

NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Metallurgy and Material Science - NOC:Non-Metallic Materials

Subject Co-ordinator - Prof. Subhasish Basu Majumder

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

- Lecture 1 - Classification and applications of non-metallic materials
- Lecture 2 - Understanding on polymer structures
- Lecture 3 - Characteristics of polymers and advanced polymeric materials
- Lecture 4 - Processing of polymers
- Lecture 5 - Polymer composites and issues related to recycling
- Lecture 6 - Defects in crystalline materials: point, line, planar and three dimensional defects
- Lecture 7 - Non- stoichiometry in non-metallic materials
- Lecture 8 - Laws of thermodynamics, reaction kinetics - Part 1
- Lecture 9 - Laws of thermodynamics, reaction kinetics - Part 2
- Lecture 10 - Phase diagram and microstructure evolution in non-metallic materials
- Lecture 11 - Carbonaceous materials
- Lecture 12 - Fundamental of diffusion, Fick's laws, their solution and applications - Part 1
- Lecture 13 - Fundamental of diffusion, Fick's laws, their solution and applications - Part 2
- Lecture 14 - Phase transformation of non-metallic materials
- Lecture 15 - Introduction to glass and amorphous solids
- Lecture 16 - Understanding on conventional glass and amorphous solids
- Lecture 17 - Glass-ceramics and specialty glasses
- Lecture 18 - Mechanical properties of non-metallic materials, stress-strain response, elastic, and plastic deformation
- Lecture 19 - Brittle and ductile materials, introduction to fracture mechanics, strength of brittle materials
- Lecture 20 - Strengthening of materials, fatigue, and creep
- Lecture 21 - Composite materials: Particle-reinforced composites, and fiber reinforced composites
- Lecture 22 - Structural Composite
- Lecture 23 - Dielectric and piezoelectric behavior
- Lecture 24 - Ferroelectric Behaviour of Non-Metallic Materials and Ferroelectric thin film for Non-Volatile Memory
- Lecture 25 - Magnetic Properties : Origin of Magnetism, Para, Dia, Ferro, and Ferrimagnetism
- Lecture 26 - Ceramic Magnets and their Applications
- Lecture 27 - Thermal Properties : Specific Heat, Heat Conduction, Thermal Diffusivity, Thermal expansion
- Lecture 28 - Thermoelectric Effect and Magnetocaloric Effect
- Lecture 29 - Optical properties: Refractive index, absorption and transmission of electromagnetic radiation,

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- Lecture 30 - Introduction to electrochemistry, Galvanic cells, Cell potentials and Gibbs Energy, Concentration
- Lecture 31 - Electrochemical storage, rechargeable batteries
- Lecture 32 - Introduction to electrochemical methods; cyclic voltammetry and other related techniques
- Lecture 33 - Fuel Cell and Energy harvesting
- Lecture 34 - Preparation of ceramic powders: auto-combustion, sol-gel synthesis, microwave assisted hydrothermal
- Lecture 35 - Introduction to sintering, sintering mechanism
- Lecture 36 - Solid-state sintering and microstructure development
- Lecture 37 - Solid-state sintering and microstructure development (Continued...)
- Lecture 38 - Liquid phase sintering and microstructure development, speciality sintering, reactive sintering
- Lecture 39 - Processing of glass and amorphous/non-crystalline solids
- Lecture 40 - Fundamental of thin film growth, growth mechanism and kinetics
- Lecture 41 - Thin film growth techniques, thermal evaporation, CVD, sputtering, CSD
- Lecture 42 - Fundamentals and processing of conducting and semiconducting ceramic devices
- Lecture 43 - Processing of ceramics devices
- Lecture 44 - Organic electronic materials: conducting polymers, semi-conducting organic materials, applications
- Lecture 45 - Thermal analyses
- Lecture 46 - Introduction of spectroscopic technique : UV-VIS spectroscopy
- Lecture 47 - Infra-red and Raman spectroscopy
- Lecture 48 - Optical and scanning electron microscopy
- Lecture 49 - X-ray photoelectron spectroscopy
- Lecture 50 - Measurement of mechanical properties, fracture toughness, MOR, hardness
- Lecture 51 - Ferroelectric thin film: synthesis and characterization
- Lecture 52 - Thermal analysis techniques: Differential scanning calorimetry and thermogravimetry
- Lecture 53 - Measurement of optical properties
- Lecture 54 - Novel ferroic composites: Synthesis and measurement
- Lecture 55 - Fundamentals of corrosion, corrosion of materials
- Lecture 56 - Oxidation, corrosion of ceramic materials, degradation of polymers: swelling and dissolution, biodegradation
- Lecture 57 - Ceramics in biology and medicine
- Lecture 58 - Design of Ceramics
- Lecture 59 - Finishing of Ceramics
- Lecture 60 - Fly-ash based glazed wall tiles: A case study