

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

2A&B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Speaker: Subhadip Raychaudhuri, Associate Professor, IIIT-Delhi

Date & time: 27-06-2018, 3:00 pm

Venue: Sadhan Basu Hall

Title: Affinity, Phenotype, Immunity: Kinetic Monte Carlo Studies of Immune Cell Activation

Abstract: Cells respond to environmental stimuli such as ligand molecules, pressure, radiation (such as UV) and heat stress. Many important cellular response processes are mediated by clustering of receptor molecules at the cell surface that function as synapses. Earliest event of such processes often involves formation of a kinetically generated non-equilibrium state of receptor or receptor-lipid (raft) clusters. Standard thermodynamic free energy analysis cannot capture all the complexities of kinetically generated receptor clusters. We carry out kinetic Monte Carlo simulations to study the formation and function of early-time receptor clusters in the context of immunological activation (such as in B cells). As part of this effort a parameter mapping scheme that relates microscopic parameters with macroscopic (thermodynamic) constants is developed. Results obtained from our studies is expected to serve as a basis for a complete model of equilibrium receptor cluster generation through directed transport mechanisms (motor protein mediated). Receptor binding affinity for ligand molecules emerges as a key parameter for early-time receptor cluster generation and thus expected to control the speed of transported receptors. Insights gained from kinetic Monte Carlo studies carried out by us can be utilized to design engineered cells such as for selective targeting of cancer cells or other kinds of altered/aberrant cells.

All are cordially invited to attend the seminar.