mende Eigenschaft. Die Daten sind in Übereinstimmung mit Rechnungen zur Photoelektronenbeugung, die auf Mehrfach-Streuung in einem Cluster-Modell basieren, und die Austauschwechselwirkung der Spin-Bahn-aufgespaltenen Rumpfniveau-Zustände mit dem spinpolarisierten Valenz-Zuständen enthalten.

MA 20.101 Mo 14:00 Poster TU C

Variation of the Magnetic Moment of Nickel by Electrochemical Charging — •Christian Lemier[1], Sadhan Ghosh[1], Jörg Weissmüller[1,2], and Raghavan N. Viswanath[1] — [1]Institut für Nanotechnologie, Forschungszentrum Karlsruhe GmbH — [2]Fachrichtung Tech. Physik, Universität des Saarlandes

It has been proposed that changes in the electronic structure in superficial space-charge regions may substantially affect the properties of metals near the surface [1]. In nanostructured materials, due to the high surface to volume ratio, even changes in a thin surface layer involve considerable amounts of the volume fraction. Therefore, these materials can be used to study the effect of charging on the surface properties. An implementation of this principle is to use a nanoporous material immersed in an electrolyte. Application of an electric field gives rise to an electric double layer region at the metal-electrolyte interface and allows to store a considerable amount of charge. Recently, changes in the lattice parameter of nanoporous Pt [2] and macroscopically bending of nanoporous Au cantilevers [3] have been observed. Here, we examine the possibility of tuning of the magnetic moment of Ni, deposited with a few monolayer thickness on nanoporous Au, and on high surface area Carbon. Changes in the magnetic moment of up to 10% have been observed by in-situ charging experiments. Special focus has been on the discrimination of the relative influence of band-filling versus that of hydride formation, OH adsorption and oxidation. [1] H. Gleiter, et al., Acta Mater. 49 (2001), 737. [2] J. Weissmüller,et al., Science 300 (2003), 312. [3] D. Kramer, et al., Nano Lett. 4 (2004), 793.

MA 20.102 Mo 14:00 Poster TU C

Reduced Magnetic Ordering Temperatures in Polycrystalline Ho Films — •E. Schierle, E. Weschke, and G. Kaindl — Institut für Experimentalphysik, Freie Universität Berlin, Arnimallee 14, D-14195 Berlin, Germany

The magnetic structure and ordering temperatures of polycrystalline Ho metal films were studied by magnetic x-ray scattering at the Ho-M_5 resonance. Ho metal is characterized by a long-period helical magnetic structure with a period of 10 layers at 40 K. As recently demonstrated, the helical helical magnetic ordering temperature drops substantially in single-crystalline films with thicknesses comparable to the length of the magnetic period [1]. In the polycrystalline films, we observe a substantial reduction of the ordering temperature even in films as thick as 100 layers, where finite-size effects are expected to be absent. This shows that the magnetic coherence does not extend across the whole film, i.e. exchange coupling across the grain boundaries is negligible and the helical domains are limited to the individual grains. The work was supported by the BMBF, project 05 KS1KEE/8.

[1] E. Weschke *et al.*, Phys. Rev. Lett. **93**, 157204 (2004).

MA 20.103 Mo 14:00 Poster TU C

Charakterisierung von Fe/GaAs(110) Grenzflächen mittels Ballistischer Elektronen Emissions Mikroskopie — •Sandra Schmaunz, Johann Vancea und Christian H. Back — Institut für Experimentelle und Angewandte Physik, Universität Regensburg, Universitätsstrasse 31, 93040 Regensburg, Germany

Die Spininjektion aus einem ferromagnetischen Metall über die Schottky - Barriere in einen Halbleiter ist für zukünftige Bauelemente der Spintronik von entscheidender Bedeutung. Die lokale Beschaffenheit der Metall / Halbleiter Grenzfläche hat dabei einen entscheidenden Einfluss. Als Untersuchungsmethode bietet sich dafür die Ballistische Elektronen Emissions Mikroskopie (BEEM) an. Dazu wurden epitaktische Fe - Schichten auf GaAs(110) Spaltkanten hergestellt und mit Au abgedeckt. Mittels BEEM im UHV konnten lokale IU - Kennlinien mit einer lateralen Auflösung von ca. 1nm gemessen werden. Die Auswertung dieser Kennlinien führten folglich zur Bestimmung der lokalen Schottky - Barrierenhöhen.

