

Wall charges and potentials from a microscopic point of view

Franz X. Bronold

Institute of Physics, University Greifswald, Germany

Macroscopic objects in contact with an ionized gas acquire a quasi-stationary negative charge because the influx of electrons outruns the influx of ions. Since the very beginning of plasma science it is known that the wall charge strongly affects the overall properties of a bounded plasma, not only via sheath formation and surface-supported electron-ion recombination but also via secondary electron emission from the surface due to various impacting species. In my talk I will give an overview of our attempt to develop a microscopic understanding of the wall charge. The first part of the talk discusses the build-up of wall charges in terms of electron physisorption in the polarization-induced external surface potential. Based on this idea we calculated electron sticking coefficients and desorption times for ideal metallic and dielectric surfaces. We also determined the charge and potential distribution across the plasma-wall interface. Once the electrons comprising the wall charge are deposited on or in the wall the question arises how to extract them. The second part of my talk will be devoted to this question taking the quantum-mechanical description of secondary electron emission from dielectric surfaces due to de-excitation of metastable molecules as an example.