

Course topic:
Nanomaterials

Lecturer:

Dr. Zohreh Sadeghian

Assessment

- The course grade consists of these components:

80% – Knowledge test

20% – Presentation and report base assignment

Learning outcomes

Upon successful completion of this course students should be able to:

- Explain methods of fabricating nanostructures.
- Relate the unique properties of nanomaterials to their reduced dimensionality.
- Describe tools for characterization of nanostructures.
- Discuss applications of nanomaterials and implication of health and safety related to nanomaterials.

Course topics:

- **Introduction and definitions**
- **Surface energy in nanomaterials**
 - Origin of surface energy
 - Consequences of surface energy in nano materials
- **Thermodynamics of nanomaterials**
- **Synthesis of nano particles**
 - Gas phase synthesis of nano particles
 - Sol-gel method
- **Optical properties of nanoparticles**
- **Magnetic properties of nanoparticles**

- **Mechanical properties of nanostructured materials**
- **Fabrication methods concerning bulk nanostructured materials**
- **High temperature behavior of nanostructured materials**
 - Grain growth inhibition
- **Sintering techniques**
- **Carbon nanostructures**

Recommended references:

- Introduction to Nanotechnology, C. P. Pooles and F. J. Owens
- Nanoparticles: from theory to applications, G. Schmid
- Nanostructured materials: processing, properties and applications, C. C. Koch
- Nanomaterials, P. Vollath