Microstructure and Texture of Materials

Overview

Microstructure and texture of polycrystalline materials, besides chemistry, govern their mechanical, electrical, magnetic and optical properties. As such designing of any engineering product requires the microstructural and textural information of a material. It is, therefore, very important to have a thorough knowledge of microstructure and texture of a material that evolves during processing. Additionally, the stability of these two important governing factors during service period of engineering components is also another key issue.

The advent of orientation imaging microscopy (OIM) has opened up a new dimension for understanding of microstructure and texture of materials. Additionally, this method rapidly provides information at a low cost in comparison to other sophisticated methods. It is, therefore, quite natural that apart from intensive research on "microstructure and texture of materials" the topic needs to be discussed in the form of classroom lecture courses along with necessary demonstration.

The present course is designed with focus on orientation imaging microscopy which utilizes electron back scattering diffraction (EBSD) technique in conjunction with scanning electron microscopy (SEM) with the objective to gain knowledge about how OIM works and how it becomes helpful for thorough understanding of microstructure and texture of materials. In this course the participants will acquire understanding of basic crystallography and diffraction theory as a foundation for how the EBSD measurement techniques work. Finally, analysis of the data in terms of determining quantifiable measures of the microstructure and ensuring their statistical reliability will be discussed.

Modules	• **12 hours lectures (6 days) and 6 hours tutorials/demonstrations** • **Course date: 7th February 2018 to 14th February 2018 (6 days)** • **Date of Examination: 15th February 2018** • **Course content:** Introduction to Crystallography (Day 1), Stereographic Projection (Day 2), Diffraction Theories (Day 3), Metallographic Principals and SEM (Day 4), Texture (Day 5), Identification and Quantification of Texture (Day 6) • **Number of participants for the course will be limited to thirty.**
You Should Attend If…	• You are engineers and researchers from industry, academia, and government organizations including R&D laboratories. • You are student at all levels (BTech/BE/MSc/MTech/PhD). • You are faculty from academic institutions.
Course Participation Fees	• The participation fees for taking the course is as follows: • **Industry/ Research Organizations: ` Rs. 5,000.00** • **Faculty from Academic Institutions: ` Rs. 3,000.00** • **Student at all levels (BTech/BE/MSc/MTech/PhD): Rs. 1,000.00** • **The above fee includes course materials. The paricipents are required to bring their own laptops for tutorial and demonstration.**
Last date of registration	• 31st January 2018 • No accommodation will be provided

The Faculty

David Field | Professor, Mechanical and Materials Engineering; Associate Dean for Research and Graduate Studies, Voiland College of Engineering and Architecture, Washington State University, USA

Prof. David Field received his BS, MS, and Ph.D (1991, Yale University) in Mechanical Engineering. From 1990 to 1994 he was employed at Alcoa Technical Center as a Sr. Engineer and from 1994-2000 at TexSEM Laboratories where he was Director of Technology. He joined the School of Mechanical and Materials Engineering at Washington State University in August, 2000.

His research interests include physical and mechanical metallurgy, electron backscatter diffraction (EBSD), deformation and recrystallization of metals, severe plastic deformation, welding and joining, anisotropy of materials, thin film and integrated circuit interconnect reliability, and advanced experimental and characterization techniques. In general, he investigates how to make metals stronger, more ductile, or more corrosion resistant, depending upon the application. Prof. Field is a fellow of ASM International, is the author or co-author of over 170 technical articles, and has been awarded 3 patents. He has given more than 100 invited presentations at national or international meetings, universities, and national laboratories worldwide and has lectured and taught dozens of workshops and courses on electron backscatter diffraction, texture analysis, and materials characterization.

Dr. Pravash Chandra Chakraborti is Professor at Metallurgical and Material Engineering Department, Jadavpur University, India. All through his professional career at Jadavpur University he is primarily involved in understanding mechanical behavior and phase transformation of metals and alloys. His primary research interests are on low cycle fatigue and ratcheting behavior of metals and alloys, and mechanical behavior of materials at cryogenic temperatures.

Dr. Amrita Kundu is Assistant Professor at Metallurgical and Material Engineering Department, Jadavpur University, India. Her research interest hinge around mechanical behaviour of materials, phase transformation in ferrous alloys, thermomechanical processing of steel, welding, materials characterisation.

Course Co-ordinators

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