Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Non-equilibrium tuning of attractive colloidal gels ARMAN BOROMAND, JOAO MAIA, Case Western Reserve University — In colloidal gel systems, the presence of multiple interactions in multiple length scales such as Van der Waals, depletion attractions, and electrostatic repulsions makes these systems challenging from both experimental and simulation aspects. Recently, there has been growing interest to tune and manipulate the structural and dynamics properties of those systems without adjusting interparticle interactions, just by taking them out of equilibrium. In this work, we used Core-Modified Dissipative Particle Dynamics (CM-DPD) with a modified depletion potential, as a coarse-grain model to address the gel formation process in short ranged-attractive colloidal suspensions for a range of volume fractions and attraction strengths. It is suggested that at high volume fractions and near the glass transition, there is a transformation from non-bonded glass to bonded-glass for which that the effect of topological frustration (caging) will be alleviated by the presence of attractive potentials (bonding) i.e. melting during cooling. In the first part of the presentation, we discuss our similar findings for semi-dilute volume fraction of attractive bimodal colloidal gels at equilibrium, which can be explained through local densification of attractive colloidal gels. In the second part, structural and dynamics properties of arrested gels will be studied under shear and after cessation of shear to study how the different flow profiles and history will alter final morphology of the gel systems.

Arman Boromand
Case Western Reserve University

Date submitted: 31 Jul 2015 Electronic form version 1.4