TEXTURE IN MATERIALS

PROF. SOMJEET BISWAS
Department of Metallurgical and Materials
IIT KGP

TYPE OF COURSE : New | Elective | UG/PG
COURSE DURATION : 12 Weeks (26-Jul' 21 - 15-Oct' 21)
EXAM DATE : 23 Oct 2021

PRE-REQUISITES : Students should have completed three years of the BE/BTech in Metallurgical, Mechanical, Materials Engg/Science; Physical metallurgy; Physics of Materials

INTENDED AUDIENCE : UG, PG, and PhD, industry/R&D professionals

INDUSTRIES APPLICABLE TO : BARC Mumbai; DMRL-DRDO Hyderabad; IGCAR Kalpakkam; ISRO; National Metallurgical Laboratory Jamshedpur; Tata Steel; JSW Steel; ArcelorMittal

COURSE OUTLINE :

Dr. Somjeet Biswas is Associate Professor in Dept. of Metallurgical & Materials Engineering, Indian Institute of Technology, Kharagpur. He specializes in mechanics of plastic deformation in ultra-fine and nanocrystalline materials through polycrystalline plasticity simulations with specific applications in aerospace, automobile and degradable/permanent bio-medical implant applications. He has used microstructure engineering techniques like severe plastic deformation, thermo-mechanical processing and recrystallization to modify the morphological characteristics, texture and grain boundary to obtain ultra-fine grain metals and alloys that possess both improved strength and ductility and hold 35 publications and 04 patents. His thrust areas of research include the development of advanced lightweight and high strength Mg, Ti, Al alloys and steels. He and his team in the 'Light Metals and Alloys Research Lab, MME, IITKGP' is working on deciphering the effect slip/twin induced deformation behaviour, dynamic recovery and recrystallization on the evolution of dislocations, microstructure, texture and grain boundaries in order to improve specific properties based upon application.

ABOUT INSTRUCTOR :

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COURSE PLAN :

Week 1**:** Introduction to crystallographic orientation or texture

Week 2**:** Fundamentals of crystal structure and stereographic projections

Week 3**:** X-ray diffraction phenomena, Pole figures and inverse pole figures

Week 4**:** Three-dimensional texture analysis

Week 5**:** Principles of texture measurements by X-ray diffraction

Week 6**:** Microtexture measurements using EBSD technique in SEM

Week 7**:** Grain boundary Classifications, character and energy

Week 8**:** Texture evolution during solidification and phase transformation

Week 9**:** Theory of deformation texture and microstructure evolution

Week 10**:** Texture in FCC, BCC and HCP materials

Week 11**:** Theory of annealing texture evolution

Week 12**:** Application: Case study