BIOENGINEERING

SEMINAR

At 3:30 pm on July 26, 2013 (Friday)

MRDG Seminar Hall, 1st floor, Biological Sciences Building

Nanoscale Biophysics of Protein Amyloids

Dr. Samrat Mukhopadhyay

Assistant Professor, Departments of Biological Sciences & Chemical Sciences
Indian Institute of Science Education and Research (IISER), Mohali

Protein misfolding leading to amyloid formation is associated with a number of debilitating human diseases such as Alzheimer's, Parkinson's, Huntington's, and transmissible prion diseases and a number of systemic amyloidosis. The underlying molecular mechanism by which amyloids and their precursors are involved in inducing functional consequences, cellular toxicity, and membrane disruption, eventually leading to cell death remain elusive. Over the past few years, we have been addressing some fundamental issues pertaining to amyloid formation from a variety of proteins using a diverse array of biochemical and biophysical tools. Recently, using scanning probe microscopy-based imaging techniques such as atomic force microscopy and near-field scanning optical microscopy, we have been able to delineate the mechanistic pathway of protein amyloid formation. Additionally, these results provide structural underpinnings of the supramolecular packing within the nanoscale amyloid assembly.

References:

"Nanoscopic Amyloid Pores formed via Stepwise Protein Assembly" M. Bhattacharya, N. Jain, P. Dogra, S. Samai & S. Mukhopadhyay (2013) *J. Phys. Chem. Lett. 4,* 480-485.

"Nanoscale Fluorescence Imaging of Single Amyloid Fibrils" V. Dalal, M. Bhattacharya, D. Narang, P.K. Sharma & S. Mukhopadhyay (2012) *J. Phys. Chem. Lett. 3*, 1783-1787.

"Chain Collapse of an Amyloidogenic Intrinsically Disordered Protein" N. Jain, M.Bhattacharya & S. Mukhopadhyay (2011) *Biophys. J. 101*, 1720-1729.

About the speaker:

Samrat Mukhopadhyay's research interest encompasses the study of complex chemical and biological systems using a diverse array of spectroscopic and imaging techniques. Earlier on, as a Ph.D. scholar under the tutelage of Prof. Uday Maitra at the Indian Institute of Science, Bangalore, he worked on the synthesis and aggregation behavior of novel bile acid derivatives. After his Ph.D., he transitioned his career into molecular biophysics to address interesting and important questions in the area of protein misfolding and aggregation that has been implicated in many debilitating neurological disorders in humans. As a visiting fellow at TIFR with Prof. G. Krishnamoorthy and Prof. Jayant Udgaonkar (NCBS), he utilized molecular biology, time-resolved fluorescence spectroscopy and atomic-force microscopy techniques to delineate the mechanism of protein misfolding leading to amyloid fibrils. During his postdoctoral work with Prof. Ashok Deniz at the Scripps Research Institute in California, USA, in collaboration with Prof. Susan Lindquist at Whitehead Institute, MIT, he addressed a key question in yeast prion biology using single-molecule biophysics approach: *How does a yeast prion determinant spontaneously assemble to form self-replicating amyloid fibrils?*