

O 26: Organic, Polymeric, and Biomolecular Films II

Time: Tuesday 11:15–12:15

Location: H42

O 26.1 Tue 11:15 H42

High-resolution ARUPS study of thin NTCDA films on Ag(111) — •SIMON HAME, JOHANNES ZIROFF, AZZEDINE BENDOUNAN, and FRIEDRICH REINERT — University of Würzburg, Experimental Physics II, 97074 Würzburg, Germany

We present high-resolution photoemission data of the valence band structure of organic thin films on noble metal surfaces, in particular on the epitaxial system of a 1,4,5,8-naphthalene-tetracarboxylic acid dianhydride (NTCDA) monolayer on a Ag(111) surface in the relaxed configuration. The electronic structure close to the Fermi edge shows two features: the HOMO peak and a peak assigned to the former LUMO which is partially filled because of charge transfer from the substrate. There appears an additional sharp feature with a pronounced temperature dependence right at the Fermi energy. In high-resolution ARUPS the backfolding of Ag 5s states can be seen as well. We also present data of the order-disorder transition upon cooling beneath 155 K and discuss the relation of quasi-2D and localized molecular properties.

O 26.2 Tue 11:30 H42

Cooling rate dependence of the glass transition of poly(propylene glycol) — •SIMONE STREIT¹, CHRISTIAN GUTT², and METIN TOLAN¹ — ¹Fachbereich Physik, Universität Dortmund, Otto-Hahn-Str. 4, 44221 Dortmund, Germany — ²Deutsches Elektronen Synchrotron (HASYLAB), Notkestr. 85, 22607 Hamburg, Germany

We performed in-situ x-ray reflectivity measurements to determine the cooling rate dependent freezing of capillary waves on the polymer melt poly(propylene glycol) (PPG). Only above the glass transition temperature T_G the surface roughness σ can be described by the capillary wave model for simple liquids, whereas the surface fluctuations are frozen in at lower temperatures. As the state of a glass forming liquid strongly depends on its thermal history, this effect occurs for fast cooling rates already at higher T than for slow cooling. For the fastest cooling rates an astonishingly high shift of T_G up to around 240 K compared to the bulk value of 196 K could be observed.

O 26.3 Tue 11:45 H42

Surface-confined coordination chemistry with metalloporphyrins: *In-situ* metalation and axial coordination — •KEN FLECHTNER, YUN BAI, SVEN SCHÖFFEL, MARIE-MADELEINE WALZ, LIAM BRADSHAW, J. MICHAEL GOTTFRIED, and HANS-PETER STEINRÜCK — Universität Erlangen-Nürnberg, Lehrstuhl für Physikalische Chemie II, Egerlandstr. 3, 91058 Erlangen, Germany

Metalloporphyrins represent the reactive centers in various biological and chemical systems, in which axial coordination of molecules on the

central metal ion is essential for their specific functionalities as an enzyme, catalyst, or sensor. Here, we applied and extended concepts of solution-based coordination chemistry to surface reactions of metalloporphyrins adsorbed on an Ag(111) surface. Employing photoelectron spectroscopy and complementary techniques, we focused on: (A) Synthesis of adsorbed metalloporphyrins by direct metalation of porphyrin monolayers with iron, cobalt, and zinc. Also, we demonstrated that adsorbed porphyrins "pick up" pre-deposited Zn atoms from the Ag surface [1]. (B) The electronic interaction between porphyrin-coordinated metal ions and a metal surface in well-defined distances, which were adjusted with different spacer substituents. (C) Axial coordination of small molecules such as NO on the metal centers of the adsorbed porphyrins, resulting in competition between the newly formed coordinate bond and the bond between ion and surface (trans effect). Supported by the Deutsche Forschungsgemeinschaft through SFB 583.

[1] A. Kretschmann *et al.*, Chem. Commun. 2007, DOI: 10.1039/b614427f.

O 26.4 Tue 12:00 H42

Functional immobilization of proteins on solid substrates: An approach to protein chip nanotechnologies — •ANDREY TURCHANIN¹, ALI TINAZLI², MOHAMED EL-DESAWY¹, ROBERT TAMPÉ², and ARMIN GÖLZHÄUSER¹ — ¹Physics of Supramolecular Systems, Department of Physics, University of Bielefeld, D-33615 Bielefeld — ²Institute of Biochemistry, Johann Wolfgang Goethe-University, D-60438 Frankfurt am Main

To study protein function and interaction, there is a high demand for specific, stable, locally immobilized, and functional protein arrays on solid substrates. To implement this, we propose a protein chip approach based on the combination of electron induced chemical nanolithography [1] with aromatic self-assembled monolayers (SAMs) and multivalent chelators [2] for high-affinity capturing of His6-tagged proteins. Templates for functional and switchable His-tagged protein architectures were created by electron beam induced changes in 4*-nitro-1,1*-biphenyl-4-thiol SAMs on gold placed in a protein repellent matrix. As a model system carboxy derivative EG3-tris-NTA and His6-tagged proteasome were studied. Different steps of the biochip templates fabrication were characterized by X-ray photoelectron spectroscopy. Their functionality was tested via in situ atomic force and fluorescence microscopy. We will present first results of functional protein arrays with about one micrometer lateral dimensions. [1] A. Gölzhäuser, W. Eck, W. Geyer, V. Stadler, T. Weimann, P. Hinze, M. Grunze, Adv. Mat. 13 (2001) 806. [2] A. Tinazli, J. Tang, R. Valiokas, S. Picuric, S. Lata, J. Piehler, B. Liedberg, R. Tampé, Chemistry 11 (2005) 5249.