($\sqrt{3}\times\sqrt{3}$)-Bi surfaces in order to study supramolecular self-assembly on passivated semiconductor surfaces. Both Si(111)-α and β-($\sqrt{3}\times\sqrt{3}$)-Bi are passivated semiconductor surfaces without highly reactive Si dangling bonds, and have Bi coverages of 1/3 and 1 monolayer, respectively. The TPA molecules adsorb randomly on α-($\sqrt{3}\times\sqrt{3}$)-Bi and do not form any ordered supramolecular layer. On the other hand, they form ordered supramolecular layers on β-($\sqrt{3}\times\sqrt{3}$)-Bi with at least four different types of coexisting structures. This completely different supramolecular self-assembly behavior on the α and β-($\sqrt{3}\times\sqrt{3}$)-Bi surfaces is quite striking since the two substrates are composed by the same atomic species and are characterized by the same unit cell. The different behavior is related to the differences in the electronic structure of these surfaces. Similar to the Si dangling bond states on Si(111)-7×7, localized surface states exist on Bi adatoms on α-($\sqrt{3}\times\sqrt{3}$)-Bi, but not on Bi trimers on β-($\sqrt{3}\times\sqrt{3}$)-Bi.

O 42.3 Wed 17:45 P2

Faceted Lead Clusters on Nano Structured HOPG — •Niklas Grönhagen, Farhad Ghaleh, and Heinz Hövel — Technische Universität Dortmund, Experimentelle Physik I, 44221 Dortmund

Lead as a cluster material shows an interesting behavior which distinguishes it from other metals. Lead starts diffusing at quite low temperatures and tends to form facets very easily. This is because Pb atoms can reorganize within or between clusters, consequently lowering their surface energy and thus transform into clusters with improved stability.

In the present study we produced faceted lead clusters by deposition of lead atoms on graphite (HOPG) samples, prestructured with nanometer sized pits [1]. The nano-pits were either distributed randomly on the sample or produced in an array using focussed ion beam lithography (ionLiNE system, Raith GmbH) [2].

Subsequently the clusters were investigated by scanning tunneling microscopy. We observed a fine structure in the height distribution given by Pb monolayer steps and an odd-even-oscillation. By measurements with scanning tunneling spectroscopy we were able to show that "Quantum Well States"are responsible for this growth behavior.

[1] H. Hövel, Appl. Phys. A 72, 295 (2001) [2] F. Ghaleh, R. Köster, H. Hövel, L. Bruchhaus, S. Bauerdick, J. Thiel, R. Jede: J. Appl. Phys. 101, 044301 (2007)

O 42.4 Wed 17:45 P2

Selective and Hierarchical Bonding Interactions in 2D Multi-Component Supramolecular Networks at Surfaces — •Alexander Langner[1], Steven L. Tait[1], Chandrasekar Rajadurai[2], Nian Lin[1], Mario Ruben[2], and Klaus Kern[1,3] — [1]Max-Planck-Institut für Festkörperforschung, Stuttgart — [2]Institut für Nanotechnologie, Forschungszentrum Karlsruhe — [3]Ecole Polytechnique Fédérale de Lausanne, Switzerland

Self-assembly of organic molecules is an efficient bottom-up approach to pattern surfaces with unique two-dimensional (2D) architectures at the nanometer scale. In order to achieve extended and highly ordered supramolecular networks, the spontaneous self-organization process has to be steered by selective, directional and strong, but non-covalent bonding interactions, such as hydrogen bonding or metal-organic complex formation. Here we concentrate on the surface supported self-assembly of aromatic ligand mixtures studied by scanning tunneling microscopy (STM) under ultra high vacuum (UHV) conditions. The various molecular building blocks are provided with either carboxylic acid or pyridyl moieties. In these ligand mixtures, selectivity of the functional groups towards different co-evaporated metal coordination centers is observed, which can lead to ligand separation or the formation of complex multi-component networks, stabilized by hierarchical bonding (i.e. hydrogen bonding as well as metal-ligand coordination). We will demonstrate that the selective and hierarchical character of the bonding interactions allow the controlled manipulation of structural network parameters.

