Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Capillary interactions in nano-particles suspensions[1] DOBRIN BOSSEV, GARFIELD WARREN, Indiana University — We have investigated the structures formed by colloidal particles suspended in solvents at volume fractions below 10% and interacting through capillary bridges. Such systems resemble colloidal gas of sticky nano-spheres that form pearl-necklace like chains that, in turn, induce strong viscoleasticity due to the formation of 3-D fractal network. The capillary force dominates the electrostatic and Van der Waals forces in solutions and can bridge multiple particles depending of the volume of the capillary bridge. We have investigated the morphology of the structures formed at different fractions of the bridging fluid. Computer simulations of a pearl necklace-like chain of spheres is conducted to explain the structure factor when capillary bridges are present. Alternatively, we have analyzed the slope of the neutron scattering intensity at low Q in a double logarithmic plot to determine the dimension of the fractal structures formed by the particles at different volume fraction of the bridging fluid. We have also studied the properties of the capillary bridge between a pair of particles. The significance of this study is to explore the possibility of using capillary force as a tool to engineer new colloidal structures and materials in solutions and to optimize their viscoelastic properties.

[1]Supported by IU FRSP grant

Dobrin Bossev
Indiana University

Date submitted: 27 Dec 2008 Electronic form version 1.4