# Department of Chemical Sciences

## Student Hosted Seminar Series

### Beyond the fluid-mosaic: Active construction of membrane domains in living cell membranes suggests a new understanding of cell membrane organization

**Satyajit Mayor**, a.k.a. 'Jitu' , is an eminent scientist from NCBS, Bangalore. He did his Ph.D in Rockefeller University and Post-doctoral research-work in Columbia University. His current research aims to understand, how cellular processes, in particular endocytic pathways are influenced by organization at the scale of molecules and membranes.

**Date and Time: 4th October 2010 @ 4:00 pm**

**Venue: AG 66**


**Abstract:**

The cell membrane has been thought to behave as a two-dimensional fluid matrix, conceptualized as a *fluid-mosaic* of a multiple components. However, functional lateral heterogeneities variously termed as membrane rafts or domains have challenged this notion of a thermodynamically dictated membrane organization. Most recently, the study of the organization of cell surface proteins such as lipid-tethered GPI-anchored proteins, Ras-proteins and several glycolipids from many laboratories including ours have posed specific challenges to the conventional model of a membrane as a passively organized fluid-mosaic. We have found that many lipid-tethered proteins, are distributed as monomers and nanoclusters on the surface of living cells. The spatial distribution and dynamics of formation and breakup of these nanoclusters is unusual and controlled by the active remodeling of the underlying cortical actin (CA).

In my lecture I will propose a mechanism for nanoclustering, based on active hydrodynamics of the CA and its coupling to the membrane, which consistently explains all our experimental observations. Our theoretical framework also provides falsifiable predictions and I will discuss recent experiments from our laboratory that confirm this prediction.

This work provides a new paradigm for molecular organization and its spatiotemporal regulation on the plasma membrane, a prerequisite for the construction of specialized and functional membrane domains in living cell membranes. This paradigm has important implications for spatial and temporal regulation of chemical activity at the surface of a living cell.