cm}^{-3}$ at a few mTorr gas pressure.

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