Research Colloquium

Synthesis, Properties and Applications of Selected Functional Polyesters and Metallopolymers

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Venue: Through online link Time: 3:30-4:30 p.m.

Abstract: Stimuli-responsive polymers respond to changes in surroundings in a desired fashion, which qualify their candidature for a wide range of applications in tissue engineering, drug delivery, sensing, and optical systems.[1] The dynamic bonds among the subunits in a polymer chain facilitate the reversible changes in the soft materials, towards an external stimulus, assisted by weak forces of interactions such as $\pi-\pi$ stacking, hydrogen bonding, or metal-ligand coordination.[2] Among several such assemblies, metal-ligand coordination polymers are of particular interest due to their highly directional and tunable non-covalent interactions. The properties of metal-ligand coordination polymers can be tuned by changing polymer sequence, binding groups, substituents on the binding group, and choice of metals.

The present colloquium will outline the design, synthesis, and characterization of different classes of phenoxy-imine and phenoxy-oxazole ligands and their metallation with Cu, Ni, Fe, and Zn ions. Initial studies were focused on optimizing the catalytic activity of selected complexes towards the ring-opening copolymerization of phthalic anhydride and cyclohexene epoxide with change in cocatalyst, solvent, and temperature. Next, functionalization of carboxylic acid group to a polyester backbone followed by the synthesis of luminescent Europium and Terbium metallopolymer gels were explored. A combination of 0.17 mmol Tb^{3+} and 0.13 mmol of Eu^{3+} yielded white light-emitting gel, which was then subjected to different stimuli-responsive studies, including thermochromism, pH triggered vapochromism, and F^- induced chemochromism. Further, the design and synthesis of hydroxyl functionalized poly(norbornene anhydride-*alt*-cyclohexene oxide) and its gelation studies were accomplished. Self-healing properties of both the gels have been studied, and the details will be presented in the seminar. The results taken together indicate that the metallopolymers have potential applications in smart coatings or paints that can be stimuli-responsive to the surrounding chemical/ physical conditions.

References

1. George R. Whittell, Martin D. Hager, Ulrich S. Schubert, Ian Manners *Nature Materials*, **2011**, *10*, 176–188.
2. Lucas Montero de Espinosa, Gina L. Fiore, Christoph Weder, E. Johan Foster, Yoan C. Simon, *Progress in Polymer Science*, **2015**, *49*, 60–78.

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