

PHY5010 Synthesis of Materials

Course Code	PHY5010	Semester	
Course Title	<i>Synthesis of Materials</i>		
Credits	3	Type	Elective

Course Outcome

This is a skill based course in which students will be given basic understanding of sample synthesis through wet chemistry routes as well as physical depositions methods. Virtual demonstration is provided based on animations and videos. Basic properties are also discussed

Course Structure

Contents: (1) Vacuum techniques, pumps and gauges. Experimental techniques. (2) Cryogenic techniques. Liquefaction of gases, various methods. Maintenance of low temperatures. Adiabatic demagnetization. Measurement of low temperatures. (3) Thin film techniques: properties, fabrication, thermal evaporation, sputter deposition, thickness measurements quartz crystal monitor, optical interference method, energy loss method, thin film optics. (4) Growth of materials: Bulk powder synthesis, Synthesis of one dimension, two dimensional and three dimensional structures. Molecular assembly, ordered structures. Photonic band gap structures, Meta-materials. Nanoscale architecture. (Physical and chemical methods)

Suggested Books

1. S. Dushman, and J.L.Laffer, Scientific foundations of vacuum techniques, Wiley (1962)
2. K. L. Chopra, Thin film phenomena, Mc Graw Hill (1979)
3. Meissel and Glang, Hand book of thin film technology, McGraw Hill (1970)
4. L. Jackson, Low Temperature Physics, Wiley (1955)
5. F. Din and A. H. Cocker, Low Temperature Techniques, Wiley (1960)