

The Indian Institute of Metals Short Professional Educational Courses (Online+Lab) on  
**“A workshop on SEM, EBSD, and EDS Technique: Theory and hands-on”**  
 (Course Number IIM-23-102)

Theory - Online Mode / IIT, Bombay - 1<sup>st</sup> & 2<sup>nd</sup>, September, 2023,  
 09:00 – 13:00 & 14:00 – 16:00 (each day)

Followed by Laboratory Training at MMMF Lab, IIT, Bombay on 3<sup>rd</sup> & 4<sup>th</sup> September, 2023

**Background:** Scanning Electron Microscopy (SEM), Electron Back Scattered Diffraction (EBSD) and Energy Dispersive Spectroscopy (EDS) are becoming common tools to understand the microstructure with a high depth of focus and resolution. Coupled with the microstructure, the increasing assessment of the phase identification, phase distribution, compositional analysis of micro phases and the bulk metal, grain structure analysis with regard to Low angle and high angle boundaries, micro-texture, internal strain measurements etc improve understanding of the material in depth. The interpretation from SEM-EBSD technique enables new product development by understanding the underlying physical metallurgy, phase transformation, deformation, recrystallization, and failure analysis. The present course is being planned to impart basic knowledge on SEM-EBSD for researchers, students, industrial product development professionals, failure analysts etc. The course must be able to give basic theory connected with the techniques for the first two days and it is combined with two more days of practical training on SEM facilities at the MMMF Lab at the Indian Institute of Technology, Bombay by three eminent faculty fully knowledgeable about the field and its emerging applications.

**Speaker Profile:** The faculty of the course consists of the following professors of eminence from IIT, Bombay,

1. Prof. I Samajdar
2. Prof. Asim Tewari
3. Prof. Sushil Mishra

The course Content would be covered in Class Room Lectures accessible through Virtual on-line route on 1<sup>st</sup> and 2<sup>nd</sup> September, followed by laboratory training.

**Who should attend:** The course is useful for practising industrial professionals dealing with new products, research professionals, students working on physical metallurgy and alloy development products, academic professionals, materials professionals from R&D laboratories, Government research institutions, etc. It will immensely benefit students and researchers. Interpretation of EBSD and EDS literature will become easier after attending the course. People who already have basic knowledge on SEM will be able to hone their skills by attending the course. The course is divided into two parts and participants interested to take up the laboratory course have to physically attend the theory and laboratory course at IIT Bombay. People who want to attend the theory course alone by online mode can participate by video lectures. The theory material would be shared with them. All participants would get participation certificate. Based on course performance and quiz, people would get a proficiency certificate if they are rated above 75% by the course co-ordinator.

**Course Content:**

Theory Classes Day-1	Theory Classes Day-2
Metallographic Sample Preparation Cutting/Sectioning; Mounting samples; Polishing	Basics of Energy-Dispersive X-ray Spectroscopy
Basics of Optical Microscopy (Metallurgical) Metallurgical Stereology	Basics of EBSD: Kikuchi diffraction patterns; Phase mapping; Texture analysis
Basics of Scanning Electron Microscopy Field emission and Tungsten SEM; SE imaging; BSE imaging; In-lens imaging	

Laboratory Classes Day-3
Sample Preparation: Mounting (Hot and Cold)
Sample Preparation: Polishing
Sample Preparation: Etching
Optical Microscopy: Imaging
Optical Microscopy: Image quantification

Laboratory Classes Day-4
SEM: Imaging (SE & BSE)
SEM: Elemental analysis
SEM: EBSD
EBSD post processing
- Grain statistics
- Phase mapping
- Texture quantification

### Registration Fees and Payment Methods

Participant type	Only Theory Course (2 days online)	Theory and Laboratory (4 days at IIT Bombay)
IIM Members	5000 + 900* = 5900	10000+1800* = 11800/-
IIM Non Member	7500 + 1350* = 8850	15000 +2700* = 17700/-
Student Member	1000 + 180* = 1180	8000 +1440* = 9440/-
Student Non-member	1500 + 270* = 1770	9000 +1620* = 10,620/-

\* (18% GST) ; Laboratory training includes Eqpt & consumables

**Dr G Balachandran**  
 Chairman, SPECS Committee,  
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**Bank Details**  
**A/c name:**  
 The Indian Institute of Metals  
**Bank:** State Bank of India,  
 SME Branch, Salt Lake,  
**Branch Code:** 04289,  
**IFSC Code:** SBIN0004289  
**Current A/c No.:** 54015600024  
**GST:** 19AAATT3359D1ZF  
**PAN:** AAATT3359D

Participants may join for 4 days at IIT Bombay for direct physical training and laboratory training in on SEM-EBSD. Participants have to make their own arrangements for stay at Mumbai. For guidance you may contact Prof. Sushil Mishra via email :- [sushil.mishra@iitb.ac.in](mailto:sushil.mishra@iitb.ac.in)

- Participants not able to attend the physical training at Mumbai may still be benefitted from the theory classes offered by the on-line mode for the first 2 days.
- Advance payment of Registration fees is mandatory
- Participation fee is non-refundable; however, change in nomination is possible
- Students may furnish suitable proof of their student status while filling the online form
- 10% discount shall be offered for registering more than 5 person.
- Individual Participants are requested to register via <https://shorturl.at/dlGR1> and pay online as per the details below.

The online transaction receipt, mentioning the course number IIM-23-102 may be uploaded by using the link provided in google form. Alternately, a demand draft in favour of "The Indian Institute of Metals" payable at Salt Lake, Kolkata can be sent to The Indian Institute of Metals, Metal House, Plot 13/4. Block AQ. Salt Lake. Sec V. Kolkata: 700091

- Organizational Participants (sponsored by organizations) are requested to register via <https://shorturl.at/huAF0> .

The google form may be filled up by Candidates who are being nominated by their employers. The concerned employer may send us a consolidated list of the candidates whom they wish to nominate along with requisite details. Accordingly we would issue a GST Invoice for the Corporate to do the payment.

