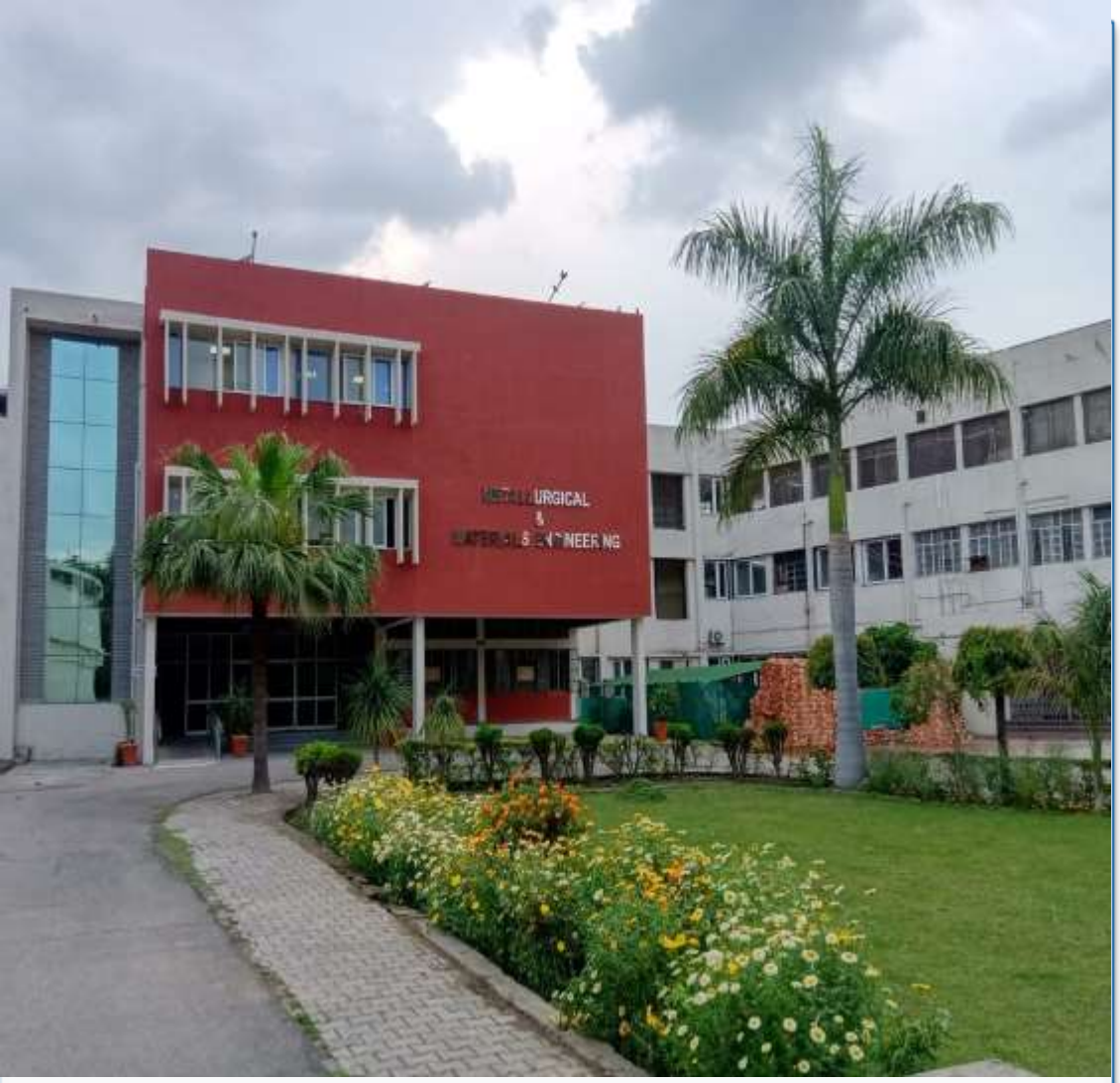

Contact Person

Mr.Krishnasamy S

Technical Officer

Department of Metallurgical and Materials Engineering

IIT Roorkee

E-mail: ksamy@iitr.ac.in

Mobile: 7060383222

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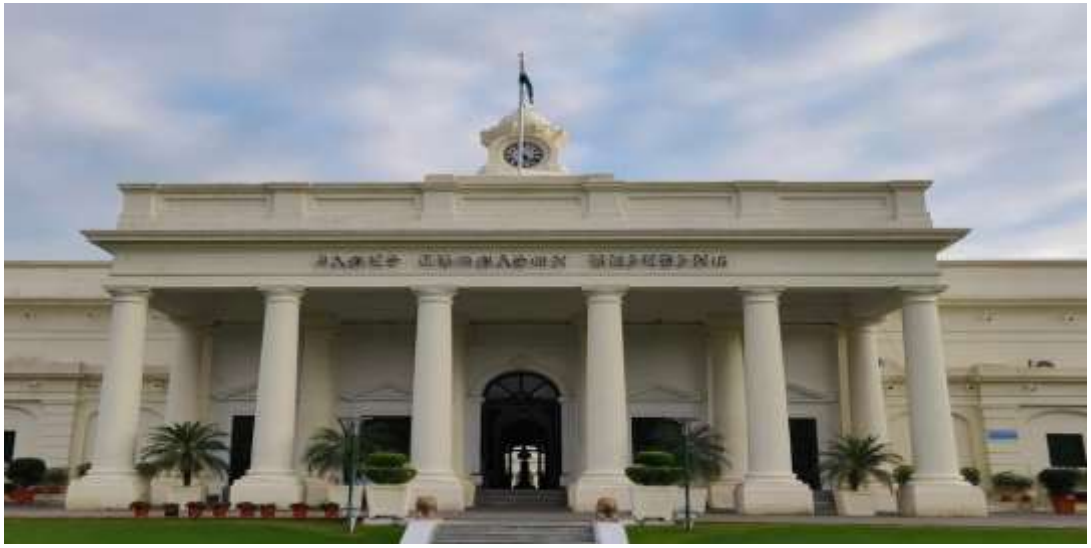
HR-TEM2025

Department of Metallurgical and Materials Engineering

Indian Institute of Technology Roorkee, Roorkee – 247667, Uttarakhand, India



Workshop on
TEM Sample Preparation and HR-TEM Operation
7th – 11th JULY 2025

[Sponsors: JEOL, AMETEK(GATAN), Oxford Instruments, Mars Scientific Instruments, ICON, ThermoFisher Scientific, and Struers]

Venue

Lectures @ CEC, IIT Roorkee

Practical @ 114, HR-TEM Lab, MMED, IIT Roorkee

Head of the Department	Coordinator	Co-coordinator
Prof.B.V.Manoj Kumar	Prof.B.S.S.Daniel	Prof.K.S.Suresh

About IIT Roorkee

Indian Institute of Technology - Roorkee had celebrated its Sesquicentennial in October 1996 and now completed more than 175 years of its existence. It was converted to IIT on September 21, 2001 by an Ordinance issued by the Government of India declared it as the nation's seventh Indian Institute of Technology, an "Institution of National Importance".
The Institute offers Bachelor's Degree courses in 10 disciplines of Engineering and Architecture and Postgraduate's Degree in 55 disciplines of Engineering, Applied Science, Architecture and planning. The Institute has facility for doctoral work in all Departments and Research Centers.

About the Department

Department of Metallurgical and Materials Engineering was established in 1963 with the intake of sixty students for undergraduate curriculum leading to Bachelors degree. Later, post-graduation curriculum was started in 1969. The Department has been actively involved in research since its inception.The first award of PhD degree is recorded in 1972.

