NSE-821 Nano Fabrication by Self Assembly

Prerequisite: Nil

Category: Elective Course

Existing Course Contents	Proposed Course Contents
• Molecular self-assembly, Nanofabrication by designing molecules and supramolecular entities, Advantages of self-assembly, Atomic-level modification of structure by synthetic chemistry • Examples in biology for self-assembly for the development of complex, functional structures, Incorporation of biological structures as final systems, Thermodynamically most stable defect-free and self-healing structures • Function in self-assembled aggregates based on organic compounds such as electrical insulators, Self-assembled monolayers (SAMs) with tailor able functions e.g., interfacial free energies. • Micro contact printing. Principles and techniques for self-assembly of films and structures on the nanometer scale • Macromolecules, biological membranes, protein multilayers, Langmuir-Blodgett, thiol, silane and layer-by-layer self-assembly techniques, nano-capsules, bio/nano-reactors, fullerenes and nano-tubules, fluorescent nano-sensors, electrochemical polymerizations deposition.	• Introduction to self assembly processes-self assembly strategies-building blocks of self assembly (materials, molecular, hierarchical and directing self assembly) • Force balance in self assembly processes • Self assembly emulating natural processes-development of complex, functional structures • Colloidal methods and shape anisotropy-Atomic-level modification of structures by synthetic chemistry • Self-assembled monolayers (SAMs) with tailor able functions e.g., interfacial free energies • Self assembly of block copolymers (LBL technique, nano reactors) and stimuli responsive materials-applications in device fabrication • Langmuir-Blodgett films formation and applications • Atomic self assembly-Self assembly of nano porous media and applications • Principles and techniques for self-assembly of films and structures on the nanometer scale

Proposed Weekly Plan for the Concerned Faculty

Week /Lecture	Topic
1,2	Introduction to self assembly processes-self assembly strategies-building blocks of self assembly (materials, molecular, hierarchical and directing self assembly)
2,3	Force balance in self assembly processes
3-5	Self assembly emulating natural processes- development of complex, functional structures
6-8	Colloidal methods and shape anisotropy- Atomic-level modification of structures by synthetic chemistry
9-11	Self-assembled monolayers (SAMs) with tailor able functions e.g., interfacial free energies

11-13	Self assembly of block copolymers (LBL technique, nano reactors) and stimuli responsive materials-applications in device fabrication
14	Langmuir-Blodgett films formation and applications
14-16	Atomic self assembly-Self assembly of nano porous media and applications
16,17	Principles and techniques for self-assembly of films and structures on the nanometer scale