a well-ordered hexagonal arrangement on the oxide nanomesh [1]. We have studied the morphology of the Fe and Co clusters and applied different methods to determine the orientation of the clusters. For Fe we found cluster growth in either bcc[110] or bcc[100] direction, depending on the deposition temperature and for Co we found close-packed planes on top of the clusters and random stacking of fcc and hcp planes. As the cluster size is limited to < 4 nm, pure Fe and Co clusters are superparamagnetic at temperatures where the Ni_3Al substrate is paramagnetic, i.e., the blocking temperature T_B of the clusters is below the Curie temperature of the substrate T_C. For ferromagnetic clusters, materials with higher anisotropy are required.

[1] M. Schmid et. al., Phys. Rev. Lett. 99, 196104 (2007).

O 12.5 Mon 16:00 SCH A215

Probing the Magnetism of Nanostructures buried in Metallic Surfaces: an *Ab-Initio* Study — •Oleg O. Brovko and Valeri S. Stepanyuk — Max-Planck-Institut für Mikrostrukturphysik, Weinberg 2, D-06120 Halle, Germany

For a long time it has been known, that the apparent transparency of metallic surfaces for electronic states can be utilized to detect and study buried nanostructures. We show that it is as well possible to study the magnetic properties of nanostructures buried up to 20Å deep in metallic surfaces. Our *ab-initio* calculations reveal the possibility of detecting magnetic properties of 3d atoms and small clusters embedded into a metallic surface and even determining the magnetic coupling between them.

O 12.6 Mon 16:15 SCH A215

Utilizing the Quantum Confinement on Islands for Exchange Interaction Tailoring: an *Ab-Initio* Study — •Oleg O. Brovko and Valeri S. Stepanyuk — Max-Planck-Institut für Mikrostrukturphysik, Weinberg 2, D-06120 Halle, Germany

Vacuum barriers at island borders inevitably confine the surface electrons to the island's geometry. Electron density redistribution which arises from such a confinement can have a substantial effect on the magnetic interaction of impurities adsorbed on top of the island. Our *ab-initio* calculations for 3d adatoms adsorbed on islands clearly demonstrate that by varying the island's size it is possible to tailor the surface-state-mediated exchange interactions of adatoms at separations ranging from several angstroms to several nanometers. By deliberate choice of the islands size the exchange coupling can be enhanced, weakened or even reversed.

O 13: Electronic structure II

Time: Monday 15:00–16:45 Location: SCH A216

O 13.1 Mon 15:00 SCH A216

Self-assembled arrays of molecular quantum resonators — •Florian Klappenberger[1], Dirk Kühne[1], Wolfgang Krenner[1], Iñaki Silanes[2], Andres Arnau[2], Javier García de Abajo[3], Svetlana Klyatskaya[4], Mario Ruben[4], and Johannes Barth[1] — [1]Physik Department E20, TU München, Germany — [2]Departamento de Fisica de Materiales and Unidad de Fisica de Materiales, E-20018 San Sebastian, Spain — [3]Instituto de Óptica CSIC, Serrano 121, 28006 Madrid, Spain — [4]Institute of Nanotechnology, Forschungszentrum Karlsruhe, Karlsruhe, Germany

Confinement of Ag(111) surface state electrons by self-assembled, periodic, two-dimensional, nanoporous networks is studied by means of low-temperature scanning tunneling microscopy/spectroscopy and electronic structure calculation. We compare the case of a purely organic, hydrogen bonded Kagomé network constructed from dicarbonitrile-sexiphenylene molecules with the case of a Co-directed assembly of a metal-organic honeycomb network of the same molecule featuring a pore size of 24 nm^2. Both network types induce resonance states within the cavities with varying lateral electronic density distribution. The spectroscopic features of the resonances together with our analysis employing a boundary element method based on Greens functions indicate finite reflection at the boundaries of the cavities, thus transmission through the pore boundaries allows interaction of electrons in neighboring resonators. By the choice of the network we can steer the pore shape and size and hence engineer the electronic properties of the functionalized surface.

