Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Nanoparticle monolayers under stress: mechanically forced desorption from a fluid-fluid interface VALERIA GARBIN, JOHN C. CROCKER, KATHLEEN J. STEBE, University of Pennsylvania — Nanoparticle-laden interfaces are studied for applications to materials with tunable electronic and optical properties, as emulsion stabilizers, and in catalysis. The mechanical response of nanoparticle monolayers under applied stress is of emerging interest since it impacts the success of these applications. Here we focus on the response of nanoparticle-laden interfaces to compression. A monolayer of nanoparticles is allowed to spontaneously form by adsorption from an aqueous suspension onto a pendant drop of oil. The effective surface pressure Π of the composite interface is monitored by pendant drop tensiometry. As the drop is compressed, the nanoparticles are mechanically forced out of the interface into the aqueous phase. A new optical method is developed to measure the nanoparticle area density *in situ*. We show that desorption occurs at a coverage that corresponds to close packing of the ligand-capped particles, suggesting that ligand-induced repulsion plays a crucial role in the desorption process.

Valeria Garbin
University of Pennsylvania

Date submitted: 01 Aug 2011 Electronic form version 1.4