

Abstract Submitted
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Experimental Study on Radio Frequency Inductively Coupled Ar/NF₃ Discharges KATSUYUKI HANAKI, TAKASHI KIMURA, Nagoya Institute of Technology — We investigated the plasma parameters in radio frequency inductive Ar/NF₃ plasmas with the probe method and optical emission spectroscopy combined with actinometry. Plasma was produced in the cylindrical stainless steel chamber with 160 mm in inner diameter and 100 mm in length, and the power injected into the plasma was kept at 120W. Experiment was performed at three total pressures of 8m, 15m and 30 mTorr, changing the NF₃ content from 0% to 30%. The structure of the measured electron energy probability functions (EETFs) did not change at any NF₃ content, resulting in the same effective electron temperature. The measured EETFs deviated from the Maxwellian distribution due to the large depletion of the electrons with the energy higher than 11-13 eV. On the other hand, the electron density markedly decreased even in small NF₃ addition lower than 5%. The atomic fluorine density estimated by actinometry was approximately proportional to the NF₃ content. We investigated the effect of O₂ addition on the plasma parameters as well. The atomic fluorine density in Ar/NF₃/O₂ discharges depended on only NF₃ content. This fact may indicate that the reaction rate to produce the atomic fluorine by the collisions between the atomic oxygen and NF_{x(x=1,2)} is much lower than that by the collisions between the atomic oxygen and CF_{x(x=2,3)}. The atomic oxygen density was approximately proportional to O₂ content.

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