Abstract Submitted
for the GEC17 Meeting of
The American Physical Society

PIC/MCC simulation of magnetized capacitively coupled plasmas SHALI YANG, Huazhong University of Science and Technology, YA ZHANG, Wuhan University of Technology, HONGYU WANG, Anshan Normal University, WEI JIANG, Huazhong University of Science and Technology — Magnetized capacitively coupled plasma (MCCP) has been widely used in microelectronic industry. External magnetic field is applied to increase the efficiency of power transfer to the plasma and enhance plasma confinement. We used our one-dimensional implicit Particle-in-cell/Monte Carlo collision (PIC/MCC) model to study the symmetric and asymmetric magnetic field on CCP. The PIC/MCC model is one-dimensional in space and three-dimensional in velocity, thus the EwB drift is correctly simulated. For the symmetric magnetic field, we studied the electrical asymmetry effects in MCCP. It is found that, with a weaker magnetic field at 10 G, the plasma density is nearly doubled and the self-bias is almost unaffected. And with a stronger magnetic field at 100 G, the plasma density is significantly increased and nearly independent of the phase angle, but at the cost of decreasing the self-bias, which results in a smaller adjustable range of ion bombardment energy. For the asymmetric magnetic field, we studied magnetical asymmetric effect (MAE) in a geometrically and electrically symmetric CCP. It has demonstrated that MAE will generate a DC self-bias and asymmetric plasma response. It can be an effective means to control the plasma properties as an augmentation to conventional measures.

Shali Yang
Huazhong University of Science and Technology

Date submitted: 04 Jun 2017 Electronic form version 1.4