

Materials Characterization Techniques

Credits: 4

Introduction: Scope of subject, classification of techniques for characterization, macro and micro-characterization structure of solids. Bulk averaging techniques: Thermal analysis, DTA, DSC, TGA, dilatometry, resistivity/conductivity. Optical & X-ray spectroscopy: Atomic absorption spectroscopy, X-ray spectrometry, infrared spectroscopy and Raman spectroscopy. Metallographic techniques: Optical metallography, image analysis, quantitative phase estimation. Diffraction methods: X-ray diffraction (crystal systems and space groups, Bravais lattices, direct and reciprocal lattice, Bragg law, powder diffraction and phase identification, single crystal diffraction, structure factor, X-ray crystal structure determination). Electron optical methods: Scanning electron microscopy and image formation in the SEM.

TEXT BOOKS

1. Transmission electron Microscopy of metals –Garet Thomas.-John wiley and sons
2. Physical Metallurgy by R.E. Read Hill
3. Elements of X-ray diffraction by BD Cullity
4. X-Ray diffraction: a practical approach by C. Suryanarayana, M. Grant Norton

REFERENCES;

1. X-ray diffraction methods - EW Nuffield.
2. X-ray diffraction B.E. Warren
3. Physical Metallurgy, Part – I – RW Chao and P. Haasan.
4. Experimental Techniques in Physical Metallurgy – VT Cherepin and AK Mallik.
5. Electron Microscopy in the study of materials –P.J.Grundy,