

NSE-951

Nanostructured Materials

Credit Hours: 3

Prerequisites: Nil

Course Objectives:

- Introduction to key concepts related to nanostructured materials and materials processing
- Detailed understanding on light alloys, crystals growth and analysis, properties of nano bainite
- Understanding on the applications of nanostructured materials

Course Contents:

- Nano Crystalline materials: introduction, classification, synthesis (inert gas condensation, mechanical alloying, spray conversion processing, electro-deposition, devitrification of amorphous phases, consolidation of powders to bulk shapes)
- Nanostructured hybrid materials, lamellar materials
- Rapid solidification of light alloys, structure (Microstructure, atomic structure of grains and grain boundaries, grain growth and grain growth inhibition),
- Nano-bainite, thermal stability, properties (diffusion and sinterability, physical properties, optical properties, mechanical properties, electric and magnetic properties, chemical properties)
- Quasi and nano-quasi crystals
- Applications of nanostructured materials.

Course Outcomes:

The student will get an in depth understanding on the fundamental concepts related to nanostructured materials and various processes involved in the synthesis and fabrication of such materials. The student will be able to use this knowledge in practical applications.

Recommended Books:

- Nanocrystals: Synthesis, Properties and Applications, Series: **Springer Series in Materials Science**, Vol. 95 Rao, C.N.R., Thomas, P. John, Kulkarni, G.U. 2007, VIII
- Glassy, amorphous and nano-crystalline materials by prof. Jaroslavšesták, meng., dr. Jiri j. Mares, dr. Pavelhubik
- Nanocrystalline materials their synthesis-structure-property relationships and applications by sie-chin tjong
- Molecular Chemistry of Sol-Gel Derived Nanomaterials, Robert Corriu and Nguye^n Trong Anh, John Wiley & Sons, Ltd. 2009.