O 13.2 Mon 15:15 SCH A216

Temperature dependent quasiparticle renormalization in nickel metal — •Ruslan Ovsyannikov, Jaime Sánchez-Barriga, Jörg Fink, and Hermann A. Dürr — Helmholtz Zentrum Berlin, BESSY II, Albert-Einstein-Strasse 15, D-12489 Berlin, Germany

One of the fundamental consequences of electron correlation effects is that the bare particles in solids become 'dressed', i.e. they acquire an increased effective mass and a lifetime. We studied the spin dependent quasiparticle band structure of Ni (111) with high resolution angle resolved photoemission spectroscopy. At low temperatures (50 K) a renormalization of quasiparticle energy and lifetime indicative of electron-phonon coupling is observed in agreement with literature [1]. With increasing temperature we observe a decreasing quasiparticle lifetime at the Fermi level for all probed minority spin bands as expected from electron phonon coupling. Surprisingly the majority spin states behave differently. We actually observe a slightly increased lifetime at room temperature. The corresponding increase in Fermi velocity points to a temperature dependent reduction of the majority spin quasiparticle renormalization.

[1] M. Higashiguchi *et al.*, Phys. Rev. B 72, 214438 (2005)

O 13.3 Mon 15:30 SCH A216

Modulated spin polarization in nanostructures — •Sebastian Wedekind, Hirofumi Oka, Guillemin Rodary, Dirk Sander, and Jürgen Kirschner — Max-Planck-Institut für Mikrostrukturphysik, Weinberg 2, D-06120 Halle(Saale)

Deposition of 0.7 ML Co onto the clean Cu(111) surface at room temperature leads to the formation of triangular two atomic layers high Co islands. We study the electronic properties of these nano islands by scanning tunneling microscopy (STM) and spectroscopy (STS) at 7 K. We observe pronounced spatial modulation patterns in the local density of states (LDOS) within the islands due to electron confinement. We explore the magnetic properties of the very same islands by spin-polarized STM and STS in a magnetic field of up to 4 T. Our spin-polarized measurements in field clearly identify the parallel and anti-parallel spin orientation states of tip and sample [1]. This enables us to measure the spatial distribution of the spin polarization within single Co islands. We find that the spin polarization is spatially modulated. Our results are discussed in view of recent theoretical predictions [2].

[1] G. Rodary, S. Wedekind, D. Sander, and J. Kirschner, JJAP (in press)
[2] L. Niebergall, V. S. Stepanyuk, J. Berakdar, and P. Bruno, PRL **96**, 127204 (2006)

O 13.4 Mon 15:45 SCH A216

Surface reconstruction and energy gap of superconducting $V_3Si(001)$ — •Nadine Hauptmann, Michael Becker, Jörg Kröger, and Richard Berndt — Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel, D-24098 Kiel, Germany

Scanning tunneling microscopy of the superconductor $V_3Si(001)$ reveals a yet unknown surface reconstruction which is most likely induced by carbon. We suggest a structural model for the reconstructed surface, which is consistent with experimental data obtained by scanning tunneling microscopy and Auger electron spectroscopy. Superconductivity of the reconstructed sample persists as monitored by scanning tunneling spectroscopy of the superconducting energy gap. Financial support by the DFG is gratefully acknowledged.

O 13.5 Mon 16:00 SCH A216

Engeneering the band line up of Si(111) and organic semiconductors by -CH3, -H and -GaSe termination — •Thomas Mayer[1], Ralf Hunger[2], Andreas Klein[1], and Wolfram Jaegermann[1] — [1]TU-Darmstadt Fachbereich Materialwissenschaften — [2]now Solibro GmbH Thalheim

We report on the variation of the Si(111) ionization energy induced by surface dipoles of -CH3, -H, and -GaSe terminations. Photoelectron spectroscopy is used to determine the experimental dipoles which are