Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Unleashing the Architectural Marvels: Advancing the Structural Landscape of Supramolecular Polymers

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Supramolecular polymers formed by the noncovalent association of monomers have evolved over the last two decades as the most promising candidates for the design of dynamic, adaptive, and recyclable materials. Study of dynamic and adaptive supramolecular polymers has now entered an era that demands assemblies with more structural and dynamic control. The synergy between structural and temporal control is important for the advent of supramolecular polymers to be employed as functional adaptive materials. Thus, taking cue from the biological self-assembly process, kinetically controlled seeded growth has been recently shown to provide length, dispersity and sequence control on the primary structure of dynamic supramolecular polymers. However, command over the molecular organisation at all hierarchical levels for the modulation of higher order structures of supramolecular polymers remains a formidable task. In this context, a surface-catalysed secondary nucleation process, which plays an important role in the autocatalytic generation of amyloid fibrils and during the chiral crystallisation of small monomers, offers exciting possibilities for topology control in synthetic macromolecular systems by introducing secondary growth pathways compared to the usual primary nucleation–elongation process. However, mechanistic insights into the molecular determinants and driving forces for the secondary nucleation event in synthetic systems are not yet realised. Recently, we have filled this dearth by showing an unprecedented molecular chirality control on the primary and secondary nucleation events in seed-induced supramolecular polymerisation. I will be discussing our recent attempts to use surface catalysed secondary nucleation process, to modulate the topology of supramolecular polymers and to modulate the functional outcomes of supramolecular materials.

Thursday, Aug 10th 2023

4:00 PM (Tea / Coffee 03.45 PM)

Auditorium, TIFR-H