Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

Implementing a model for material dependent secondary electron emission coefficients in PIC/MCC simulations of capacitive RF plasmas[1]

MANASWI DAKSHA, Institute of Electrical Engineering, Ruhr-University Bochum, Germany, ARANKA DERZSI, Wigner Research Centre for Physics, Hungary, Department of Physics, West Virginia University, USA, ZOLTAN DONKO, Wigner Research Center for Physics, Hungary, JULIAN SCHULZE, Institute of Electrical Engineering, Ruhr-University Bochum, Germany Department of Physics, West Virginia University, USA — Ion induced secondary electron emission coefficients (γ) are a pivotal parameter utilized in Particle-in-Cell/ Monte Carlo collision (PIC/MCC) simulations to mimic realistic plasma-surface interactions. However, γ is usually implemented in a rudimentary way, e.g. as an arbitrary constant. Experimental and theoretical studies have, however, suggested that it is significantly influenced by the surface material, its crystallinity, the impinging ion properties, etc. Therefore, we use an ab-initio model based on Hagstrums theory to calculate realistic γ-coefficients, which are then included in PIC/MCC simulations. To demonstrate the effect of material dependent γ on modeling results, simulations of 13.56 MHz, single frequency argon and helium capacitive discharges are carried out based on different models for γ. We find that, depending on the material simulated, the plasma properties will change dramatically, if realistic surface coefficients are used. Thus, we conclude that a realistic material dependent implementation of γ is required to obtain realistic simulation results.

[1]US NSF Grant no: 1601080, DFG SFB TR 87

Manaswi Daksha
Institute of Electrical Engineering, Ruhr-University Bochum

Date submitted: 08 Jun 2018 Electronic form version 1.4