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

Internal Webinar

Design, synthesis and self-assembly of tetraphenylethylene-based systems: Applications in bio-imaging and as fluorescent nanomaterials

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Fluorescent nanomaterials have found potential applications in various fields including bio-imaging, optoelectronics and sensors. Real-world applications based on fluorophores often face the challenge of aggregation caused quenching (ACQ). This long-standing hurdle of ACQ was overcome by the discovery of AIEgens. Aggregation-induced enhanced emission (AIEE) is a phenomenon in which molecules exhibit an enhanced emission in the aggregated state due to the restricted intermolecular bond rotations. Bio-imaging probes and optoelectronic devices based on AIEgens are gaining much attention in recent years and are in high demand owing to their excellent fluorescent output. Tetraphenylethylene (TPE) is a widely used AIEgen owing to its feasible synthetic strategy, strong self-assembly propensity via π-stacking and remarkably high fluorescence quantum yield in the aggregated state. Often TPE is explored as a single component system focusing on its AIE active features. Multi-component systems based on TPE is less explored and is considered a grey area of research. The talk discusses the design, synthesis and self-assembly of multi-component systems based on TPE, which is derived either supramolecularly or covalently and their applications in bio-imaging and as functional fluorescent nanomaterials. Spectroscopic studies have revealed promising photoluminescence behaviours for the aggregated species of the TPE-based multi-component systems. Further the applications of TPE-based supramolecular aggregates as fluorescent nanoprobes for bio-imaging and also as soft nanomaterials are detailed.

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