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Probe measurements and optical emission spectroscopy in inductively coupled RF Ar/C₄F₈/O₂ discharges TAKASHI KIMURA, HATSUYUKI HANAKI, Nagoya Institute of Technology — Measurements with a Langmuir probe and optical emission spectroscopy combined with actinometry are carried out in inductively coupled RF Ar/C₄F₈/O₂ discharges at the total pressure lower than 30mTorr for the Ar content ranging from 60% to 90%. Plasmas are produced in the cylindrical stainless steel chamber with 160 mm in inner diameter and 80 mm in length, where the power injected into the plasma is 140W. The structure of the measured electron energy probability functions can be changed from a Druyvesteyn distribution to a Maxwellian one as the Ar content decreases. The electron density measured at each fixed Ar content gradually decreases with increasing the O₂ content, whereas the measured effective electron temperature is not sensitive to the O₂ content. The atomic fluorine density measured at each fixed Ar content has the local maxima when the ratio of the O₂ content to C₄F₈ one is 0.3 and 0.7-0.8, whereas it has the local minimum when the ratio is about 0.6. The atomic oxygen density measured at each fixed Ar content decreases with the decrease in the O₂ content, and then can not be deduced from the optical emission spectroscopy when the O₂ content is lower than C₄F₈ content. This work is partially supported by Grant-in-Aid from the Japan Society for the Promotion of Science.

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