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Controlling Surface-Mediated Interactions at the Organic Semiconductor / Metal Interface[1] OLIVER MONTI, NAHID ILYAS, University of Arizona, ROCIO CORTES-RODRIGUEZ, PERCY ZAHL, PETER SUTTER, Brookhaven National Laboratory — We show by a combination of two-photon photoemission spectroscopy (2PPE) and low-temperature scanning tunneling microscopy (LT-STM) that surface-mediated interactions at the organic semiconductor / metal interface can be controlled by the molecular orientation on the surface. For the dipolar molecule boron subphthalocyanine chloride (dipole moment of 4.5 D) on Cu (111), nearest-neighbour distance distributions show radically different properties for the two different molecular orientations on the surface, "Cl-up" and "Cl-down". We are able to model the respective interaction potentials by a combination of Friedel oscillation-induced surface mediated interactions and van der Waals (Cl-up) vs. screened Coulomb interactions (Cl-down). These interaction modes, substantially different for the two molecular orientations, lead to completely different growth modes at higher coverages. They result from selective charge-transfer to Cl-down molecules, as corroborated by 2PPE. Our results suggest a pathway towards control of the interfacial electronic structure and molecular assembly at organic semiconductor / metal interfaces.

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