quantum dots show Single Electron Tunneling (SET) at room temperature through the ligand barrier between two adjacent clusters. The combination of photonic bandgap behaviour with SET in one system can serve as a means of lossless intern energy or information transfer between photons and electrons, a problem which has not been solved yet for PhCs.

CPP 30.32 Di 16:30 Poster TU D

Photophysics of Dynamic Phenomenon at the Quantum Dot Surface — •Mohamed Abdel-Mottaleb[1], Thomas Blaudeck[2], Frank Cichos[2], and Christian von Borczyskowski[1] — [1]a Optical Spectroscopy and Molecular Physics, Institute of Physics, TU Chemnitz, 09107 Chemnitz, Germany — [2]Photonics and Optical Materials, Institute of Physics, TU Chemnitz, 09107 Chemnitz, Germany

Understanding of the optical properties of quantum dots is of growing importance due to the potential applications of such systems. Of main importance is the quantum dots intermittence. Generally, a proposed explanation for this phenomenon is the charge transfer from the quantum dot to the surrounding medium. The surrounding medium is though of as a distribution of traps that can either reside on the nanoparticle surface itself or in a close proximity to it. In either situation, the surface of the nanoparticle will play an important role in this phenomenon. Thus, the understanding, and eventually the control, of quantum dot intermittence is dependent on both the nature of the traps and that of the quantum dot surface.

Using a combination of steady-state titration and time resolved florescence we will demonstrate the dynamic nature of the quantum dot surface and propose a simple procedure to influence the dynamic processes occurring at the surface. Furthermore, through the introduction of organic molecules to the surface, we studied the organic-quantum dot interactions.

CPP 30.33 Di 16:30 Poster TU D

A TEM and XANES study of vanadium oxide nanotubes — •A. Gloskovskii[1], S. A. Nepijko[1], G. Schönhense[1], A. Reiber[2], H. A. Therese[2], G. H. Fecher[2], H. C. Kandpal[2], C. Felser[2], W. Tremel[2], and M. Klimiankou[3] — [1]Institut für Physik, Johannes Gutenberg - Universität, 55099 Mainz — [2]Institut für Anorganische und Analytische Chemie, Johannes Gutenberg - Universität, 55099 Mainz — [3]Institut für Materialforschung I, Forschungszentrum Karlsruhe GmbH, 76021 Karlsruhe

The vanadium oxide nanotubes used in this study were synthesized using the sol-gel technique following the procedure reported by Krumeich et al. [1]. TEM studies of vanadium oxide nanotubes show that the samples consist of multi-walled nanotubes with inner diameters in the range of 20-40 nm, and a length of typically several μm (it can even reach tens of μm). Spectroscopic measurements were performed to understand the electronic state of vanadium in relation to bulk material. The EDX and EELS measurements revealed that the chemical formula of the nanotubes is V_2O_5. Comparison of XAS measurements taken from nanotubes and bulk V_2O_5 revealed an overall similarity but also significant differences in details between their spectra. The latter can be explained by a major contribution of the surface to the electronic structure and electronic transitions of V_2O_5 nanotubes in comparison to bulk material. Band structures for both bulk and slab V_2O_5 were calculated by LMTO and FLAPW methods showing a good agreement with the experiment.

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[1] F. Krumeich et al.; J. Am. Chem. Soc. 121, (1999) 8324

CPP 30.34 Di 16:30 Poster TU D

Stockmayer fluids under the influence of confining disordered materials — •Carsten Spöler and Sabine H.L. Klapp — Stranski-Laboratorium für Physikalische und Theoretische Chemie, Technische Universität Berlin, Straße des 17. Juni 124, 10623 Berlin, Germany

