Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Charging and Screening in Nonpolar Solutions of Nonionizable Surfactants SVEN BEHRENS, Georgia Tech — Nonpolar liquids do not easily accommodate electric charges, but surfactant additives are often found to dramatically increase the solution conductivity and promote surface charging of suspended colloid particles. Such surfactant-mediated electrostatic effects have been associated with equilibrium charge fluctuations among reverse surfactant micelles and in some cases with the statistically rare ionization of individual surfactant molecules. Here we present experimental evidence that even surfactants without any ionizable group can mediate charging and charge screening in nonpolar oils, and that they can do so at surfactant concentrations well below the critical micelle concentration (cmc). Precision conductometry, light scattering, and Karl-Fischer titration of sorbitan oleate solutions in hexane, paired with electrophoretic mobility measurements on suspended polymer particles, reveal a distinctly electrostatic action of the surfactant. We interpret our observations in terms of a charge fluctuation model and argue that the observed charging processes are likely facilitated, but not limited, by the presence of ionizable impurities.

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Date submitted: 07 Dec 2009 Electronic form version 1.4