DY 21: Soft Matter II

Time: Wednesday 16:30–17:45 Location: H47

DY 21.1 Wed 16:30 H47

Generalized-Ensemble Monte Carlo Simulations of Polymer Adsorption on Nanostrings — •Thomas Vogel and Michael Bachmann — Soft Matter Systems Research Group, Institut für Festkörperforschung (IFF-2), Forschungszentrum Jülich, 52425 Jülich, Germany

We study the conformational behavior of polymers adsorbed at nanostrings as a limiting case of adsorption on nanocylinders or nanotubes [1,2]. We report on results of generalized-ensemble Monte Carlo simulations of a flexible bead-stick polymer interacting with an attractive linelike substrate. Varying the string attraction strength and its effective thickness, we identify different conformational phases for the adsorbed polymers. There are, for example, phases dominated by collapsed globules attached to the string and monolayer conformations wrapping the string in a very ordered way. Results on the thermodynamics of transitions between structural phases are discussed and shapes of low-energy states are presented [3].

[1] A. Milchev and K. Binder, J. Chem. Phys. **117**, 6852 (2002)
[2] I. Gurevitch and S. Srebnik, Chem. Phys. Lett. **444**, 96 (2007)
[3] T. Vogel and M. Bachmann, preprint (2009)

DY 21.2 Wed 16:45 H47

A Gibbs free energy model for compressible polymer blends. Application for describing diffusion in compressible multicomponents systems — •Elian Masnada and Didier R. Long — CNRS/Rhodia UMR5268 Lyon (France)

We propose a Gibbs free energy model for describing the thermodynamics of compressible polymer blends, or polymer-solvent systems. Most of such models require the introduction of ad-hoc equation of state relations for each component, as well as an ad-hoc equation of state for the blend. The model we propose is self-contained in the sense that we derive the equation of state of the blends, and that the latter gives the equation of state of the pure liquid in the case when the other component is absent. We show how we can compare the predictions of our model to experimental data such as the predictions of spinodal lines, or the calculation of an effective Flory interaction parameter which can be compared to experimental data. We show how our model allows for recovering the usual expression of the RPA (structure factor) of incompressible polymer blends, in the limit of large bulk modulus K (as compared to the osmotic modulus). Our model allows for calulating the effect of the pressure on the compatibility of polymer blends, either in the case of low temperature spinodal decomposition (UCST) or in the case of high temperature decomposition (LCST). Our model contains a smaller number of adjustable parameters than previously published models, which all have a physical meaning. We will also discuss how this free energy model can be used for describing the diffusion of various species in out of equilibrium situations.

DY 21.3 Wed 17:00 H47

Manipulation of colloidal crystal structures by confinement — •Andrea Fortini and Matthias Schmidt — Theoretische Physik II, Universität Bayreuth, Universitätsstraße 30, 95440 Bayreuth, Germany

We study the phase behavior of hard-sphere colloidal particles confined between impenetrable walls using extensive Monte Carlo computer simulations. We extend the results of our previous studies [Schmidt and Löwen. Phys. Rev. Lett. 1996, 4552 , Fortini and Dijkstra. J. Phys.: Condens. Matter, 2006 L371] by considering more complex and experimentally relevant confinement geometries. We find a sequence of non closed-packed equilibrium structures that depends on the hard spheres packing fraction and the degree of confinement. We discuss the stability phase diagram of the different phases and the experimental realization of the model.

DY 21.4 Wed 17:15 H47

Heterodyne electrophoretic light scattering of a interacting colloidal system — •Martin Medebach — Stranski Laboratory, Technische Univeristät Berlin, Strasse des 17.Juni 124, 10623 Berlin

A heterodyne light scattering technique is used to measure the electrophoretic flow behavior of a concentrated, deionized colloidal suspension. It was found that the measured power spectra show an increase of the frequency-integrated intensity with the electric field. Because the number of particles should remain constant this finding is unusual. Further on, the width of the spectra depends linearly on the electric field. Although the system is interacting an influence of the structure factor on the spectra is apparently missing. A model that explains the intensity effect and the missing structural influence on the spectra will be discussed in detail.

DY 21.5 Wed 17:30 H47

Electroconvection in a Liquid Crystal under a Symmetry Breaking Magnetic Field — •Andreas Walter, Wolfgang Schöpf, and Ingo Rehberg — Experimentalphysik V, Universität Bayreuth, 95440 Bayreuth

We investigate homeotropically aligned MBBA under the influence of electric and magnetic fields. MBBA has a negative dielectric anisotropy and a positive anisotropy of the magnetic susceptibility. Thus, when placed between two parallel electrodes, electroconvection takes place only after a symmetry breaking bend Fréedericksz transition.

A magnetic field is applied perpendicular to the driving electric field in order to establish a preferred direction within the system. We report on results for the primary instability, i.e. the Fréedericksz transition.

In contrast to the planar orientation, electroconvection occurs as a secondary bifurcation. Motivated by theoretical expectations, we search for a subcritical bifurcation leading to oscillating behaviour.