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PIC simulation of reactive radio-frequency plasma[1] PAUL MATTHIAS, DANIEL KAHNFELD, KARL LUESKOW, GUNNAR BANDELOW, RALF SCHNEIDER, Ernst-Moritz-Arndt Univeritaet Greifswald, Institute of Physics, STEFAN KEMNITZ, Universitaet Rostock, Institute of Computer Science and Technology, JULIA DURAS, Nuernberg University of Applied Sciences
— Reactive plasmas are important for industrial applications. For sputter processes and plasma etching especially asymmetric capacitively coupled plasmas with a radio-frequency modulated voltage are used. The latest experimental results show an unexpected high-energy peak of negative ions at the grounded anode, depending on the cathode material. Here the Particle-in-Cell (PIC) method was used to simulate this experiment. The main mechanism for the effect is identified as the production of negative ions near the surface of the cathode. In a one dimensional simulation the negative ions are trapped inside the plasma because of the symmetric potential. Thus it was shown that these high-energy peaks of negative ions at the anode only appear in asymmetric discharges, due to the self-bias voltage. To reproduce the asymmetry a two dimensional model will be used in the future.

[1]German Space Agency DLR Project 50 RS 1510

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