The phase behavior of fluids is very sensitive to the nature of the intermolecular interactions as well as to the presence of a confining material on a nanometer scale. Our work bases on integral equation theory (Reference Hypernetted Chain Approximation) in combination with the replica method and we consider Stockmayer fluids (i.e. fluids containing dipolar and Lennard-Jones interactions) exposed to disordered porous matrices (e.g. silica aerogels). The model matrices consist of hard spheres, hard spheres with additional Lennard-Jones matrix-fluid interaction or dipolar hard spheres. For all confined systems a remarkable shift of the boundaries of the homogeneous isotropic high temperature phase, relative to the bulk fluid, is observed as shown on this poster.[1,2] The treatment of the orientational dependence of the dipolar potential is cumbersome but angle-averaged potentials (like the Keesom potential) are known to produce reasonable well predictions of the condensation transition for the bulk Stockmayer fluid (as long as the dipole moment remains relative small). Therefore, we also test the performance of angle-averaged potentials for our confined systems.[3] [1] C. Spöler and S.H.L. Klapp, J. Chem. Phys. 118, 3628 (2003) [2] C. Spöler and S.H.L. Klapp, J. Chem. Phys. 120, 6734 (2004) [3] C. Spöler and S.H.L. Klapp, J. Chem. Phys. 121, 9623 (2004)

CPP 30.35 Di 16:30 Poster TU D

Depletion force between two large spheres suspended in a bath of small spheres: Onset of the Derjaguin limit — •Martin Oettel — Max–Planck–Institut für Metallforschung, Heisenbergstr. 3, 70569 Stuttgart, Germany

We analyze the depletion interaction between two hard colloids in a hard–sphere solvent and pay special attention to the limit of large size ratio between colloids and solvent particles which is governed by the well–known Derjaguin approximation. For separations between the colloids of less than the diameter of the solvent particles (defining the depletion region), the solvent structure between the colloids can be analyzed in terms of an effective two–dimensional gas. Thereby we find that the Derjaguin limit is approached more slowly than previously thought. This analysis is in good agreement with simulation data which are available for a moderate size ratio of 10. Small discrepancies to results from density functional theory (DFT) at this size ratio become amplified for larger size ratios. Therefore we have improved upon previous DFT techniques by imposing test particle consistency which connects DFT to integral equations. However, the improved results show no convergence towards the Derjaguin limit and thus we conclude that this implementation of DFT together with previous ones which rely on test particle insertion become unreliable in predicting the force in the depletion region for size ratios larger than 10.

M. Oettel, Phys. Rev. E **69**, 041404 (2004).

CPP 30.36 Di 16:30 Poster TU D

Raman spectroscopy on metallic single-walled carbon nanotubes under electrochemical doping — •Peter Rafailov — Institut für Festkörperphysik der Technischen Universität Berlin, Sekr. PN 5-4, Hardenbergstr. 36, D-10623, Germany

We report a Raman investigation of the high-energy modes of metallic single-walled carbon nanotubes (SWNTs) upon electrochemical doping. We found these modes to be extremely sensitive to quite low doping levels which is manifested in large frequency shifts and dramatic intensity redistribution within the high-energy Raman band. These phenomena are explained by a possible removal of a Peierls-like instability that governs the softening of the high-energy modes in metallic carbon nanotubes.

CPP 30.37 Di 16:30 Poster TU D

Photophysics of Single Supramolecular Aggregates of Semiconductor Nanoparticles and Organic Molecules — •Thomas Blaudeck and Frank Cichos — Photonics and Optical Materials, Institute of Physics, TU Chemnitz, 09107 Chemnitz, Germany

We report on elementary interaction processes in aggregates of self-organized thiol-end-capped organic molecules and semiconductor nanoparticles (NPs). In the regime of strong coupling between individual NPs, delocalization of the electronic states across multiple NPs leads to new states and yields a change of optical and electronic properties by environment. In this respect, steady-state spectroscopy of CdSe NPs in solution shows significant red-shifts of the band-edge exciton in both absorption and emission spectra as the concentration of 1,4-Benzenemethanethiol (BDMT) is increased. This fact is interpreted as an indication for the aggregation process. Photoluminescence of the aggregates reveals a spectral variation correlated with size. We also present results on the single-particle scale approached by confocal microscopy, spectroscopy and time-correlated single-photon counting (TCSPC).

CPP 30.38 Di 16:30 Poster TU D

Scaling Properties of Dendrimers — •Ulrich Scheler and Bernd Fritzinger — Leibniz Institute for Polymer Research Dresden, Hohe Str. 6, D-01069 Dresden

A scaling exponent for PAMAM dendrimers with varying terminal groups in methanol is derived from the molar-mass dependence of the hydrodynamic radius. The hydrodynamic radius is calculated from the