Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Seminar

Real-space Imaging Approaches to investigate glass transition and dynamics of soft materials

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Observing the dynamics of individual molecules or particles in real-space and time continues to remain an enduring problem in material science. Such real-space visualization is relatively easy for systems composed of micron sized colloidal particles. Therefore, using a binary mixture of colloidal suspensions, we studied the origins of glass transition which saw huge debates as to whether it is kinetic or thermodynamic in nature. Here, by pinning particles along a wall using holographic optical tweezers, we have provided experimental evidence in favor of Random First Order Transition (RFOT) theory, a thermodynamic theory of glass transition.

Inspired by the insights gleaned from real-space colloid experiments, it is natural to strive to extend real-space imaging in liquid to nanometer resolution. With this in mind, we have developed protocols to image individual macromolecules using transmission electron microscopy (TEM) in liquid environments. Unlike conventional TEM, this liquid-phase TEM opens up opportunities to visualize structural features of materials as well as their rearrangements in a liquid. Nevertheless, imaging single molecules in liquid TEM comes with a lot of challenges. In this talk, I will discuss our efforts using graphene sheets to wrap liquids to provide a direct visualization of numerous static and dynamical features of polymers in a liquid environment. I will also discuss our efforts to go beyond polymers and use it for other soft systems and more specifically living systems.

Monday, Dec 4th 2017

04:00 PM (Tea/Coffee at 03:30 PM)

Class Room - 3, TIFR-H