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Kinetics of metastable He atom at middle pressure in micro hollow cathode discharge MARI INOUE, Wakayama University, TAKAYUKI OHTA, Meijo University, TSUYOSHI KANAE, Wakayama University, MASAFUMI ITO, Meijo University, MASARU HORI, Nagoya University — Hollow cathode discharges has been studied as light sources. Conventional hollow cathode discharges has been operated in low pressure, while micro hollow cathode discharge in near atmospheric pressure. In this study, the behavior of metastable He atoms (2^3S_1 - 2^3P_0 ; 1082.909 nm) in micro hollow cathode discharge in the middle range of the pressure from 5 to 30 kPa were fundamentally studied. The translational temperature and density of metastable He atoms were measured by diode laser absorption spectroscopy. The spectral line profile was analyzed and the pressure-broadening effect was investigated. The absorption profile of metastable He atoms was obtained by scanning the wavelength of the diode laser. The absorption profile of metastable He atoms shifts from a Gaussian to Voigt profile at around pressure of 10 kPa. The metastable He atoms temperatures were estimated to be 900 to 1150 K, and the densities were measured to be $1.3 \times 10^{13} \text{ cm}^{-3}$ to $7.6 \times 10^{12} \text{ cm}^{-3}$ in the range of 5 to 30 kPa. The translational temperatures and densities of metastable He atoms were decreased with increasing pressure below 10 kPa, on the other hand, increased with increasing pressure in the range from 10 to 30 kPa.

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