

# Introduction to crystallographic texture and related phenomenon

## Credits: 4

**Unit-I:** Concepts of texture in materials, their representation by pole figure and orientation distribution functions; Texture measurement by different techniques: X-ray diffraction, neutron diffraction, synchrotron X-rays, ultrasonic wave.

**Unit-II:** Origin and development of textures during materials processing stages: solidification, deformation, annealing, phase transformation; Deformation microstructure and texture in FCC, BCC and HCP metals and alloys.

**Unit-III:** Modelling of deformation texture, Sachs, Taylor and Self consistent models for polycrystal deformation and Texture evolution; Annealing phenomenon: Recovery, recrystallization and grain growth, texture evolution during annealing.

**Unit-IV:** Solidification and transformation texture, Texture development during coatings and thin film deposition.

**Unit-V:** Influence of texture on mechanical, chemical and physical properties: Yield strength, ductility, fatigue, corrosion, stress corrosion cracking, magnetic and dielectric properties; Texture and formability.

**Unit-VI:** Case studies: Texture control in aluminium industry, automotive grade and electrical steels, magnetic and electronic materials.

### Resources:

#### Text Books:

1. Introduction to Texture Analysis: Macrotecture, Microtexture and orientation mapping, Gordon and Breach Science Publishers, V. Randle and O. Engler.
2. Recrystallization and Related Annealing Phenomenon, Pergamon Press, F.J. Humphreys and M. Hatherly.

#### References:

1. Texture and Anisotropy, Cambridge University Press, U.F. Cocks, C.N. Tome and H.R. Wenk
2. An Introduction to Textures in Metals (Monograph No.5), The Institute of Metals, London, M. Hatherly and W.B. Hutchinson.