Processing of Semiconducting Materials - Video course

COURSE OUTLINE

The present course on "Processing of Electronic Materials" is designed for the undergraduate students to develop the basic tools with which they can later learn about newly developed devices and applications. Obviously it will provide the students with a sound understanding of existing materials, devices and processing technologies.

Semiconductor materials, devices and processing technologies are the foundation of electronic industry which is the largest industry in the world with global sales over one trillion dollars since 1998.

The semiconductor industry which is a subset of electronic industry will grow at a faster rate in coming days and it will constitute 25% of the electronic industry in 2010. A basic knowledge of processing of electronic materials is essential to the understanding of advanced courses in electronics.

This knowledge will also enable a learner to contribute to the information age which is based on electronic technology. The course material on processing of electronic materials will be very useful to undergraduate students, post-graduate students, teachers and practitioners. A number of chosen problems will be solved to illustrate the concepts clearly.

COURSE DETAIL

Sl. No	Topic	Hours
1.	Introduction to Electronic Materials.	1
2.	Electrical conductivity of materials.	1
3.	Direct & indirect band semiconductors.	1

NPTEL

http://nptel.iitm.ac.in

Metallurgy and Material Science

Additional Reading:

1. Rolf E. Hummel, "Electronic Properties of Materials", Springer
2. Ben G. Streetman and S.K. Banerjee, "Solid State Electronic Devices", PHI

Coordinators:

Dr. Pallab Banerji
Department of Materials ScienceIIT Kharagpur

4.	Semiconductor statisics.	1
5.	Doping in semiconductors • Diffusion • Ion implantation	5
6.	Elemental and compound semiconductors.	2
7.	Crystal Growth: Bulk • Silicon crystal growth • Silicon float-zone • GaAs crystal growth techniques	4
8.	Bandgap Engineering & Epitaxy • Low dimensional structures • CVD • MBE	6
9.	Materials Characterization • Resistivity • Bandgap • Defects in materials	4
10.	Thin film deposition • Thermal oxidation • Dielectric deposition • Polysilicon depostion • Metallization	4
11.	Metal-semiconductor contact	4

	• Ohmic contact • Schottky contact • Applications	
12.	p-n junction	2
13.	Electrical properties of polymers, ceramics, dielectric and amorphous materials	3
14.	Dielectric Materials and Insulation	2

References:

1. S.M. Sze, "Semiconductor Devices: Physics & Technology", Wiley
2. S.O. Kasap, "Principles of Electronic Materials and Devices", Tata McGraw Hill.