Encapsulation Induced Aggregation – A Self-assembly Strategy for Weakly Pi-stacking Chromophores

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Molecular assembly of weakly pi-stacking dye molecules often requires participation of strong side-group interactions.[1] We explore an alternative strategy that promotes aggregation of core-substituted naphthalene diimide (cNDI) molecules by means of spatial confinement inside the hydrophobic core of a polymer micelle. Locally elevated concentration and reduced degrees of freedom of confined molecules not only drive a spontaneous molecular aggregation, but also provides a unique opportunity to study the dynamics of the self-assembly process in which one aggregate form gradually reorganizes[2] into the other. Competing self-assembly pathways in synthetic supramolecular systems have generated great interest in recent times, where the importance of molecular structure has been discussed. Our work complements the existing knowledge by highlighting the role of a unique environment in shaping the course of supramolecular assembly. Finally, the effect of fast aggregation kinetics on self-sorting[3] of aggregates is also demonstrated.

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