

Adsorption of large organic molecules on surfaces: X-ray standing waves as a high-precision-technique for structural investigations

Christian Kumpf

Universität Würzburg, Experimentelle Physik II, Am Hubland, D-97074 Würzburg, Germany

The properties of many functional materials and electronic devices based on (multi-) layer systems and thin films are dominated by their surfaces and interfaces. This is particularly true for organic thin films and adsorbate systems, the properties of which largely depend on their interaction with the underlying substrate. It was frequently reported in the last years, that chemisorption on surfaces does not only occur for small molecules (e.g., CO and N₂), but also for larger organic molecules like, PTCDA, NTCDA, phthalocyanines, etc. Gaining insight into the precise adsorption geometry of these molecules is important in order to hence obtain a comprehensive understanding of these materials since this knowledge enables designing specific devices and systems with desired properties.

In this contribution recent structural investigations on the adsorption of large organic molecules on metal surfaces are reported. Special emphasis is put on (normal incidence) x-ray standing waves (NIXSW) investigations on NTCDA and metal-phthalocyanines on the silver (111) surface. Different behavior of the molecular layers regarding molecular ordering, molecule-molecule, and molecule-substrate interaction, and the occurrence of phase transitions are discussed. Furthermore, technical aspects of the XSW technique (non-dipolar effects in the photoemission and electron-induced contributions to the Auger emission process), and possibilities for their consideration are discussed.