Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Hybrid Modeling of SiH_4/Ar Discharge in a Pulse Modulated RF Capacitively Coupled Plasma[1] WANG XI-FENG, SONG YUAN-HONG, WANG YOU-NIAN, Dalin University of Technology, PSEG TEAM — Pulsed plasmas have offered important advantages in future micro-devices, especially for electronegative gas plasmas. In this work, a one-dimensional fluid and Monte-Carlo (MC) hybrid model is developed to simulate SiH_4/Ar discharge in a pulse modulated radio-frequency (RF) capacitively coupled plasma (CCP). Time evolution densities of different species, such as electrons, ions, radicals, are calculated, as well as the electron energy probability function (EEPF) which is obtained by a MC simulation. By pulsing the RF source, the electron energy distributions and plasma properties can be modulated by pulse frequency and duty cycle. High electron energy tails are obtained during power-on period, with the SiHx densities increasing rapidly mainly by SiH_4 dissociation. As the RF power is off, the densities in the bulk region decrease rapidly owing to high energy electrons disappear, but increase near electrodes since diffusion without the confinement of high electric field, which can prolong the time of radials deposition on the plate. Especially, in the afterglow, the increase of negative ions near the electrodes results from cool electron attachment, which are good for film deposition.

[1]This work was supported by the National Natural Science Foundation of China (Grant No. 11275038).

Wang Xi-Feng
Dalin University of Technology

Date submitted: 19 Jun 2015 Electronic form version 1.4