Confined colloids: rods and spheres

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The ongoing miniaturization in science and technology increases the importance of surfaces and boundaries and raises new questions about the behaviour of liquids in confinement. One particularly suitable way to study these emerging questions is by combining colloid science with soft-lithography techniques. We will focus on two problems. Firstly, we study the nematic phase of rodlike fd virus particles confined to channels with wedge structured walls. Here, we observe a splay to bend transition at the single particle level as a function of the wedge opening angle. Lattice Boltzmann simulations reveal the underlying origin of the transition and its dependence on nematic elasticity and wedge geometry. Our combined work provides a simple method to estimate the splay-to-bend elasticity ratios of the virus and offers a way to control the position of defects through the confining boundary conditions. Secondly, we study the fluid-fluid demixing kinetics and morphology of a system of spherical colloids and non-adsorbing polymers confined between two parallel walls. We follow the dynamics at the single domain level, which allows us to test the stability of the formed liquid bridges. Finally, we consider the role of hydrodynamics and of thermal interface fluctuations in our system.