SURFACE PROCESSES IN LOW-PRESSURE CAPACITIVELY COUPLED PLASMAS

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Abstract. Low-pressure radio frequency capacitively coupled plasmas (RF CCPs) are used for several applications, e.g. etching and deposition processes. Despite their high technological relevance, some details of their operation, e.g. plasma-surface interactions, are not understood in many cases. Kinetic simulations based on the Particle-in-Cell method combined with Monte Carlo type treatment of the collision processes (PIC/MCC approach) are widely used to study various phenomena in RF CCPs. Such simulations typically require a number of input parameters, including surface coefficients. Such coefficients are often unknown or suffer from large uncertainties, therefore, several assumptions related to the description of the interaction of plasma particles with the boundary surfaces are implemented in the simulations. Recently, the importance of the realistic description of the various surface processes in kinetic simulations of RF CCPs has attracted increasing attention (see e.g. Derzsi et al. 2020). The simple models used to describe e.g. the secondary electron emission induced by heavy-particles and electrons have been replaced by complex, more realistic models, which take into account the dependence of the secondary electron yield on various factors, such as the energy of the incident particles, the electrode material and its surface conditions. In this talk, the recent efforts to describe the interaction of plasma particles with the boundary surfaces realistically in particle based simulations of RF CCPs are presented, as well as an overview of how the realistic surface models implemented in the simulations have provided an improved understanding of the effects of elementary surface processes on the plasma parameters in low-pressure RF CCPs.

References

Derzsi, A., Horváth, B., Donkó, Z., Schulze, J. : 2020, *Plasma Sources Sci. Technol*, **29**, 074001.