

## Interaction of surfactants with Silica Nanoparticles – Supercharging, Charge Reversal and other Unexpected Results

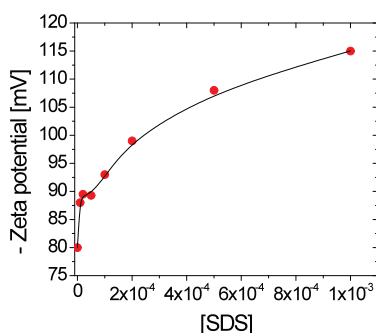
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It is well known that anionic silica nanoparticles, often in association with surfactants, are employed to stabilize emulsions by adsorption to the oil – water interface (Pickering emulsions). This attachment is strongly influenced by the hydrophilic or lipophilic character of particles that can be controlled by the surfactant adsorption. An obvious possibility is the use of a cationic surfactant like CTAB [1]. However, this gives rise to a decrease of the effective charge and hence to a destabilization of the system. Furthermore, our final purpose is to extend the Layer by Layer (LbL) technique by introducing nanostructured Pickering emulsions therefore the effective charge of the stabilizing colloids is of great importance.

In this work, we present a study on particle interactions under the addition of cationic (CTAB) and anionic (SDS) surfactant on anionic silica nanoparticles by means of the static structure factor,  $S(q)$ , and the collective diffusion coefficient,  $D_{\text{eff}}$ , obtained from small-angle X-ray scattering (SAXS) and dynamic light scattering (DLS) measurements, respectively. The effective charge of the particles (shown in the figure at the bottom) was determined from electro-acoustic sonic amplitude measurements. Especially interesting is the conclusion about the adsorption of SDS on the silica causing a supercharged system which is a successful result with regard to the application to LbLs. Further surprising results concern the interaction of silica beads with non-ionic surfactants, also in the presence of ionic surfactants.



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### References

- [1] F. Ravera, E. Santini, G. Loglio, M. Ferrari and L. Liggieri, *J. Phys. Chem. B* **39** 19543 (2006)