

Seminář odd. 26

Tenkých vrstev a nanostruktur

Fyzikální ústav AVČR, Cukrovarnická 10, Praha 6

datum: 11. 2. 2016 čtvrtek

čas: 15:00

místnost: knihovna, budova A, 1.p.

TÉMA

Charge distribution of adsorbed single molecules: the effect of the underlying surface

Tobias Meier, Rémy Pawlak

Department of Physics, University of Basel, Klingelbergstr. 82, 4056 Basel, Switzerland

Electron donor-acceptor molecules are promising candidates for molecular electronic devices since they may generate separated electron-hole pairs upon absorption of photons. To preserve the intrinsic electronic character of such complexes upon adsorption, a particular attention must be focused on their interaction with the underlying surface. In this contribution, we will first show the adsorption of TTF-dppz [1], a fused piconjugated donor-acceptor molecule, deposited on insulating NaCl films on Cu(111). To investigate the interplay between the atomic structures of TTF-dppz and NaCl, we performed high-resolution scanning tunneling (STM) and atomic force microscopy (AFM) measurements at 5 K with CO-terminated tips. The charge distribution above individual molecules has been studied by local contact potential mapping [2,3] which reveals the coexistence of two charge redistribution depending on the adsorption site. In agreement with numerical calculations [4], such variation of the TTF-dppz properties is found to arise from the formation or not of a complex with a single Na⁺ ion of the surface. In a second example, we will describe the adsorption of porphyrin derivatives on hydroxylated rutile-TiO₂(110). The interaction of the single molecules with the hydroxyl groups (OH) of the rutile surface has been particularly regarded by a combined STM/AFM study. We found that a relevant change of the charge distribution of those molecules is provoked by the presence or not of OH groups underneath [5]. Finally, we will discuss our first results on the adsorption of phthalocyanin molecules on a topological insulator (Bi₂Te₃).

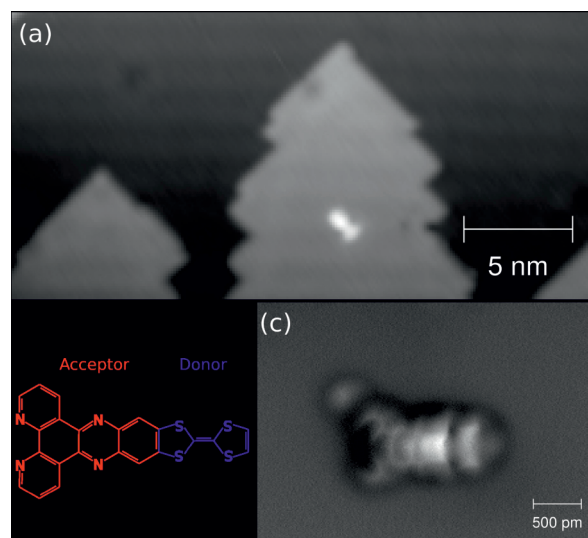


Figure 1: (a) STM topographic image of a single TTF-dppz molecule on NaCl thin film deposited on Cu(111). (b) chemical structure of TTF-dppz. (c) constant height AFM image of TTF-dppz.

References:

- [1] C. Jia et al., Chem. Eur. J. 13, 3804 (2007).
- [2] S. Kawai et al., ACS Nano 7, 9098 (2013).
- [3] B. Schuler et al., Nano Lett. 14, 3342 (2014).
- [4] P. Hapala et al., Phys. Rev. B 90, 085421 (2014).
- [5] R. Pawlak et al. To be submitted.

odborný garant: Ing. Pavel Jelínek, PhD.