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Measurement of metastable Ar atom density in atmospheric-pressure microgap discharge using laser absorption spectroscopy AKIHIRO KONO, Nagoya University, TOMOYUKI SHIBATA, MITSUTOSHI ARAMAKI — Atmospheric-pressure Ar glow discharge in a microgap between two knife-edge electrodes (10-mm length, 100-μm gap separation) driven by 2.45-GHz microwave is being studied aiming at an application to VUV excimer light source. One of the knife-edge electrodes has a gas sink at its ridge, enabling introducing gas flow through the discharge plasma. The density of metastable Ar atoms, which are precursors of excimer molecules, is studied using laser absorption spectroscopy. The beam of a tunable diode laser at wavelengths around 696.5 nm is arranged to pass through the microgap obliquely to have an absorption path length of $\sim$1 mm. At a microwave power of 10 W, the observed absorption at the line center was $\sim$10% with a pressure broadened line width of $\sim$13 GHz, giving metastable Ar atom density of 3×10^{13} cm^{-3}. In a similar condition, the electron density measured using a laser Thomson scattering technique was 3×10^{14} cm^{-3}. The behavior of metastable atom density for varying discharge conditions is under investigation. (Work supported by Grant-in-aid 15075205 from MEXT Japan.)

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