O 42.5 Wed 17:45 P2

In-situ scanning tunneling microscope growth studies of InAs and InN quantum dots during MOVPE growth — •Matthias Schmies, Raimund Kremzow, Markus Pristovsek und Michael Kneissl — TU Berlin, Institut für Festkörperphysik, EW 6-1, Hardenbergstr. 36, D-10623 Berlin, Germany

Novel optoelectronic devices, like single-photon emitters and semiconductor lasers demand a better understanding of the growth process and control of quantum dots (QD). Most optoelectronic devices are grown by metal organic vapour phase epitaxy (MOVPE) systems which allows mass fabrication for industrial applications. While QD growth has been studied intensively for InGaAs, the understanding of the mechanisms responsible for the formation of the QDs and especially of the ripening process during annealing and cooling down after growth is still relatively poor. The InGaN material system is even less understood. In order to investigate the growth dynamics and to clarify the theory of QD ripening we employed a in-situ scanning tunnelling microscope (STM) which allows measurements during MOVPE growth. In this paper we will discuss the ripening process of InAs QDs on GaAs(001):Si at 475°C. For the InAs/GaAs system the development of the stucture density agrees to the mean field theory of Lifshitz, Slyozov and Wagner (LSW-theory) of the Ostwald ripening process for three dimensional island on a two dimensional substrate. Additionally, we will present first experiments of InN QDs grown on GaN/templates sapphire using tertiarybutylhydrazine (tBHy) as nitrogen precursor.

O 42.6 Wed 17:45 P2

Monodisperse micro-island formation on Ni/Ru(0001) monolayers — •Peter Jakob[1], Kai Anhut[1], Sebastian Schnur[2], and Axel Gross[2] — [1]Fachbereich Physik, Philipps-Universität Marburg, D-35032 Marburg, Germany — [2]Institut für Theoretische Chemie, Universität Ulm, D-89069 Ulm, Germany

The formation of virtually identical and thermally stable Ni micro-islands (trimers) is presented. In our combined experimental and theoretical investigation we define the conditions for their unusual creation (expulsion of Ni atoms or trimers from the underlying substrate by means of adsorbate induced compressive stress) and give a detailed characterization of the micro-islands' structural properties, chemical composition and electronic/magnetic properties [1]. Specifically, we show that their exceptional structural and thermal stability can be ascribed to oxygen attached to the islands, thereby forming (metallic) Ni-oxygen composites. Our observation of a high density of identical clusters represents a major contribution to overcome a common challenge in materials science related to establishing a correlation between structural and catalytic/electronic properties of nanoscale objects. Usually, the various approaches lead to a dazzling array of sizes and shapes rather than monodisperse particles in a well-defined environment.

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O 42.7 Wed 17:45 P2

Theoretical study of nucleation processes on patterned surfaces — •Stefan Frieder Hopp and Andreas Heuer — Institut für Physikalische Chemie, Universität Münster, 48149 Münster, Germany

The properties of template-directed nucleation are studied in the transition region where full nucleation control is lost and additional nucleation beyond the pre-patterned structure is observed. To get deeper insight into the microscopic mechanisms, Monte Carlo simulations are performed. In this context, the previously used continuous algorithm [1] is replaced by a discrete one to reduce simulation time and to allow more detailed calculations. The applied method is based on the assumption that the molecules on the surface occupy the sites of a simple fcc lattice. It is shown that the simulation results presented in [1],[2] can be reproduced quite well by the discrete algorithm. Furthermore, the new method facilitates the calculation of the distribution of nuclei on the surface by using the radial distribution function g(r) which provides another possibility of comparison with experimental data.

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[2] F. Kalischewski, A. Heuer. Dynamic effects on the loss of control in template-directed nucleation, preprint (2008)

O 42.8 Wed 17:45 P2

Nanopartikel - eine Perspektive für die tribologische Anwendung in der Industrie? — •Sven Martin Proppert, Katja Tönsing und Dario Anselmetti — Universität Bielefeld, Experimentelle Biophysik und angewandte Nanowissenschaften, Deutschland

Angestoßen durch wiederholte Medienberichte über nanopartikuläre Festschmierstoffe für Verbrennungsmotoren[1] wird in dieser Arbeit in einem kombinierten mikroskopischen (AFM) und makroskopischen (Pin on Disk Tribometer) Ansatz untersucht, inwieweit sich Schmier- und Verschleißschutzwirkung bei der Verwendung unterschiedlicher Nanopartikel nachweisen lassen.