

Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Development of DC plasma source for extremely low pressure operation BYUNG-KEUN NA, IN-SIK BAE, KAIST, SHIN-JAE YOU, JUNG-HYUNG KIM, KRIS, HONG-YOUNG CHANG, KAIST — As the line width of semiconductor devices decreases less than 20 nm, development of a low pressure plasma source became a crucial issue. Moreover, as the atomic layer deposition is getting more important for the fine processing, the low density plasma source also became necessary. However, capacitive and inductive discharges, the most widely used plasma source, are not well generated below the pressure of 10 mTorr. The mean free path of electron under 10 mTorr is usually longer than the system size; hence the neutral gas is hardly ionized by the electron-neutral (e-n) collisions. In this presentation, a new type of DC plasma source which can be operated below 10 mTorr is introduced. A geometrical trick, instead of magnetic field, was used to increase free flight length of electron. A number of e-n collisions could occur through the longer flight length than the mean free path; finally plasma was generated even in extremely low pressure. The plasma generation could be confirmed by the anode current and Langmuir probe measurement. The plasma was generated at a few mTorr, and the plasma density was as low as 10^8 cm^{-3} . This plasma source can be used for extremely fine processing.

Byung-Keun Na
KAIST

Date submitted: 06 Sep 2012

Electronic form version 1.4