Morphological Alteration of Different Self-Assembled Aggregates and Investigation of Various Dynamical Processes inside the Confined Assemblies

To unveil the structural and dynamical features of various systems in the field of chemistry and biology, fluorescence spectroscopy is a very efficient technique. Inside the biological cell membranes, the dynamics and reactivity of various bio-active molecules are strongly influenced by the surrounding water molecules as well as cellular confinement. Different organized assemblies like micelle, mixed micelle, vesicle having small amount of water confined in it, mimics the biological cell membranes. Therefore, it is highly interesting to investigate the effect of confinement of the above-mentioned a ssemblies on various important dynamical processes such as excited state intramolecular proton solvation dynamics, rotational motion, translational diffusion, and cis-trans isomerization kinetics of various fluorophores. We have shown that how the rotational anisotropy and translational diffusion of different hydrophilic and hydrophobic probe molecules modulate inside the confined media during the micelle-vesicle-micelle transitions. We have also investigated concentration-controlled morphological altera fibril and the effect of various external stimuli on the morphologies with the aid of different microscopic techniques. Various dynamical processes of different Coumarin dyes inside the confined media of reverse micelle and lamellar structure have been studied in presence of two different sugars. Using femtosecond fluorescence upconversion and fluorescence correlation spectroscopy (FCS) measurements, various dynamical processes of different dye molecules have been investigated in room-temperature ionic liquid (RTIL)-cosolvent mixtures. Femtosecond fluorescence upconversion technique is also helpful to study the excited-state intramolecular double proton transfer (ESIDPT) dynamics of [2,2 ▪ -Bipyridyl]-3,3 ▪ diol, BP(OH)2 in three alcohol-water and DMSO-water binary mixtures. Finally, in order to unveil the photoinduced electron transfer (PET) dynamics between carbon nanodot (CND) and two cationic fluorophores, transient absorption technique has been employed.