Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Multiple dynamical regimes in colloidal polymer suspension with competing interaction SUNITA SRIVASTAVA, SUHASINI KISHORE, Department of Chemistry, Stony Brook University, NY, USA, SURESH NARAYANAN, Advance Photon Source, Argonne National Laboratory, IL, USA, SURITA BHATIA, Department of Chemistry, Stony Brook University, NY, USA — We present combined x-ray photon correlation spectroscopy (XPCS), dynamic light scattering (DLS) and rheometry study of dynamical transitions in colloidal polymer suspension with short range attraction and long range repulsion. Our system is based on aqueous dispersions of laponite®nanoplatelets where the range and magnitude of competing short range depletion attraction and long range repulsion interparticle interaction, were tuned by varying the concentration and molecular weight of the adsorbing poly(ethylene oxide) chains. We observed three distinct dynamical regime: a state of slow dynamics consisting of finite clusters for which interparticle interactions are predominantly repulsive, second dynamical regime, at above saturation concentration of added polymer in which small clusters of nanoparticles are held by short range depleting attraction and third regime of percolating network in which nanoclusters diffuse freely in a network with characteristic length larger than the size of the cluster. Through our experiments we demonstrate experimental parameters to control the macroscopic mechanical and dynamical properties in colloidal suspension by manipulating the interparticle interactions at nanoscale.

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Date submitted: 10 Jan 2014 Electronic form version 1.4