

## PhD Open Seminar

Department of Chemistry, IISER Bhopal

**Speaker:** Ramakanta Mondal (Thesis Advisor. Dr. Saptarshi Mukherjee)

**Roll No:** 1220213

**Topic of Seminar:** “Role of Surfactants in Drug Delivery and Protein Unfolding/Refolding Dynamics: A Spectroscopy and Calorimetric Approach”

**Date:** September 15, 2017

**Time:** 12:00 noon

**Venue:** AB-II (401)

### **Abstract**

The use of self-assembled surfactants have significantly enhanced due to the ability of formation of nanostructures with a variety of properties and potential functions in the fields of pharmaceutical industries, food, cosmetic formulations and also have other industrial applications.<sup>1</sup> In bulk aqueous phase, surfactants self-assemble and form various aggregates such as micelles, vesicles, lipid bilayers etc. and their applications have been found in all routes of drug delivery in medical science.<sup>2</sup> Also these amphiphilic molecules are widely used in several steps of protein purifications, molecular weight determination, protein separation and structural determination of proteins.<sup>3</sup> It has been documented that inappropriate folding and improper aggregation of proteins results in several age-related diseases, including Alzheimer's and Parkinson's disease along with other neurodegenerative disorders.<sup>4</sup> Thus preventing proteins from aggregating has always been a topic of growing interest. The *in-vitro* refolding of a model protein has been established for understanding the mechanisms by which a polypeptide chain folds to its native conformation in the cellular environment.

As a part of my doctoral research, various aspects of self-assembly of amphiphilic surfactant systems have been investigated using several spectroscopic and calorimetric approaches.<sup>5-8</sup> The encapsulation and release of an anticancer drug Norharmane with a modern delivery vehicle Niosome has been explored.<sup>5</sup> We have also shown that mixed micellar system can served as a better vehicle for drug delivery as compared with the pure micelle by using a model drug Phenosafranine.<sup>6</sup> Another aspect of surfactant in refolding of a unfolded protein human serum albumin has been investigated.<sup>7</sup> The conformational modification of human hemoglobin induced by natural occurring surfactant (bile salt) at various pH has also been examined.<sup>8</sup>

### **References**

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5. Paul, B. K.; Ghosh, N.; Mondal, R.; Mukherjee. S. *J. Phys. Chem. B* **2016**, *120*, 4091-4101.
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