

$\lambda/4$ -Tantal(V)- und Silizium(IV)oxid-Schichten auf Silizium-Substrat mittels Elektronenstrahlverdampfen abgeschieden. Aufgrund der hohen Brechungsindexdifferenz beider Materialien von 0,6 im Bereich der exzitonischen Lumineszenz von ZnO ($I_S = 3,36$ eV) konnten bereits bei 10,5 Schichtpaaren eine Reflektivität von über 99,5 % und eine Weite des Stoppbandes von 540 meV erreicht werden. Vergleichend dazu erfolgte die Herstellung der DBRs basierend auf den hochbrechenden Materialien Hafnium(IV)- und Zirkon(IV)oxid. In einem weiteren Schritt wurden auf einen 10,5 - paarigen unteren Spiegel eine $3\lambda/2$ -Silizium(IV)oxid-Kavität und ein 10 - paariger oberer Spiegel

abgeschieden. Das Reflexionsspektrum weist eine Kavitätsmode bei 3,28 eV mit einem Q-Faktor von 130 auf. Ein effizientes optisches Pumpen der aktiven Zone wird durch eine hohe Transmission im Bereich der HeCd-Laserlinie bei 3,81 eV ermöglicht. Zum Erzielen einer starken Licht-Materie-Kopplung wurde eine gesputterte ZnO-Schicht als aktives Medium in die Struktur integriert.

Another 12 posters from High-k Dielectric Materials - Synthesis, Properties, Applications, for abstracts look on Wednesday 18:30 - 20:30

DS 18: Poster: Towards Molecular Spintronics, Organic Thin Films, Optical Layers, Vibrational Spectroscopy, Tailoring organic interfaces

Time: Tuesday 14:30–19:30

Location: Poster A

DS 18.1 Tue 14:30 Poster A

Stability and spin coherence of hydrogen atoms trapped in pure silica zeolite — ●ROLF SIMON SCHOENFELD¹, WOLFGANG HARNEIT¹, and CORMA AVELINO² — ¹Institut für Experimentalphysik, Freie Universität Berlin, Arnimallee 14, D-14195 Berlin, Germany — ²Instituto de Tecnología Química UPV-CSIC, Universidad Politécnica de Valencia, Avenida de los Naranjos s/n, 46022 Valencia, Spain

We report the first observation of electron paramagnetic resonance (EPR) of hydrogen atoms trapped in pure silica LTA zeolite after gamma irradiation of n-hexane filled samples. Heating experiments revealed stability up to 80 °C in both air containing and evacuated samples. The small isotropic line width and the low deviation of hyperfine coupling constant and g-factor from the free atom values indicate a minimal distortion of the electron wave function. In addition, spin lattice and spin spin relaxation times T1 and T2 were measured by means of FT EPR. Although relaxation by spin diffusion cannot be excluded, a long spin coherence time of more than 12 microseconds was observed at ambient temperature in an evacuated sample.

DS 18.2 Tue 14:30 Poster A

Observation of spin switching in a chainlike supramolecular Fe (II) complex observed by STM/CITS — ●M. STOCKER¹, A. VOLKOV¹, M.S. ALAM¹, V. DREMOV¹, M. RUBEN², and P. MÜLLER¹ — ¹Institut für Physik der Kondensierten Materie, Universität Erlangen-Nürnberg — ²Institut für Nanotechnologie, FZ Karlsruhe

Using a home-made microscope and custom-build control electronics and software we performed STM/CITS measurements on a chainlike supramolecular Fe (II) complex. The investigated complex shows spin crossover from a low-spin to a high-spin state in a temperature range between 250-350K. We investigated single and multiple polymer strands deposited onto HOPG surfaces. STM topography was able to resolve single monomers. The CITS technique at ambient conditions showed two distinct monomer species, one highly conducting, the other close to insulating. Furthermore we were able to observe spontaneous reversible switching between the two states. The different conductance can be attributed to the different spin states of the Fe (II) metal center. We discuss the results in terms of spin crossover theories.

