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Measurement of metastable fractions and effect of stepwise ionizations in inductively coupled argon plasmas by optical emission spectroscopy YOUNG-KWANG LEE, CHIN-WOOK CHUNG, Hanyang University — Metastable number densities relative to ground state and contribution of stepwise ionization to total ionization were experimentally investigated in low-pressure inductively coupled argon plasmas. In the pressure range 3–50 mTorr, optical emission spectroscopy (OES) was used to determine metastable fractions by measuring the emission intensities from 4p to 4s levels. The measured metastable fractions were in good agreement with the calculation, showing a dependence on the discharge pressure. The contribution of stepwise ionization was also estimated from the measured metastable fractions along with a model prediction. It is observed that at relatively low discharge pressures (< 10 mTorr) the ionization is mainly provided by the direct ionization, whereas at higher pressure the stepwise ionization is dominant with increasing discharge power.

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