MA 20.104 Mo 14:00 Poster TU C

Atomic structure and magnetic properties of MnSi thin films — •M. Hortamani, P. Kratzer, and M. Scheffler — Fritz Haber Institut der Max-Planck Gesellschaft , Faradayweg 4-6, 14195 Berlin, Germany

Epitaxial manganese silicide compounds are promising candidates as materials for magneto-electronic and spintronic devices. We compare the structural and magnetic properties of Mn-silicide films on Si(111) and Si(001) surfaces using density functional theory calculations performed with the full-potential augmented plane wave plus local orbital method (FP-LAPW+lo). Experimental studies find initial epitaxial growth of Mn or Mn_xSi_y clusters in the Volmer-Weber growth mode on both Si(001) and Si(111) substrates, which later grow together to form a rough thin film in case of Si(111). Our calculations show that ferromagnetic manganese-silicon multilayers are the most stable epitaxial films on both surfaces. These films have a CsCl-like atomic structure with a lattice mismatch of less than 2% to the substrate. Their formation is exothermic in thermodynamic equilibrium with bulk Mn, and endothermic in equilibrium with bulk MnSi. Moreover, MnSi films with CsCl-like structure on Si(111) are found to be more stable than films of other epitaxial silicides, such as Mn_3Si or Mn_5Si_3. The Mn magnetic moments are as high as 1.8 μ_B at the surfaces and interfaces, and saturate at 0.3 μ_B in the interior of the film. The calculated spin polarization at the Fermi level for CsCl-like MnSi on Si is higher than 30% and for the (001) interface, and 35% for the (111) interface, which opens up the possibility for a highly spin-polarized current to be injected into the Si substrate.

MA 20.105 Mo 14:00 Poster TU C

Co-doped zinc oxide — •M. Lübbe[1], K.-W. Nielsen[1], A. Erb[1], J. Simon[2], W. Mader[2], L. Alff[1], M. Opel[1], and R. Gross[1] — [1]Walther-Meißner-Institut, Bayerische Akademie der Wissenschaften, D-85748 Garching — [2]Institut für Anorganische Chemie, Rheinische Friedrich-Wilhelm Universität, D-53117 Bonn

Due to their potential application in spintronics diluted magnetic semiconductors have attracted much interest. In particular, thin films of ZnO with a few atomic percent of a transition element substituted for zinc are studied intensively. Recently, a model based on a narrow impurity band [1] has been proposed for explaining the ferromagnetic exchange in ZnO. According to this model, $Zn_{1-x}Co_xO$ is expected to show ferromagnetism at room temperature and hence has attracted broad interest.

We have prepared quasi-homoepitaxial $Zn_{0.95}Co_{0.05}O$ and $Mn_{0.95}Co_{0.05}O$ films on ZnO substrates by UHV pulsed laser deposition with substrate temperatures ranging between room temperature and 600°C and different background atmospheres (Ar or Ar + 1% O_2). During growth the thin films are characterized by in-situ RHEED. Furthermore X-ray diffraction and reflectometry as well as transmission electron microscopy have been applied for structural characterization. The magnetic properties have been analyzed by SQUID magnetometry and magnetotransport experiments. The Co substituted samples show ferromagnetic hysteresis at room temperature and a saturation magnetization of up to $1\mu_B$/Co.

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[1] M. Venkatesan *et al.*, Phys. Rev. Lett. **93**, 177206 (2004)

MA 20.106 Mo 14:00 Poster TU C

Heterostructures based on ZnO and Magnetic Materials – a Possible Way to Artificial Magnetic Semiconductors? — •Karl-Wilhelm Nielsen[1], Maike Lübbe[1], Andreas Erb[1], Jürgen Simon[2], Werner Mader[2], Matthias Opel[1], Lambert Alff[1], and Rudolf Gross[1] — [1]Walther-Meissner-Institut, Bayerische Akademie der Wissenschaften, Walther-Meissner Straße 8, 85748 Garching — [2]Institut für Anorganische Chemie, Rheinische Friedrich-Wilhelm Universität, Römerstraße 164, 53117 Bonn

Diluted Magnetic Semiconductors (DMS) are interesting materials for spintronics due to the combination of semiconducting and magnetic properties. A promising candidate in this field is transition metal doped ZnO, since this material systems allows for ferromagnetism at room temperature. Very recently, the observed room temperature ferromagnetism in ZnO-based DMS was explained by Venkatesan *et al.* [1] in term of a model based on a narrow impurity band.

Whereas in usual DMS the magnetic ions are distributed statistically within the semiconducting matrix, in our work we want to artificially synthesize a new class of DMS by growing epitaxial heterostructures consisting of semiconducting and magnetic materials. We present our first steps in this direction based on heterostructures consisting of ZnO and