

Vertical Adsorption Distances Impact Energetics at Organic-Metal Interfaces

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Contact formation at organic/inorganic interfaces is of utmost importance for the performance of organic electronic devices. Vertical bonding distances of conjugated organic molecules in monolayers on metals are crucial for the energy-level alignment and thus for the charge injection properties at these interfaces [1]. Even for weakly interacting systems site-specific interactions can lead to adsorption induced molecular distortions and, consequently, to additional intramolecular dipoles, which impact the energy-level alignment. Guidelines to tune adsorption heights by rational molecular design are discussed [2]. For strongly interacting system (charge transfer complex formation) distortions of the molecules on the substrate play a pivotal role in the process of surface-induced aromatic stabilization, which results in metallic organic monolayers [1-3]. Interface energetics and chemical reactions are being accessed by ultraviolet photoelectron spectroscopy (UPS) and X-ray photoelectron spectroscopy (XPS). Element-specific bonding distances of organic (sub)monolayers on metal single crystalline substrates have been measured by the X-ray standing wave (XSW) technique. We will compare the contact formation of the pure hydrocarbon systems pentacene on single crystalline coinage metal surfaces with that of fluorinated pentacene, tetraazaterrylene and perylene derivatives thin films on the same surfaces [3-5]. Going beyond organic/metal interfaces the vertical structure and energetics of organic/organic heterostructures on metal surfaces will be also discussed.

References

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