



INSTITUTE SEMINAR

4 November 2015

4:00 p.m.

Fermion

Speaker:

Dr. Ranjini Bandyopadhyay
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Title:

**Microscopic structures and yielding of colloidal clay dispersions
in the presence of salt**

Abstract:

Na-montmorillonite is a natural clay mineral and is available in abundance in nature. The aqueous dispersions of charged and anisotropic platelets of this mineral exhibit non-ergodic kinetically arrested states ranging from soft glassy phases dominated by interparticle repulsions to colloidal gels stabilized by salt induced attractive interactions. When the salt concentration in the dispersing medium is varied systematically, the viscoelasticity and yield stress of the dispersion show non-monotonic behavior at a critical salt concentration, thus signifying a morphological change in the dispersion microstructures. We have directly visualized the microscopic structures of these kinetically arrested phases using cryogenic scanning electron microscopy. We have observed the existence of honeycomb-like network morphologies for a wide range of salt concentrations. The transition of the gel morphology, dominated by overlapping coin (OC) and house of cards (HoC) associations of clay particles at low salt concentrations, to a new network structure dominated by face-face coagulation of platelets, is observed across a critical salt concentration. We have further assessed the stability of these gels under gravity using electroacoustics and a light transmission technique developed in our group. This study, performed for concentrated clay dispersions for a wide concentration range of externally added salt, is useful in our understanding of many geophysical phenomena that involve the salt induced aggregation of natural clay minerals.
