In the framework of our toy model we study universal features as well as distinct differences of a two-dimensional colloidal suspension under steady shear stress and periodic driving. Especially, the gelling behavior and thus macroscopic observables differ in that there appears a transition from (quasi-)stationarity to irreversible gelation. We present improvements to our collision-driven dynamics simulation, by which the investigations have been conducted. Its main features comprise a spatial coarse-graining scheme as well as approximative reduction of local event queues, which results in good algorithmic efficiency at high precision.

CPP 20.35 Wed 16:00 Poster A

The concept of temperature in driven granular suspensions — •Matthias Schröter, Alexander Buck, Leen Alawieh, and Harry L. Swinney — CNLD, UT Austin, Texas

Dense granular suspensions driven by a flow field show signatures of glass formation like dynamical heterogeneities, rate-dependence, or increase of timescales. The possibility to describe such non-equilibrium phenomena with an effective temperature is still debated. Our measurements using a torsion pendulum and tracking of tracer particles test the applicability of fluctuation-dissipation theorem based temperature concepts.

CPP 20.36 Wed 16:00 Poster A

Colloids in AC fields: Edge localized instabilities in dielectrophoretic bottles — Jinyu Zhao, •Günter K. Auernhammer, and Doris Vollmer — MPI Polymerforschung, Mainz, Germany

Dielectric colloids dispersed in a dielectric liquid experience a body force in gradients of AC fields. This force is due to the contrast in the dielectric properties between the colloids and the surrounding liquid. It allows to tune the concentration of colloids in the dielectrophoretic bottle by changing the applied field.

We investigate the process of filling the dielectrophoretic bottle, i.e., directly after turning the field on. Our system consists of sterically stabilized PMMA colloids in a density-matching mixture of decaline and cyclohexyl bromide. At high frequencies of the applied field (100 kHz to 1MHz), we find that the spatially homogeneous migration of the colloids can be unstable against localized colloidal flows. Our experiments indicate a critical value of the driving force for the instability. The onset is at a field of $\approx 0.5 V/\mu m$ in the dielectrophoretic bottle. We analyze this instability in analogy to the Rayleigh-Taylor instability. In contrast to the standard Rayleigh-Taylor instability, the driving body force is not due to gravity but due to the applied field gradient.

CPP 20.37 Wed 16:00 Poster A

Towards magnetic response of composite materials: Nanoparticle incorporation into polymer matrix — •Marta Kolasinska[1], Rumen Krastev[1], Thomas Gutberlet[2], and Helmuth Möhwald[1] — [1]Max Planck Institut für Kolloid- und Grenzflächenforschung, 14424 Potsdam/Golm, Deutschland — [2]Paul Scherrer Institut, 5232 Villigen PSI, Switzerland

Nanometer thick polymer materials with embedded nanoinhomogeneities possess a number of specific properties which depend strongly on the inter particle distances in the matrix. Fabrication of well-defined nanostructures is a prerequisites to obtain materials of desired functions.

We incorporated magnetite nanoparticles onto/into polyelectrolyte multilayers (PEMs) and found that a 2D ordering of particles into *monolayers* depends on treatment of underlying PEM changing it from metastable to equilibrium. The metastable glassy PEM were permeable for the nanoparticles while in the melted PEM the particle penetration was blocked. They were concentrated at the film *surface* forming 2D ordered layer. The magnetic moment of the sample was checked by neutron reflectometry. We found pronounced magnetic response in the reflectivity curves. This proves that structures with appropriate concentration of magnetic particles were achieved which makes such materials suitable to prepare new magnetic responsible materials.

CPP 21: POSTERS Colloids, Nanoparticles and Aggregates

Time: Wednesday 16:00–18:30 Location: Poster A

CPP 21.1 Wed 16:00 Poster A

Tuning the Surface Field at Liquid/Liquid Interfaces: New Wetting Behaviours and Surface Phase Transitions — •Christian Bahr[1], Erfan Kadivar[2], Yasutaka Iwashita[1], Holger Stark[3], and Stephan Herminghaus[1] — [1]MPI for Dynamics and Self-Organization, 37073 Göttingen — [2]Department of Physics, University of Isfahan, 81746 Isfahan, Iran — [3]Institute of Theoretical Physics, Technical University Berlin, 10623 Berlin

We present experimental and theoretical results concerning the ordering and wetting behaviour at interfaces between thermotropic liquid crystals and aqueous phases. The addition of a surfactant to either of the two bulk media provides the interface with an ordering potential which strongly influences the behaviour in the vicinity of the liquid-crystal – isotropic phase transition.

At nematic – isotropic transitions, the observed behavior changes from surface-induced order at higher surfactant concentrations to surface-induced disorder at lower surfactant concentrations. The experimental behavior can be well described within the framework of Landau-de Gennes theory. Current measurements concentrate on the realization of prewetting transitions.

At smectic – isotropic transitions, the variation of the surfactant concentration enables the observation of new surface layering transitions and surface triple points which were predicted by theoretical models but have experimentally not been demonstrated so far.

[1] E. Kadivar, Ch. Bahr, and H. Stark, Phys. Rev. E **75**, 061711 (2007); Ch. Bahr, Phys. Rev. Lett. **99**, 057801 (2007).

CPP 21.2 Wed 16:00 Poster A

Time resolved fluorescence studies of self-assembling porphyrins — •Jędrzej Szmytkowski[1,3], Chilla Malla Reddy[2], Mihaela Carmen Balaban[3], Teodor Silviu Balaban[2,3], and Heinz Kalt[1,3] — [1]Karlsruhe Institute of Technology (KIT), Universität Karlsruhe (TH), Institute of Applied Physics, Karlsruhe, Germany — [2]Karlsruhe Institute of Technology (KIT), Forschungszentrum Karlsruhe, Institute of Nanotechnology, Karlsruhe, Germany — [3]Center for Functional Nanostructures (CFN), Karlsruhe, Germany

There is a great interest in biomimetic antenna systems, which can be used in hybrid solar cells. The self-assembly causes an increase in the harvesting of sunlight in such structures. In order to find novel artificial self-assembling compounds, we have studied the time resolved luminescence of several new diacetyl zinc porphyrins as well as push-pull porphyrins having an electron withdrawing group and an electron donating group directly grafted onto the porphyrin macrocycle and the data have been analyzed using decay associated spectra (DAS). The results show the formation of molecular aggregates in the investigated systems.

CPP 21.3 Wed 16:00 Poster A

Self–assembly driven pattern formation of dendron–like macromolecules on a structured surface — •Marta Balbás-Gambra, Erwin Frey, and Thomas Franosch — Arnold Sommerfeld Center for Theoretical Physics and Center for NanoScience, Ludwig-Maximilians Universität, München

Dendron–like macromolecules have been observed to self–assemble into a broad variety of patterns on top of graphite surfaces. We have developed a theoretical model to understand the nature of this assembly and explored the phase behavior as a function of temperature and density. The interaction between the macromolecules is described by an interaction–site model, which largely simplifies the complexity and reduces the model to a few points representing both the aromatic rings and carbonated chains of the molecule. The attraction between chains of different molecules is accounted for by a short ranged potential (Lennard–Jones), whereas the strong repulsion of the aromatic rings is encoded in a hard–sphere interaction. Suitable order parameters are introduced to describe the ensuing ordered phases and corresponding patterns. The phase behavior is explored employing extensive Monte–Carlo simulations.

CPP 21.4 Wed 16:00 Poster A

Influence of self assembled monolayers on local structuring