INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Aromatic π-π interactions, known as π-stacking involves interactions of aromatic rings of individual molecules, forming functional nanoassemblies. Among all the aromatic systems reported, benzene dimer is considered to be the prototypical system for the study of π-π stacking. π-stacking systems are important building blocks in the design of peptide and small organic molecules as it dominates significant number of the supramolecular assembly and recognition process. External perturbations are believed to influence the π-stacking interactions through their impact on the π-electron density of the aromatic ring. Self-assembling peptide and organic systems containing quadrupole and dipole ring systems are chosen as the model systems for our experiments described in this thesis. Though it is a spontaneous process, where no further input of information is required, the final structures cannot be directed as it happens in macroscopic engineering. Fabrication at the nanoscale is a process at which the atoms are placed specifically at its designated sites. In this thesis work, an attempt to direct the fabrication process was made i) where the basic units are sequences of amino acids with different symmetry elements and ii) where the basic units are Triphenylmethyl based organic systems. The resulting nano-assemblies forming organic nanoflowers and stimulus responsive hybrid systems can potentially be harnessed in the fabrication of devices, especially for heavy metal sequestration, capacitors and field-effect transistors (FETs).