Effect of confined surface electrons on atomic motion on nanoislands — •Larissa Niebergall[1], Alexey S. Smirnov[2,3], Nikolay N. Negulyaev[2], Wolfram Hergert[2], Alexander M. Saletsky[3], and Valeri S. Stepanyuk[1] — [1]Max Planck Institute of Microstructure Physics, 06120 Halle, Germany — [2]Physics Department, Martin-Luther-University, 06099 Halle, Germany — [3]Faculty of Physics, Moscow State University, 119899 Moscow, Russia

Several fascinating phenomena occur if surface electrons are confined to closed nanostructures [1-3]. The first experimental investigation of the quantum confinement of surface electrons on nanoscale islands on (111) noble metal surfaces by means of STM has been performed by Li et al. [3]. These studies revealed the validity of the confinement picture down to the smallest of island sizes. Here, the quantum confinement of surface electrons on top of nanoscale islands and around them is studied by means of the first-principles Korringa-Kohn-Rostocker Greens function method [4]. Our kinetic Monte Carlo simulations reveal that confinement-induced electronic states around and on top of nanoislands significantly affect atomic diffusion [4]. Formation of empty zones and orbits of adatom motion is shown. We demonstrate that the quantum confinement dramatically influences the growth process of nanoislands at low temperatures [4].

1. N. N. Negulyaev et al., Phys. Rev. Lett. 101, 226601 (2008)
2. V. S. Stepanyuk et al., New J. Phys. 9, 388 (2007)
3. J. Li et al., Phys. Rev. Lett. 80, 3332 (1998)
4. A. S. Smirnov et al., Phys. Rev. B 78 041505R (2008)

O 53.5 Thu 16:00 SCH A215

Reduction of the critical temperature in ultrathin superconducting lead nanocrystals — Christophe Brun[1], I-Po Hong[1], François Patthey[1], I .Yu. Sklyadneva[2,3], R. Heid[4], P. M. Echenique[2,5], K. P. Bohnen[4], E. V. Chulkov[2,5], and •Wolf-Dieter Schneider[1] — [1]Ecole Federale de Lausanne (EPFL), CH-1015 Lausanne, Switzerland — [2]Donostia International Physics Center (DIPC), 2018 San Sebastian/Donostia, Basque Country, Spain — [3]Inst. Strength Physics and Mat. Sci., 634021, Tomsk, Russia — [4]Forschungszentrum Karlsruhe, Inst. f. Festkörperphysik, D-76021 Karlsruhe, Germany — [5]Departamento de Fisica de Materiales and Centro Mixto CSIC-UPV/EHU, Faculdad de Ciencias Quimicas, 20080 San Sebastian/Donostia Basque Country, Spain

The energy gap of superconducting Pb nanocrystals grown on a Si(111) substrate was probed *in situ* layer-by-layer between 5 to 60 monolayers by low-temperature scanning tunneling spectroscopy. The critical temperature T_c was found to decrease from its bulk value as a function of inverse island thickness, in quantitative agreement with *ex situ* magnetic susceptibility measurements, however, in stark contrast to previous scanning probe results. *Ab initio* density functional calculations of the electron-phonon coupling constant support the experimental findings and show that the decrease of T_c mainly originates from a concomitant decrease of the electronic density of states at the Fermi level.

O 53.6 Thu 16:15 SCH A215

Gas Sensitivity in Nanoporous Crystalline Metal Oxides: Dependence on Coordination Number — •Julia Draeger[1], Markus Ulrich[1], Claus-Dieter Kohl[2], Stefanie Russ[3], and Armin Bunde[1] — [1]Institut für Theoretische Physik III, Justus-Liebig-Universität, Heinrich-Buff-Ring 16, 35392 Giessen — [2]Institut für Angewandte Physik, Justus-Liebig-Universität, Heinrich-Buff-Ring 16, 35392 Giessen — [3]Institut für Theoretische Physik, Freie Universität Berlin, Arnimallee 14, 14195 Berlin

We use a percolation model to study numerically and analytically the influence of gas adsorption on the conductance of thin films of nanoporous crystalline metal oxides. We model the layers by a network of intergranular contacts with conductances that depend on the amount of adsorbed gas molecules. For a given layer thickness, average grain size and coordination number we estimate the critical gas concentration N_c below which the nanoporous structure is insulating due to the absence of a percolating cluster of conducting grains. Above N_c, which decreases strongly with the coordination number, the conductance increases rapidly. In order to obtain a low threshold N_c, it is advantegous to consider films consisting of several monolayers with low coordination number.

