ELECTRONIC STRUCTURE OF STRONGLY COUPLED ORGANIC-METAL INTERFACES

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ABSTRACT

Contact formation at organic-inorganic interfaces is of utmost importance for the performance of organic electronic devices and for weakly interacting interfaces the energy-level alignment is well understood. However, at many organic-metal interfaces strong coupling involving charge transfer and hybridization prevails [1]. In such cases vertical bonding distances and possible adsorption induced molecular distortions are crucial for the energy-level alignment and thus for the charge injection properties at these interfaces. Element-specific bonding distances of organic (sub)monolayers on the (111) surfaces of coinage metals have been measured by the X-ray standing wave (XSW) technique. Interface energetics and chemical reactions have been accessed by ultraviolet photoelectron spectroscopy (UPS) and X-ray photoelectron spectroscopy (XPS). By increasing the complexity of the systems from pure hydrocarbon systems like pentacene or perylene [2,3] to oxygen and/or nitrogen substituted derivatives [1,3,4] we could identify the pivotal role of these side-groups in the process of surface-induced aromatic stabilization, which results in metallic organic monolayers. Going beyond organic-metal interfaces the vertical structure and energetics of organic-organic heterostructures on metal surfaces will be also discussed [5].