

MSE 856 Nano Materials and Processing

CHs: 3

Pre-requisites: Nil

Course Objectives:

- Understanding of different nanostructures
- Importance of nanostructured materials for different applications

Course contents:

- Synthesis of zero dimensional nanomaterials (Nanoparticles(NPs) through homogeneous nucleation, NPs through heterogeneous nucleation, kinetically confined growth of NPs)
- Synthesis of 1 D nanomaterials (Vapor Liquid Solid (VLS) growth, Evaporation Condensation Growth, Template based synthesis, Electrospinning)
- Fabrication of thin films (Fundamentals, PVD, CVD, ALD, Electrochemical deposition, sol gel thin films, self-assembly)
- Characterization of nanomaterials:
 - Ion surface interactions and ion based characterization tools e.g. Rutherford back scattering analysis, Secondary Ion Mass Spectrometry (SIMS)
 - Electron surface interactions and Electron microscopy
 - Physisorption, Chemisorption, BET Surface Area Measurement
 - Selected Application(s)

Course Outcomes:

- At the end of the course:
 - The student should be able to characterize different nanostructures using different techniques and give suggestion related to the alteration of structures etc.

Recommended Text/Reference Books:

- Nanotechnology (Mark A Ratner) Engines of Creation, The coming era of Nanotechnology (Eric Drexler)