Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Theoretical and experimental study of ion flux formation in an asymmetric high-frequency capacitive discharge[1] I. SCHWEIGERT, D. ARISKIN, Institute of Theoretical and Applied Mechanics SB RAS, Russia, T. CHERNOIZYUMSKAYA, A. SMIRNOV, St.-Petersburg State Polytechnical University, Russia — Parameters of a high-frequency capacitive discharge in argon in axially symmetric chambers of different geometries are studied in experiments and by means of two-dimensional kinetic modeling by the Particle-in-Cell Monte Carlo collision method. It is demonstrated that a change in the ratio of the areas of the driven and grounded electrodes can substantially increase the ion energy on the electrode practically without disturbing the plasma parameters. Particular attention is paid to studying the self-bias voltage and the ion distribution function on the electrode for gas pressures ranging from 15 to 70 mtorr. In the experiment, the ion flux was studied by an energy analyzer placed behind the grounded electrode with an orifice in the middle. Several reactors with different ratios of the areas of the driven and grounded electrodes were considered to study the effect of the chamber geometry on the ion flux. The plasma potential relative to the grounded electrode and, therefore, the maximum energy of the ions are demonstrated to increase with increasing area ratio. The measured and calculated parameters of the plasma, such as the electron concentration and temperature, and also the ion energy distribution functions are in good agreement.

[1]The authors gratefully acknowledge the support of this work by the Russian Foundation for Basic Research (grant No. 08-02-00833a).

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Date submitted: 10 Jun 2010 Electronic form version 1.4