The understanding of processes in the boundary layer between plasma and surfaces of immersed solids is of fundamental importance for both the probe diagnostics of plasma and plasma processing of materials. However, the interpretation of obtained experimental data is complicated, at least at higher pressures, in chemically active plasmas or for substrates with complex geometries. The theoretical description of these processes is difficult and therefore this is the area where computational modelling can be widely performed. The comparison of results of computer models with experimental data became very effective way of studying and understanding plasma-solid interaction. It was proved that especially the particle simulations give deep insight into stated problems.

In our contribution a two-dimensional self-consistent particle code is employed for the detailed study of sheath structure surrounding immersed solids. The code is based on the combination of deterministic molecular dynamics simulation of movement of charged particles in both external and local fields and stochastic Monte Carlo treatment of scattering events with neutral particles in plasma, i.e. on PIC-MCC technique. It was shown that this technique is capable of providing detailed information about plasma behaviour near solids (e.g. 1). The studied problem is an analysis of interacting sheaths around two solids immersed in low-temperature plasma in the positive column of a glow discharge. As it is well known (e.g. 2) that probes perturb their local surroundings, the theoretical analysis of I-V characteristics of probes located in sheath region of a substrate or another probe is a nontrivial problem. This is a typical task where the computational approach can bring new results. In this contribution the sheath layer of the immersed solid is mapped by a probe of smaller dimensions. Consequently, the effects of various discharge conditions as gas pressure and plasma composition are discussed. We study their influence on spatial distributions of charged particle densities in the sheath and on electron/ion fluxes on the probe.


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