Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Higher-Density Negative-Ion Production Using Magnetized SF_6Plasma M. ABID IMTIAZ, TETSU MIENO, Dept. Physics, Shizuoka Univ. — Negative-ion plasmas have a big potential to improve production of high-quality LSIs in the high-tech industries by reducing notching effects during Si-etching. To realize the ultra-fine etching in LSI fabrications, a higher-density and stable negative-ion source is necessary. In a magnetized plasma column generated from an electronegative gas, it is known that negative ions are accumulated around the plasma column via radial diffusion [1]. In this study, DC discharge is applied in SF_6 gas to produce a plasma column with B =0.3 Tesla. The Langmuir probe method is applied for the diagnosis of the plasma produced in a metal chamber of 200 cm long and 21 cm diameter. Gas pressure and discharge current dependences of n(-) are observed. The radial density profiles are compared with those of CF_4. Negative-ion density is calculated using the modified Bohm criterion [1]. It is found that at p =0.13 Pa n (-) in SF_6 plasma is $\sim$8x10^{17} m^3, and in CF_4 plasma, n (-) $\sim$3x$10^{17}m^3$. This ion-ion plasma has n(-)/n(e) range from 100 to 900, and is attractive for applications.

[1] M. Abid Imtiaz, S. Tsuruta and T. Mieno: Plasma Sources Sci. Technol. **16** (2007) 324.

M. Abid Imtiaz
Dept. Physics, Shizuoka Univ.

Date submitted: 07 Jun 2010 Electronic form version 1.4