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Tenkých vrstev a nanostruktur

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TÉMA

Electronic states at donor-acceptor/ metal interfaces probed with electron spectroscopies: NEXAFS, XPS and UPS

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The active interface in charge injection devices is often defined by a monolayer-thick blend of donor and acceptor molecules in contact with a metal surface. We have explored electronic states of such hetero-interfaces using high-resolution core-level photoemission (XPS), near-edge X-ray absorption (NEXAFS), and valence band photoemission (UPS) spectroscopies. A thorough analysis is carried out using Au(111), Ag(111) and Cu(111) surfaces, onto which pentacene (PEN) and copper phthalocyanine (CuPc) are mixed with their fluorinated counterparts F16CuPc and PFP, respectively. We analyze in detail the variations in all spectral features as a function of the donor/acceptor ratio, revealing subtle binding energy shifts in core-levels and changes in HOMO/LUMO filling. The systematic exploration allows us to correlate all observations, thereby offering important clues to predict energy barriers for electron/hole injection/extraction in such hybrid interfaces.

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