Scope and Objectives

Polymer-surfactant interaction is considered very important from fundamental as well as application point of view. The interaction between surfactants and polymers have elicited growing interest in recent years, because of their prime interest for the formulation of a broad spectrum of technological, pharmaceutical and industrial formulations. The role of such systems in areas such as enhanced oil recovery, detergency, mineral and material processing, paint formulation, solubilization, gelation, behavior of proteins in cell membranes etc., have attracted ever increasing interest. Polymer-surfactant systems and hydrogels have received considerable interest in the recent years because of their advantages in enhancing the adsorptivity, solubility, bioavailability and being biocompatible at the same time.

In view of this we attempted to explore the molecular interactions mediated by polymer and surfactant based soft systems like polymer-surfactant assemblies, hydrogels that can be formed in an aqueous environment by changing the composition of their components: water, surfactant and polymers and thus can be tuned for particular applications. The emphasis was laid on interaction of Gemini surfactants with bioderived polymers, surface active Gemini surfactants have been recognized as highly efficient and superior over normal conventional surfactants. Since addition of different variety of inorganic/hydrophobic salts affects the morphologies of such self-assemblies has not received enough attention although it can provide guidelines for understanding the mechanism of such interactions. The special attention was paid to recognize nature and type of interactions within such systems and their possible effects on various phenomenon. Therefore, the goal of thesis has been achieved by specifically focusing on the following objectives:

1. To formulate and characterize various self assembled soft systems based on polymers and surfactants like polymer-surfactant and polymer-polymer mixed systems, hydrogels and gel beads.
2. Reveal the comparative interaction of single chain and Gemini surfactants with polymers

3. To study the effect of different variety of salts (hydrophilic and hydrophobic), pH and temperature on the morphologies of such assemblies.

4. To investigate the encapsulation and loading capabilities of such systems towards poorly water soluble prototype compounds of pharmaceutical importance

5. To investigate release kinetics of such solubilized drugs within the prepared hydrogels for its prospective use as drug delivery vehicle.

6. To investigate the adsorption capacity of prepared gel beads towards various dyes for its use in waste water treatment.

The goals of these studies were achieved by using experimental techniques like Rheology, Spectrophotometry, Fluorimetry, Scanning electron microscopy, conductometry and Tensiometry.