

Self-assembly and self-organization are of great interest for the creation of micro- and nanostructured patterned surfaces by bottom-up approaches. By transferring mixed Langmuir monolayers of a phospholipid (DPPC) with small ad-mixings of other components onto solid substrates large area chemical patterns structured in the meso- up to the nanoscale can be created. These patterns can provide the basis for further chemical modification to form topographical or more complex chemical structures. We present the transfer of DPPC mixed with different dyes yielding luminescent stripe patterns as a proof of concept. Furthermore, transferred patterns composed of DPPC and alkoxyamines followed by polymerization of the pattern yield structured polymer brushes. The concept should be expandable to various other substances opening a wide field of possible applications in biological science and surface modification.

DS 4.5 Mon 12:15 H34

**Organophosphonate Functionalized Silicon Nanowires for DNA Hybridization Studies** — ●DANIEL PEDONE<sup>1</sup>, ANNA CATTANI SCHOLZ<sup>1</sup>, STEFAN BIRNER<sup>1</sup>, MANISH DUBEY<sup>2</sup>, JEFFREY SCHWARTZ<sup>2</sup>, MARC TORNOW<sup>3</sup>, and GERHARD ABSTREITER<sup>1</sup> — <sup>1</sup>WSI, TU München — <sup>2</sup>Princeton University, USA — <sup>3</sup>IHT, TU Braunschweig

Semiconductor nanowire field effect devices have great appeal for label-free sensing applications due to their sensitivity to surface potential changes that may originate from charged adsorbates. In addition to requiring high sensitivity, suitable passivation and functionalization of the semiconductor surface is obligatory. We have fabricated both freely suspended and oxide-supported silicon nanowires from Silicon-Insulator substrates using standard nanopatterning methods (EBL, RIE) and sacrificial oxide layer etching. Subsequent to nanofabrication, the devices were first coated with an hydroxyalkylphosphonate monolayer and then bound via bifunctional linker groups to single stranded DNA or PNA oligonucleotides, respectively. We investigated DNA hybridization on such functionalized nanowires using a differ-

ence resistance setup, where subtracting the reference signal from a second wire could be used to exclude most non-specific effects. A net change in surface potential on the order of a few mV could be detected upon addition of the complementary DNA strand. This surface potential change corresponds to the hybridization of about  $10^{10} \text{ cm}^{-2}$  probe strands according to our model calculations that takes into account the entire hybrid system in electrolyte solution.

DS 4.6 Mon 12:30 H34

**Nanopatterning by Phase Mask Projection Laser Ablation** — ●MARISA MÄDER, THOMAS HÖCHE, JÜRGEN GERLACH, and RICO BÖHME — Leibniz Institute of Surface Modification, Permoserstrasse 15, 04318 Leipzig, Germany

Nanostructures attached to a substrate promise optical and electronic applications like LEDs or diodes. Moreover, for Nanodots applications in various probing techniques (including Surface Enhanced Raman Spectroscopy) are also aspired. So far, however, the fabrication process of most nanostructures is still very complex and often too costly for industrial use. An alternative, versatile, fast, and relatively easy process is the technique of laser ablation using phase-mask projection. Pulsed laser light with the wavelength of 248 nm is sent through a phase mask. The phase mask modulates the phase of the incident beam at defined positions. Using a Schwarzschild reflection objective, the resulting interference pattern is demagnified and projected onto a thin film. At positions where the intensity exceeds the ablation threshold of the film but not the substrate, material is ablated from the substrate. Different shapes of nanostructures can be fabricated this way, depending on the pattern of the phase mask. GaN nanowires were produced with a striped mask while Au nanodots were fabricated using a checkerboard mask. In principle, every combination of thin film and substrate material is possible, as long as the ablation thresholds are matching, respectively.

