Title:	Self- assembly of Supramolecular nanoconjugates at Liquid-liquid interface
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Abstract:	Nanoconjugates stabilized Pickering emulsions have attracted immense interest in past decade and have created opportunity for the development of novel materials with unique physical properties. The physical properties of these emulsions such as permeability, mechanical strength, and biocompatibility can be precisely controlled through the judicious choice of colloids and preparation conditions for their assembly at interface. These nanoconjugates form 2D layer at liquid-liquid interface by cooperative interactions and result in forming defect-free nanostructures. This thesis focuses on designing supramolecular nanoconjugates to stabilize emulsions for application in catalysis, controlled permeability and flow-based detection. In brief, our first approach demonstrated one-step microfluidic fabrication of enzyme immobilized polymeric microcapsules using nanoparticle-enzyme conjugates. These solid core microcapsules provided robustness and prevented enzyme leaching, thus producing a highly reusable scaffold for biocatalysis. Next work demonstrated that these biocatalytic microcapsules can be used as microscale engine to mimic the life-like behavior of microorganism such as fluid actuation and buoyancy driven motion. The system was further developed to provide muti-modal catalysis using mpg-C3N4- enzyme conjugates. These microcapsules were able to perform biocatalysis as well as photocatalysis simultaneously, thus providing a pathway for environmental remediation for biomedical wastes. In another approach, we developed pillar[5]arene nanoconjugates stabilized emulsions which can be utilized for fluid flow-based lab-on-chip detection of toxins. Finally, we explored jamming of supramolecular constructs at liquid- liquid interface to control the molecular permeability of the 2D films. In brief, we have synthesized Pickering emulsions employing non-covalent self-assembled nanoconjugates which generate supramolecular assemblies and stabilize liquid-liquid interface. These MCs demonstrated their potential applications in catalysis, fluid flow based detection, encapsulation, and controlled release.
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