DS 18.3 Tue 14:30 Poster A

Magnetization Tunneling and Quantum Transport in Single Molecule Magnets — ●NIKOLAOS P. KONSTANTINIDIS^{1,2}, MAARTEN R. WEGEWIJS^{1,2}, CHRISTIAN ROMEIKE¹, HERBERT SCHOELLER¹, and WALTER HOFSTETTER³ — ¹Institut für Festkörper-Forschung - Theorie III, Forschungszentrum Jülich, 52425 Jülich, Germany — ²Institut für Theoretische Physik A, RWTH Aachen, 52056 Aachen, Germany — ³Institut für Theoretische Physik, J. W. Goethe-Universität, D-60438 Frankfurt, Germany

The electric current through a single molecule magnet is investigated theoretically as function of an external magnetic field. We present results for the linear transport regime obtained by the numerical renormalization group (NRG) technique [1], as well as non-linear transport properties obtained using quantum kinetic equations. We predict effects related to the coherent magnetization tunneling generated by the magnetic anisotropy. In particular, we show how non-trivial Kondo and spin-tunneling effects allow for a complete determination of the magnetic properties of such a device by transport experiments.

[1] M. R. Wegewijs, C. Romeike, H. Schoeller and W. Hofstetter,

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DS 18.4 Tue 14:30 Poster A

Identifying the single-molecule spin states by vibronic transport effects — ●FELIX RECKERMANN^{1,2}, MAARTEN R. WEGEWIJS^{1,2}, and HERBERT SCHOELLER² — ¹Institut für Festkörper-Forschung - Theorie 3, Forschungszentrum Jülich, 52425 Jülich, Germany — ²Institut für Theoretische Physik A, RWTH Aachen, 52056 Aachen, Germany

We show that an electric current through a mixed-valence dimer molecule can detect the spin states of the electronic excitations without external magnetic field. Mixed-valence complexes are molecules in which an excess electron can tunnel between hetero-valent metal ions. This tunneling mediates both a ferromagnetic double-exchange interaction between the ionic spins as well as a non-adiabatic electron-vibration (so called vibronic) interaction.

One has to account for the coupling of the electron motion to the breathing mode of the two ionic ligand-shells as well as the breakdown of the Born-Oppenheimer approximation. The resulting entanglement of the electronic and vibrational degrees of freedom can be detected by a sharp dependence of the differential conductance on the electro-mechanical parameters. Furthermore, the double-exchange coupling of the ionic spins and the vibrational motion become correlated. In a three terminal device geometry, this allows one to identify the spin states of the molecule using the FC-effect.

DS 18.5 Tue 14:30 Poster A

On the electronic structure of cobalt phthalocyanine — ●THOMAS KROLL¹, VICTOR YU. ARISTOV^{1,2}, OLGA V. MOLODSOVA¹, VICTOR M. ZHILIN², DENIS V. VYALIKH³, BERND BÜCHNER¹, and MARTIN KNUPFER¹ — ¹IFW Dresden, P.O. Box 270016, D-01171 Dresden, Germany — ²Institute of Solid State Physics, Russian Academy of Sciences, Chernogolovka, Moscow distr., 142432, Russia — ³Institute of Solid State Physics, TU Dresden, D-01069 Dresden, Germany

Metal phthalocyanines (MPc) are molecular based systems that contain a transition metal ion in its centre. They have long been attractive materials for fundamental aspects as well as technological interest. Furthermore, metal phthalocyanine complexes have the potential to provide important information on general questions regarding metal-organic complexes. They may thus act as archetype model systems for the physical behaviour of a large number of other TM complexes.

In this presentation, we will concentrate on cobalt phthalocyanine (CoPc). In this material, the Co ion appears in a divalent state with formally 7 electrons in the 3d shell. We will show results of spectroscopic measurements such as X-ray absorption spectroscopy at the Co L-edge, together with a theoretical description of the data. This approach has already proved to work successfully for transition metal oxides. Our results will clarify important aspects of the electronic structure of CoPc and shed further light on general questions regarding metal-organic complexes.

DS 18.6 Tue 14:30 Poster A

Electronic excitation spectra of transition metal phthalocyanines — ●ROBERTO KRAUS, MANDY GROBOSCH, and MARTIN KNUPFER — IFW Dresden, D-01069 Dresden, Germany

The electronic structure of transition metal phthalocyanine (TMPc) complexes offer valuable insight into the interaction of the metal ion