## DS 5: Organic Interfaces (SYOE 1)

Time: Monday 14:30–15:45

Location: H32

DS 5.1 Mon 14:30 H32

**Structural and morphological study of perylene films grown on different substrates** — ●MARYAM BEIGMOHAMADI, PHENWISA NIYAMAKOM, AZADEH FARAHZADI, STEPHAN KREMERS, CHRISTIAN EFFERTZ, THOMAS MICHELY, and MATTHIAS WUTTIG — Institute of Physics (IA), RWTH Aachen University of technology 52056 Aachen, Germany

Recently, organic semiconductors have emerged as a technologically important class of electronic materials. Of particular interest is the morphology and the growth of organic films, deposited on insulating substrates, since this configuration is used in Organic Thin Film Transistors (OTFTs). Key elements for the device performance are the structure of the functional organic layer and the charge injection from the metallic contacts. Therefore, understanding of structural properties and the morphology of organic films deposited on metallic substrate is essential for applications in future devices. Also improved internal ordering of the organic thin film, together with increased electrical conductivity and with reduced activation energy for electrical conductivity could enhance field-effect carrier mobilities. The growth of highly ordered perylene films deposited on oxidized and metallic substrates is studied. By employing Atomic Force Microscopy (AFM) and X-ray Diffraction (XRD), the structure and the morphology of the films are characterized. AFM reveals the existence of dislocation in the grains. From XRD, it has been observed that the perylene films, deposited on Al<sub>2</sub>O<sub>3</sub>/Si, have fiber texture ordering in c-axis. However, for perylene films deposited on Au layer the crystalline structure is less developed.

DS 5.2 Mon 14:45 H32

**A photoemission electron microscopy investigation of diindenoperylene thin films** — ●MARIA BENEDETTA CASU<sup>1</sup>, INDRO BISWAS<sup>1</sup>, MATHIAS NAGEL<sup>1</sup>, PETER NAGEL<sup>2</sup>, STEFAN SCHUPPLER<sup>2</sup>, and THOMAS CHASSÉ<sup>1</sup> — <sup>1</sup>University of Tübingen, Institute of Physical and Theoretical Chemistry, Tübingen, Germany — <sup>2</sup>Forschungszentrum Karlsruhe, Institut für Festkörperphysik, Karlsruhe, Germany

Organic-based displays are widely present on the market, used for HIFI cars, mp3 player, and mobile phones, as well as in television screens, without mentioning e-paper, one of their most fascinating applications. It is very important to reach a deep general understanding of their electronic, structural, and morphological properties that despite the numerous investigations is still missing. We present the results of photoemission electron microscopy (PEEM) investigations on diindenoperylene thin films deposited on polycrystalline gold. The thin films were prepared by using organic molecular deposition and thickness-dependent investigations were performed. PEEM is a very powerful tool that can give a deep insight in in-situ growth. The opportunity to use a synchrotron radiation source allows the simultaneous investigation of morphology, structure, and electronic characteristics. All these aspects usually investigated by using separated techniques, often on differently prepared samples, are univocally related in our results with special attention to the molecular arrangement. This approach, in synergy with micro near-edge x-ray absorption fine structure, helps in gain a detailed knowledge also in case of critical phenomena like polymorphism in organic materials.

DS 5.3 Mon 15:00 H32

**Molecular Orientation and Adsorption Energies of Pentacene: SiO<sub>2</sub> versus Metals** — ●DANIEL KÄFER and GREGOR WITTE — Physikalische Chemie I, Ruhr-Universität Bochum, 44780 Bochum

Having a high charge carrier mobility, pentacene is still one of the most promising organic semiconductors for the fabrication of organic thin film transistors. Of particular interest is the interaction at the interface with noble metals and SiO<sub>2</sub> substrates since these materials are commonly used in field-effect devices. Because of the high anisotropy of the charge carrier mobility the molecular orientation of pentacene within the first layers of thin films plays a crucial role. Moreover, the subsequent film growth depends largely on this interface structure. By combining NEXAFS and XRD to determine the molecular orientation and crystalline phase with TDS to probe the interaction strength, pentacene films grown on SiO<sub>2</sub>, gold and silver surfaces as