UCLA Chemistry & Biochemistry

C (N) S I California NANOSystems Institute

Special Seminar

Prof. Zahra Fakhraai

Department of Chemistry
University of Pennsylvania

presenting

Measuring Long-range Correlated Dynamics in Organic Glasses

Nanometer-sized thin films of small organic molecules are widely used in applications ranging from organic photovoltaics and organic light emitting diodes, to protective coatings and high resolution nano-imprint lithography. Physical vapor deposition (PVD) is widely used in manufacturing ultra-thin layers of amorphous organic solids, with an underlying assumption that the properties of these layers are bulk-like. Here, we demonstrate that films of organic glass-formers with thicknesses of 30 nm or less have dynamics significantly enhanced relative to the bulk at temperatures well below the glass transition temperature, Tg. Furthermore, we show that a sharp glass to liquid transition exists when the thickness of the layer changes from 40 nm down to 20 nm. We demonstrate how this significant change in the glass dynamics is related to the enhanced mobility at the air/glass interface and the length scale over which the effects propagate (~30 nm, or ten times the size of the molecule) is related to the dynamical correlation in the bulk glass. While these measurements are important for a host of applications, they can also help elucidate the fundamental mechanisms of glass transition temperature, a question that has attracted numerous theories in the past half century. Specifically, we are able to show that glassy systems have long-range correlated dynamics that can well exceed their inter-molecular interaction range.

Tuesday, November 29, 2016
4:00 P.M.
3141 CNSI
Executive Conference Room

Contact: Carol Canedo at x64956 or carol@chem.ucla.edu for more information