Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Effect of Nano-Scale Roughness on Particle Wetting and on Particle-Mediated Emulsion Stability ADRIANA SAN MIGUEL, SVEN BEHRENS, Georgia Institute of Technology — Colloidal particles can strongly adsorb to liquid interfaces and stabilize emulsions against droplet coalescence, the effectiveness of which depends crucially on the particle wettability. From the study of macroscopic solids, surface wetting is known to be influenced strongly by nano-scale roughness (as seen *e.g.* in the "Lotus effect" or in anti-fog coatings); similarly, strong effects of particle roughness on particle-stabilized emulsions should be expected. Here we report the first experimental study of particle wetting and particle-mediated emulsion stability in which particle roughness could be varied continuously without varying the surface chemistry. We demonstrate an enabling method for preparing particles and macroscopic substrates with tunable nano-roughness and correlate the extent of roughness quantitatively with surface wetting (measured *via* the three-phase contact angle) and with emulsion stability (quantifiable *via* the maximum capillary pressure). Our results confirm a dramatic influence of roughness on wetting, emulsion stability, and even the type of emulsion formed (o/w *vs.* w/o) upon mixing oil with an aqueous particle dispersion. Whether particle roughness benefits emulsion stability or not is seen to depend on both the size and shape of the surface features.

Sven Behrens
Georgia Institute of Technology

Date submitted: 11 Nov 2011 Electronic form version 1.4