O 4: Nanostructures at Surfaces

Time: Monday 11:15–12:30 Location: MA 042

O 4.1 Mon 11:15 MA 042

Dynamic processes in metalorganic networks based on oligopyridines and copper — •Achim Breitruck[1], Harry E. Hoster[1], Christoph Meier[2], Ulrich Ziener[2], and R. Jürgen Behm[1] — [1]Institute of Surface Chemistry and Catalysis, Ulm University, D-89069 Ulm — [2]Institute of Organic Chemistry III, Ulm University, D-89069 Ulm

We report on the dynamics of chiral metalorganic networks on the basis of Bis-terpyridines (BTP) and copper which were studied by time-resolved scanning tunneling microscopy (STM). Using highly oriented pyrolytic graphite (HOPG) as substrate, the samples were prepared by vapor deposition of oligopyridines to form a quadratic 2D molecular network[1] and post-deposition of copper under ultra high vacuum (UHV) conditions. At Cu coverages below phase saturation, we observed the formation of an Cu-organic network, consisting of copper-free and copper-containing BTP trimers. At room temperature, this allows the migration of Cu atoms within the network via a hopping mechanism from Cu-containing to Cu-free trimers on a timescale of seconds. The mechanism is accompanied by a local rearrangement of the BTP molecules. Despite the high adlayer dynamics, we find very large enantiopure domains with sizes $> 10^4$ nm^2.

[1] H.E. Hoster et al., Langmuir 23, 11570-11579, (2007)
[2] A. Breitruck et al., Surf. Sci. 601, 4200-4205, (2007)

O 4.2 Mon 11:30 MA 042

Mid infrared microspectroscopy: Characterization od diamond-like (DL) and polymer-like (PL) single nanoparticle — •Jean-Sébastien Samson[1], Raphaella Weiss[2], Erik Bründermann[1], Jörg Winter[2], and Martina Havenith[1] — [1]Physical Chemistry 2, Ruhr-University Bochum, Bochum, Germany — [2]Experimental Physics 1, Ruhr-University Bochum, Bochum, Germany

We report on the infrared spectroscopic characterization of plasma nanoparticles formed in a dusty plasma by scanning near-field infrared microscopy (SNIM). We use high power OPO-lasers with up to 2,7 W output power as radiation source [1] which emit in the so-called fingerprint region (2,5-4 um). We were able to use the characteristic N-H absorption band around 3300 cm-1 to spectrally resolve a shift of the band between the diamond-like and the polymer-like phase. The measurement were carried out on a sample containing 100 nm diamond-like and 400 nm polymer-like plasma nanoparticles. Our results demonstrate the high sensitivity of SNIM for characterization of nanoparticles found in plasma. [1]J.-S. Samson et al. PCCP, (2006), 8, 753-758

O 4.3 Mon 11:45 MA 042

Nanostructuring of the HOPG surface — •Artur Böttcher[1], Markus Cudaj[1], Daniel Löffler[1], Sharali Malik[2], Manfred Kappes[1,2], Patrice Brenner[3], and Dagmar Gerthsen[3] — [1]Institut für Physikalische Chemie, Universität Karlsruhe, Karlsruhe, Germany — [2]Institut für Nanotechnologie, Forschungszentrum Karlsruhe, Germany — [3]Laboratorium für Elektronenmikroskopie, Universität Karlsruhe, Germany

By combining the focused ion beam technique, 30keV-Ga^+-FIB, with high-temperature oxidation well defined periodic structures were fabricated on HOPG surfaces [1]. The method exploits the high reactivity of the amorphous surface areas towards the oxidation-induced gasification of undercoordinated carbon sites, C→CO, CO_2. Large surface areas covered by periodically arranged nanocavities, gratings and arrays of nm-sized squares have been fabricated routinely. The minimum width of the grooves written is limited by the interaction of the ion beam with the substrate and levels presently off at 80 nm. The mean depth of the grooves can be easily varied in the range up to 55 nm by applying different ionic doses. These parameters enable to fabricate large arrays of nanographene plates with desired size and shape. Two stages are clearly distinguishable in the kinetics of the etching process: within the early stage the amorphous carbon is removed and in the later stage the prism surfaces of the regular graphite are gradually gasified with lower efficiency. The integral removal probability depends on the surface temperature and ranges from 10^{-11} to 10^{-8} C/O_2. [1] A. Böttcher et al. Nanotechnology, 17(2006)

O 4.4 Mon 12:00 MA 042

Effect of HF concentration on physical and electronic properties of electrochemical formed nano-porous silicon — •Pushpendra Kumar[1], Manash Ghosh[1], Hongdan Yan[1], Frank Ludwig[2], Meinhard Schilling[2], and Peter Lemmens[1] — [1]IPKM, TU-Braunschweig — [2]EMG, TU-Braunschweig

We report on the preparation and functionalization of porous silicon (PS) using electrochemical etching in hydrofluoric (HF) acid based solutions. The properties of PS such as thickness of the porous layer, porosity and average pore diameter are precisely controlled and characterized using optical absorption, nitrogen sorption isotherms, field emission SEM, Raman and PL spectroscopy. Functionalization was performed by oxidizing and subsequent doping with different dyes and magnetic molecules.

O 4.5 Mon 12:15 MA 042

Preparation and functionalization of porous anodic aluminum oxide templates — •Hongdan Yan[1], Seth White[1], Pushpendra Kumar[1], Peter Lemmens[1], and Pengxiang Zhang[2] — [1]IPKM,TU-Braunschweig — [2]IAMPE, Kunming University of Science and Technology, Yunnan, China

We report on the preparation of porous anodic aluminum oxide templates (AAO) and their functionalization/modification. AAO with nanoporous morphology is a well controlled template material due to the high density and uniformity of nano pores. Free standing, transparent membranes have been prepared and doped with dyes, magnetic molecules. Ni and Fe nano-wires have been grown within the pores by electrodeposition.