Abstract Submitted
for the GEC06 Meeting of
The American Physical Society

Probe Measurements and Optical Emission Spectroscopy in RF Inductively Coupled Ar/SF_6 Discharges TAKASHI KIMURA, MICHIO MABUCHI, Nagoya Institute of Technology — With the probe method and optical emission spectroscopy combined with actinometry, we investigated the dependence of the plasma parameters on the SF_6 content in radio frequency inductively coupled Ar/SF_6 discharges. Plasma was produced in the cylindrical stainless steel chamber with 160 mm in inner diameter and 75 mm in length, and the power injected into the plasma was kept at 140W. Experiment was performed in the total pressure range from 5 mTorr to 25 mTorr, changing the SF_6 content from 0% to 30%. Under our experimental condition, the electron density and its effective temperature were independent of the SF_6 content. The electron density was on the order of 10^{16} m^{-3} and its effective temperature was about 4 eV. The atomic fluorine density estimated by actinometry, which was on order of 10^{19} m^{-3}, was approximately proportional to the SF_6 content. We investigated the effect of dilution gas addition (H_2 and O_2) on the plasma parameters as well. The measured electron energy probability functions (EEPFs) did not depend on the dilution gas content for the SF_6 content higher than 10%, resulting in the constant effective electron temperature and the constant electron density. The atomic fluorine density gradually increased with increasing O_2 content whereas it markedly decreased with increasing H_2 content.

Takashi Kimura
Nagoya Institute of Technology

Date submitted: 01 Jun 2006 Electronic form version 1.4