CPP 28 Nano structures

Zeit: Dienstag 15:15–16:15 Raum: TU C243

CPP 28.1 Di 15:15 TU C243

Studying Surfactant Self-Assembly by Fluorescence Correlation Spectroscopy — •Heiko Zettl[1], Moshe Gottlieb[2], and Georg Krausch[1] — [1]Physikalische Chemie II, Universität Bayreuth — [2]Chemical Engineering Department, Ben-Gurion University, Beer Sheva, Israel

The formation of micelles of SDS, AOT, CTAC, and C12E5 have been studied by Fluorescence Correlation Spectroscopy (FCS). From FCS experiments the translational diffusion coefficient, hydrodynamic radii, and the critical micelle concentration (cmc) is determined. As label for our experiments we use several commercial dyes. The detected CMC is similar to values reported in literature. The size of the detected micelles is bigger than the reported values. The reason for this difference may be the additional dye molecule. The results show that there is no need to synthesize labelled surfactant molecules for determination of the CMC of surfactants by FCS. Moreover, our results indicate that the charge of the surfactant head group and the polarity of the dye molecules need to be adapted for successful CMC determination. In contrast to classical methods for CMC determination like light scattering or conductivity measurements FCS has the ability to follow the process of micelle formation. Already below the classical CMC we see the formation of micelles and can follow the increase of the number of micelles with increasing surfactant concentration.

CPP 28.2 Di 15:30 TU C243

Fluid adsorption on nanostructured substrates — •Holger Bohlen and Martin Schoen — Stranski-Laboratorium für Physikalische und Theoretische Chemie, Technische Universität Berlin, D-10623 Berlin, Germany

We investigate the effect of substrate curvature and fluid-substrate potential energy on the phase behavior of an adjacent fluid by means of grand canonical ensemble Monte Carlo (GCEMC) simulations of a Lennard-Jones fluid. Substrates are infinitely long in the y-direction and consist of a periodic sequence of grooves of various depths. The shape of the grooves is controlled by a parameter η such that their degree of convexity increases with $1 < \eta < \infty$. The fluid-substrate potential consists of two contributions, that is a homogenous background potential corresponding to a semi-infinite solid and a potential corresponding to a finite piece of solid with nonplanar surfaces. We discuss results for the filling behavior of grooves on nanorough substrate surfaces and the conditions under which condensation in such pores occurs.

CPP 28.3 Di 15:45 TU C243

Structural characterization of physisorbed nitrogen films in periodic mesoporous silica by small-angle diffraction — •Andreas Schreiber[1,2], Ingke Ketelsen[1], Sebastian Schemmel[1], Ernst Hoinkis[3], and Gerhard H. Findenegg[1] — [1]Stranski Laboratorium für Physikalische und Theoretische Chemie, Technische Universität Berlin, Sekr. ER1 — [2]POROTEC GmbH, Hofheim/Ts. — [3]Hahn-Meitner Institut Berlin

Periodic mesoporous oxides such as MCM-41 represent nanostructured host materials exhibiting quasi-periodic order on a mesoscopic scale while being amorphous on the atomic scale. Due to their well-defined pore geometry they are useful for fundamental studies in fluid physics, such as the effect of pore size on physisorption and pore condensation. We have studied nitrogen adsorbed films in MCM-41 and SBA-15 using small-angle neutron diffraction by analysing the intensities of the leading Bragg peaks resulting from the 2D hexagonal packing of the cylindrical pores. The dependence of the peak intensities on the amount of adsorbed gas can be reproduced by a crystallographic model [1] with the form factor F(R1,R2) of a core-shell cylinder, where R2 represents the pore radius and t = R2-R1 the film thickness. This analysis was used to discriminate between semi-empirical expressions for t as a function of the relative pressure p/p0.

[1] M. Impéror-Clerc et al., J. Amer. Chem. Soc. 122 (2000) 11925

CPP 28.4 Di 16:00 TU C243

Synthesis of nanostructured transition metal chalcogenides (MQ_2, M = Mo, V, Ti, W) — •N. Zink[1], H. A. Therese[1], F. Rocker[1], W. Schermann[2], J. Etzkorn[1], M. Fleischhammer[1], T. Gutjahr[1], J. R. Gomm[3], L. Löffler[3], R. Seshadri[3], U. Kolb[4], J. Li[4], and W. Tremel[1] — [1]Institut f. Anorg. u. Anal. Chemie — [2]Institut f. Org. Chemie, Johannes Gutenberg - Universität, 55099 Mainz — [3]Materials Department and Materials Research Laboratory, University of California Santa Barbara, Santa Barbara, CA 93106-5050 — [4]Institut f. Phys. Chemie

Nanostructured transition metal chalcogenides of the MQ_2-formula have been prepared with different morphologies and properties. The preparation methods used vary from solvo- and hydrothermal and thermal decomposition, over a coating technique and H_2S-reduction to MOCVD (metal organic chemical vapour deposition). These materials exhibit tubular, onion- and sheet-like structure respectively in the nano range as shown by high resolution HRTEM studies. The samples were further characterised by XRD, small area electron diffraction (SAED), EDX, and EELS. The materials prepared via the solvothermal route exhibit extremely large surface areas as shown by specific surface area studies (SSA) which make them interesting as catalyst. Reversible Cu-intercalation is possible electrochemically up to the stoichiomtry of $Cu_{0.4}MoS_2$ for MoS_2 prepared by MOCVD and by decomposition technique. Rheological studies of the MoS_2 prepared by MOCVD show that it can be used as a good lubricant. (Funded by DFG in SFB 625 TP9.)