O 49: Nanostructures at Surfaces V (Self Organization of Molecules)

Time: Thursday 11:15–12:00 Location: H36

O 49.1 Thu 11:15 H36

Insertion of Cu into ordered oligopyridine networks — •Achim Breitruck[1], Christoph Meier[2], Harry E. Hoster[1], Ulrich Ziener[2], and Rolf J. Behm[1] — [1]Institut für Oberflächenchemie und Katalyse, Universität Ulm, 89069 Ulm — [2]Institut für Organische Chemie III, Universität Ulm, 89069 Ulm

The effect of Cu deposition on pre-deposited ordered quasiquadratic networks (QQN) on HOPG was investigated by scanning tunneling microscopy (STM) under ultrahigh vacuum (UHV) conditions. Deposition of small amounts of Cu and subsequent annealing results in the formation of a new hexagonal metal organic network (HMON), coexisting with the ordered oligopyridine precursor layer. The formation of the HMON phase is accompanied by a loss in hydrogen bonds, prevailing in the QQN phase. This loss is overcompensated by the formation of strong Cu-pyridine interactions - the structure determining interactions in the HMON. Hence, the structural transition, from QQN phase to the hexagonal metal organic network is induced by a Cu mediated gain in intermolecular interaction energy.

O 49.2 Thu 11:30 H36

Relaxation of surface stress induced by an organic adsorbate: PTCDA on vicinal Ag(111) — •Florian Pollinger[1], Pavo Vrdoljak[1], Zhen Tian[2], Dirk Sander[2], Dominik Fertig[1], Stefan Schmitt[1], Christian Kumpf[1], Achim Schöll[1], Jürgen Kirschner[2], and Eberhard Umbach[1] — [1]Universität Würzburg, Experimentelle Physik II, Am Hubland, 97074 Würzburg — [2]Max-Planck-Institut für Mikrostrukturphysik, Weinberg 2, 06120 Halle

Self-organization of metallic surfaces on large scales can be induced by the adsorption of organic molecules and has been observed in several experiments [1]. One example is the growth of 3,4,9,10-perylene-tetracarboxylic-acid dianhydride (PTCDA) on stepped (8.5°-vicinal) Ag(111) surfaces. At elevated temperatures, the adsorbate molecules lead to a bunching of substrate steps, which agglomerate to facets of critical sizes. The facets arrange in a coverage-dependent grating-like pattern on a mesoscopic length scale. The resulting order requires a long-range interaction which is mediated by the substrate [2]. It can be explained by a change of surface stress induced by the adsorbate layer. Experimentally, such a change is directly accessible by an optical cantilever bending technique. We monitored the bending of a faceting thin Ag(10 8 7) crystal with this method in order to quantifiy the occurring relaxation of surface stress. [1] J. I. Pascual et al. J. Chem Phys. 120, 11367 (2004) [2] Q. Chen et al., Prog. Surf. Sci. 73, 59 (2003)

O 49.3 Thu 11:45 H36

Chemical nanopatterning of aromatic self-assembled monolayers — •Mark Schnietz[1], Andrey Turchanin[1], Mohamed El-Desawy[1], Harun Solak[2], and Armin Gölzhäuser[1] — [1]Physics of Supramolecular Systems, Department of Physics, University of Bielefeld, D-33615 Bielefeld — [2]Laboratory for Micro and Nanotechnology, Paul Scherrer Institute, 5132 Villigen PSI, Switzerland

Well-defined immobilization of single molecules, molecular arrays and biological objects on solid substrates is of great importance for many areas of fundamental and applied research. Chemically-patterned self-assembled monolayers (SAMs) may play a key role in reaching this goal. We applied extreme UV-interference lithography (EUV-IL) for generation of chemical nanopatterns in 4*-nitro-1,1*-biphenyl-4-thiol (NBPT) SAMs on Au-coated substrates. X-ray photoelectron spectroscopy and atomic force microscopy were employed for characterization. We show that EUV-irradiation converts terminal nitro groups of a NBPT into amino groups while the underlying aromatic groups are dehydrogenated and cross-linked. Large area nitro/amino line/space patterns (1*0.5 mm2) with a line width of about 50 nm were obtained with this approach. We used the resulting chemical nanopatterns for the preparation of biologically relevant interfaces in exchange and grafting type experiments.