Melting investigations using charged colloids

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As compared to the case of metals, single crystals made from charged colloids in aqueous suspension are easy to prepare.[1] So, investigations on the phase transition melting is realizable by an change of the colloidal interaction without mechanical disturbances.
With temperature the interaction can be influenced in two ways. One way is to let ions diffuse slowly into the system until interaction is sufficiently short ranged and the colloidal crystal melts in a Swiss cheese pattern.[2-4] The other way is to introduce a surfactant, which varies the charge of the colloids and the ionic concentration in the solvent by a simple temperature-dependent adsorption process as it is shown in Figure 1.[5]
Both systems are studied with a multipurpose instrument combining of static light scattering, dynamic light scattering and torsional resonance spectroscopy. First results concerning temperature-dependent phase behavior, elasticity as well as the kinetics of a homogenous nucleated melting system are presented.

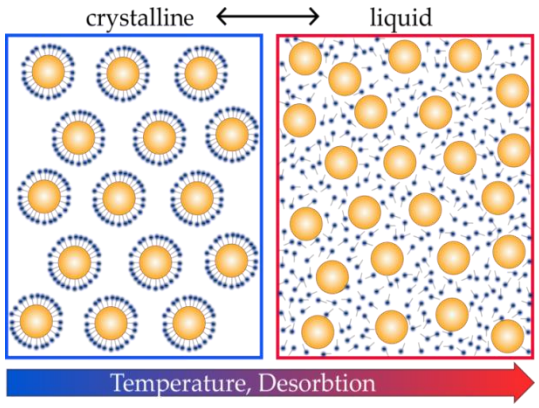

Figure 1 A thermosensitive colloidal system.[5] Blue headed surfactants adsorb on the yellow colloids at low temperatures. This leads to an increase of the charge of the colloids and a decrease of the potential screening ion concentration. The system becomes crystalline. At high temperatures surfactants desorb into the surrounding solvent and the system becomes liquid.

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