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Sticking of PS molecular fragments on silver (Ag) using sputter deposition

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Plasma surface treatments present nowadays an efficient and ecological tool for surface functionalisation. For this application, the deposition and sticking of molecules in the sub-monolayer range is of great importance, as this monolayer defines the surface properties in general, and the adhesion properties in the context of reversible adhesion between metal and polymer surfaces. Studies for the adhesion of molecules in the sub-monolayer range are difficult to carry out by plasma deposition techniques. In this presentation we will use sputter deposition as experimental technique and molecular dynamics (MD) simulations as well as density functional theory (DFT) calculations as numerical methods.

The sputter deposition of polystyrene (PS) molecules on silver substrates was carried out by the Storing Matter (StoMat) prototype¹⁻³ and the deposits were analyzed by static secondary ion mass spectrometry (ToF-SIMS). ToF-SIMS mass spectra showed successful adhesion of PS fragments after double fragmentation of PS during sputter deposition and ToF-SIMS analysis. For the PS deposits, a Gaussian distribution was observed. Sputter deposition parameters (impact energy of ions during sputter deposition, thickness of deposit) were studied in order to investigate their effect on sticking behaviour of molecular fragments. The results obtained will be discussed in detail and compared to numerical simulations.

Reference List

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Keywords

polystyrene, deposition, sticking, Storing matter, sub-monolayer