O 53.7 Thu 16:30 SCH A215

Metal-organic networks as templates for Fe and Co nanostructures — •Uta Schlickum[1], Regis Decker[1], Florian Klappenberger[2], Giorgio Zoppellaro[3], Svetlana Klyatskaya[3], Mario Ruben[3], Johannes Barth[2], and Harald Brune[1] — [1]Institut de Physique des Nanostructures, EPF-Lausanne, Switzerland — [2]Physik Department E20, Technische Universität München, Germany — [3]Institut für Nanotechnologie, Forschungszentrum Karlsruhe, Germany

Recently we demonstrated the capability to form extremely regular metal-organic honeycomb nanomeshes using linear dicarbonitrile molecules in combination with Co atoms on Ag(111). The size of the network unit cell can be adjusted by the length of the employed linear molecular bricks [1]. In this contribution we present a new approach to steer the growth of metal-nanostructures using these metal-organic networks as templates. When depositing Fe or Co atoms onto the template, the metal atoms adsorb exclusively on top of the metal-organic network avoiding the open hexagonal cavities. In addition, the nucleation sites for Fe clusters can be shifted from the organic ligands towards the metal coordination nodes by changing the deposition temperature. Therefore, by tuning the honeycomb mesh size and the deposition temperature we can control the adsorption sites, the shape and the spacing of the small metal-clusters.

[1] U. Schlickum et al., Nano Lett. 3813 (2007)

O 53.8 Thu 16:45 SCH A215

Silver cluster growth on highly oriented molecular films — •Günther Weidlinger[1], Lidong Sun[1], Michael Hohage[1], Sina Gusenleitner[2], Stephen Berkebile[2], Michael Ramsey[2], and Peter Zeppenfeld[1] — [1]Institut für Experimentalphysik, Johannes Kepler Universität Linz, Altenberger Straße 69, A-4040 Linz — [2]Institut für Physik, Fachbereich Experimentalphysik, Karl-Franzens-Universität Graz, Universitätsplatz 5, A-8010 Graz

Para-sexiphenyl (p-6P) was deposited on the Cu(110)-(2x1)O surface at room temperature under UHV conditions. The structure of the (2x1)-reconstructed substrate served as a template for the growth of a highly ordered molecular film. The sequential deposition of p-6P films was monitored by means of Reflectance Difference Spectroscopy (RDS) showing a high optical anisotropy at the HOMO-LUMO transition energy, which is characteristic for the growth of a well-oriented molecular layer. Following the growth of this molecular layer, Ag clusters were prepared on the p-6P film by means of physical vapor deposition. The cluster growth can be monitored by the RD signal related to the particle plasmon resonance of the Ag clusters. Ex-situ AFM studies of these samples reveal that the Ag clusters are distributed homogeneously on the p-6P layer. Furthermore, photoelectron emission spectroscopy measurements show that the p-6P features are absent in the corresponding spectra, indicating that the Ag clusters are on top of the p-6P layer.

O 53.9 Thu 17:00 SCH A215

Modification of SrTiO3 single-crystalline surface after plasma flow treatment — •Alexandr A. Levin[1], Nikolay A. Kulagin[2], Torsten Weissbach[1], Tilmann Leisegang[1], Enrico Langer[3], and Dirk C. Meyer[1] — [1]Institut für Strukturphysik, Technische Universität Dresden, 01062 Dresden, Germany — [2]Kharkiv National University for Radioelectronics, av. Shakespeare 6-48, 61045 Kharkiv, Ukraine — [3]Institut für Festkörperphysik, Technische Universität Dresden, 01062 Dresden, Germany

Surface of pure and transition metal-doped SrTiO3(STO) single crystals before and after hydrogen plasma-flow treatment (energy of 5...20 J/cm2) is investigated by wide-angle X-ray diffraction (WAXRD), fluorescence X-ray Absorption Near Edge Structure (XANES) and scanning electron microscopy (SEM) techniques. Plasma treatment results in the formation of a textured polycrystalline layer at the surface of the single-crystalline samples with different orientation. The formation of the quasi-ordered structures consisting of nanoscale-sized pyramids is observed by SEM. XANES evidences the change of the valency of the part of Ti4+ to Ti3+ due to the plasma treatment. The data obtained together with results of X-ray spectroscopy measurements [1] gives evidences of the change of stoichiometry of the STO samples resulting in a change of their physical properties after plasma treatment [2].

[1] N.A. Kulagin, A.A. Levin, E. Langer, D.C. Meyer, I. Doichinovich, Ya. Purich. Crystallography Reports 53 (N6) (2008) 1061-1067 [2] J.-C. Krupa, N.A. Kulagin. Physics of Laser Crystals. Kluwer Academic Publisher. Brusseles, 2003

O 53.10 Thu 17:15 SCH A215

Generation of phononic thermperature waves during short pulse laser nanostructuring experiments on metals — •Dmitry Ivanov and Baerbel Rethfeld — Technical University of Kaiser-