Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Age coarsening of colloidal gels: a micro-mechanical study ROSEANNA ZIA, Cornell University, BENJAMIN LANDRUM, WILLIAM RUSSEL, Princeton University — We study the evolving structure and time-dependent rheological properties of an aging colloidal gel, with a focus on understanding the non-equilibrium forces that drive late-age coarsening. The gel is formed from a dispersion of Brownian hard spheres that interact via a hard-sphere repulsion and short-range attraction. The O(kT) strength of attractions lead to an arrested phase separation, and the resulting structure is a bi-continuous, space-spanning network that exhibits elastic and viscous behaviors: the gel may sustain its weight under gravity, or flow under shear. With weak attractions the bonds are reversible, giving rise to a continuous breakage / formation process as the gel ages. This balance favors coarsening over time, accompanied by an increase in feature size and elastic strength. We show here that anisotropic surface migration leads to heterogeneous coarsening, and that this migration is driven by gradients in particle-phase stress.

Roseanna Zia
Cornell University

Date submitted: 02 Aug 2013 Electronic form version 1.4