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Particle Simulations of Sheath dynamics in Low Pressure Capacitively Coupled Argon Plasma Discharges YOSHINORI TAKAO, Department of Aeronautics and Astronautics, Kyoto University, Japan, KENJI MATSUOKA, KOJI ERIGUCHI, KOUICHI ONO — A numerical study of low pressure parallel-plate rf Ar discharges has been performed including the transport of ions and electrons in the sheath on the substrate. We employ a two-dimensional particle-in-cell with Monte Carlo collisions (PIC/MCC) method, for an asymmetric reactor geometry with an external electrical circuit. The plasma chamber is 12.5 cm in radius (5 cm in radius for the rf-powered electrode) and 4 cm in height. The peak electron density obtained in the discharge is 2.0×10^9 cm^{-3} at 20 mTorr and a rf voltage of 300 V, where the dc self-bias voltage is about - 200 V. The angular distribution function of ions (IADF) has a significant peak at around normal incidence (or at an incident angle $\theta \sim 0$ from the electrode surface normal), indicating that a large part of ions impact the electrode almost perpendicularly after being accelerated through the sheath. Increasing rf frequencies from 13.56 to 40.68 MHz results in larger distribution at lower incident angles, so that more desirable angular distribution is obtained.

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