About High Resolution Transmission Electron Microscope (HR-TEM) Lab

The HR-TEM instrument of JEOL make, Model No. 3200FS was installed in AUGUST 2017 and started functioning with the following analysis:

1.High Resolution Transmission Electron Microscope Imaging: Bright Field, Dark Field and High Resolution Lattice Fringe Imaging.
2.Electron Beam Diffraction: Selected Area Electron Diffraction (SAED), Converged Beam Electron Diffraction (CBED) and Nano Beam Electron Diffraction(NBED).
3.Scanning Transmission Electron Microscope (STEM) imaging: Bright Field STEM and High Angle Annular Dark Field (HAADF) STEM imaging.
4. Spectroscopy: Energy Dispersive X-Ray Spectroscopy (EDS/EDX), Electron Energy Loss Spectroscopy (EELS) spectrum and Energy Filtered Transmission Electron Microscope (EFTEM) with mapping & Zero Loss imaging.

TEM Sample Preparation Lab

The following TEM sample preparation systems are functional for conducting, non-conducting (ceramic) and powder samples:
1. Twin-Jet Electro Polishing (Struers-Tenupol 5)
2. PIPS-II (GATAN-695)
3. Ultrasonic Disc Cutter (Fischione)
4. Dimpling Grinder (Fischione)
5. Low Speed Saw (Buehler) and its allied tools

About the Workshop

1.To explore the knowledge of TEM and practical demonstration of TEM sample preparation using various research instruments and samples.

2. To demonstrate the operational techniques of 300kV High Resolution Transmission Electron Microscope (HR-TEM) operations.

Workshop Schedule

1. Forenoon Session, *Lecture Day 1*:

TEM - Introduction, Principles and techniques [Basics] - Prof. Suhirt Mula
[History, Comparison to other Microscopes, Instrument: Construction, Electron Guns, Illumination, Alignment, Stigmation and Detectors]

***Lecture Day 2:* TEM - Sample Preparation - Prof. B.S.S. Daniel**
[Bulk to thin slice, various techniques (TwinJet Polishing, Cross-Sectional Sample, Dimpling Grinder, Ultrasonic Disc Cutting, Lithography, FIB lamella, Drop Casting, etc.), precautionary measures while preparing the sample]

***Lecture Day 3:* Imaging [TEM and STEM] - Prof. G.P. Chaudhari**
[TEM - Contrasts: Diffraction, Phase and Mass-thickness (and their associations with Bright and Dark Field Imaging and High Resolution Lattice fringe Imaging), STEM - Bright Field and High Angle Annular Dark Field Imaging]

***Lecture Day 4:* Electron Diffraction - Prof. K.S. Suresh**
[Basic Crystallography, Selected Area and Convergent Beam - Electron Diffractions, Kikuchi Diffraction, Acquisition and Analysis]

***Lecture Day 5:* Basic Spectroscopy - Prof. Sumeet Mishra**
[Energy dispersive X-ray Analysis, Electron Energy Loss Spectroscopy and Energy Filtered Transmission Electron Microscopy]

2. Afternoon Session, , Day 1-5 :

Dr. Manovah David T, Project Consultant, Mr.Krishnasamy S, Technical Officer
Practical Demonstration – 1:
TEM sample preparation starting from bulk to thin slices with the help of the sophisticated instruments such as, Twin-Jet Electro Polishing, Dimpling Grinder, Ultrasonic Disc Cutting, Drop Casting, etc and demonstrate the precautionary measures while preparing the sample for avoiding its any internal structural changes, demonstration of Lithography techniques and FIB Lamella (ThermoFisher)
Practical Demonstration – 2:
HR-TEM operations (SAED, Bright, Dark Field and High Resolution Lattice Fringe imaging, STEM and EDS) Registration Fee:
Research Scholars/Students: Rs.3000+GST@18% = **Rs. 3,540/-**
Academic (Faculty / Scientists): Rs.6000+GST@18%=**Rs.7,080/-**
Industry: Rs.12000+GST@18% :**Rs.14,160/-**
No TA/DA will be given to the Participant, IITR Guest House (NC-NIGAM&KIH) booking will be arranged (SHARING) on charges by the visitor/Participant.
Lunch, Tea & snacks: By the organizers

Certificates: on participation, Workshop between 7th – 1th JULY 2025.
Any queries, E-mail: **ksamy@iitr.ac.in**, Mobile: **7060383222**
Registration (First come, First served) Link:
https://forms.gle/7j7XiySekc4TrvhK6
Last Date to Apply: 30th JUNE 2025