

International Conference on

NANOBIOTECHNOLOGY & NANOREGULATIONS

July 31-August 01, 2017 Chicago, USA



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Interactions of nanoparticles with model lipid systems

The use of colloidal particles for various drug delivery applications is ubiquitous in the biomedical field. However, the exact mechanisms of initial cell surfaces response to colloidal particles in the environment are not well understood. Using model lipid membranes, and soft and hard colloidal particles, we will present the interactions between cell membranes and nanoparticle based drug delivery vehicles with relevance to various different diseases. Particularly, we will demonstrate that these nanoparticles are capable of causing re-organization of lipids in model membranes, leading to the formation of lipid-raft like domains which influence cellular processes. Further, we will also demonstrate that both the physicochemical properties of the colloidal particles, as well as the composition of the model cell membranes modulate these interactions at the molecular level. A complete understanding of these interactions will enable the design of colloidal particles with the potential for therapeutic intervention at the cellular level.

Biography

Prajnaparamita Dhar is an Associate Professor in the Department of Chemical and Petroleum Engineering. She has her Undergraduate and Master's degrees in Physics from the University of Calcutta, and Indian Institute of Technology, Bombay, India and PhD in Chemistry from the Florida State University, USA. Her lab is focused on interfacial phenomenon in nanomedicine, with a particular focus on developing novel biophysical and biochemical tools to probe the physical rules governing the self-assembly and functioning of biological systems on the nanoscale, i.e., nature's intricate biological structures. In addition, her lab is also interested in designing efficient engineered nanocarriers of drugs that will work effectively within the body for specific treatments of diseased cells and tissues.

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