

Plenarvortrag

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Microphysics of charge-transfer across the plasma-wall interface — ●FRANZ XAVER BRONOLD, RAFAEL LESLIE HEINISCH, JOHANNES MARBACH, MATHIAS PAMPERIN, ELENA THIESSEN, and HOLGER FEHSKE — Institut für Physik, Ernst-Moritz-Arndt-Universität Greifswald, 17489 Greifswald, Deutschland

Low-temperature gas discharges interact with solids which either serve as electrodes connecting the gas discharge to the external circuitry or as walls confining the plasma in space. The most fundamental manifestation of the plasma-solid interaction is the plasma sheath, an electron depleted region adjacent to an unbiased macroscopic object in contact with an ionized gas. It is the positively charged part of an electric double layer whose negatively charged part is inside the wall. In my talk I

will discuss the charge-transfer responsible for sheath formation from a microscopic point of view. Central to our approach is the concept of the electron-surface layer which visualizes the potential and the electron distribution across the interface. Combining it with an invariant embedding approach allows us to calculate the electron sticking coefficient for various wall materials. The second part of the talk concerns electron extraction from the wall due to charge-transferring atom-surface collisions. Using a semi-empirical Anderson-Newns model we developed a flexible tool for the computation of wall recombination and secondary electron emission coefficients. Besides wall parameters the microscopic look at sheath formation provides however also new vistas for plasma diagnostics and manipulation. With this look into the future I will close the talk. Supported by the DFG through CRC/Transregio TRR24.