

High-End Workshop

On

Mastering Microstructural Characterization: A Hands-On Workshop on SEM, EDS and EBSD (MCWS-2024)

(Under DST-SERB, Accelerate Vigyan Sponsored-Karyashala Scheme)

Feb 26- Mar 6, 2024



Organised by:

Department of Metallurgical and Materials Engineering,
Visvesvaraya National Institute of Technology,
South Ambazari Road, Nagpur - 440010
Website: www.vnit.ac.in

Event Organizers:

Dr. Rajesh K. Khatirkar, Professor

Dr. Seelam R Reddy, Assistant Professor

Dr. Abhinav Arya, Assistant Professor

Metallurgical and Materials Engineering, Visvesvaraya National Institute of Technology (VNIT),
South Ambazari Road, Nagpur – 440010, Maharashtra

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ABOUT THE KARYASHALA SCHEME:

The KARYASHALA scheme represents an initiative by the Science and Engineering Research Board (SERB), under the Accelerate Vigyan scheme, which is spearheaded by the Government of India. This scheme aims to offer practical, hands-on experience to students, particularly those from universities, colleges, private academic institutions, and newly established institutes. The primary focus is on enhancing their proficiency in handling and troubleshooting high-end scientific instruments. Additionally, the scheme facilitates skill development in areas and themes essential for effective research work.

ABOUT THE INSTITUTE:

Visvesvaraya National Institute of Technology, Nagpur (VNIT Nagpur) stands as one of the thirty National Institutes of Technology across INDIA. It is recognized as an Institute of National Importance and it bears the name of Bharat Ratna Sir M. Visvesvaraya. Originally known as Visvesvaraya Regional College of Engineering (VRCE), it was founded in 1960 under a scheme supported by the Government of India and the Government of Maharashtra. The institute is dedicated to contributing significantly to the national objective of producing high-quality human resources of global standards. This involves establishing a sustainable technical education system that adapts to the evolving needs of the country, incorporates pertinent social concerns, and fosters an environment conducive to the creation of innovative technologies for national development.

ABOUT THE DEPARTMENT:

The department of Metallurgical and Materials Engineering was established in 1965 and it offers undergraduate programme in Metallurgical and Materials Engineering (B.Tech), post-graduate programmes (M. Tech) in Materials Engineering (ME) and Process Metallurgy (PM) and PhD programme. The department is equipped with state-of-the-art equipment for structural, mechanical and thermal characterization of materials. Besides, our department also have a very good corrosion and wear testing laboratory. The department is having collaborative projects with National Institutions like IGCAR, DMRL, NML, ARCI etc. We also offer characterization facilities on payment basis to universities and industries in the central India to promote research and collaboration.

INTRODUCTION TO THE WORKSHOP

The demand of materials to perform under complex service conditions necessitates rapid advances in design and development of materials and associated technologies. The theme of linking properties with the structure and chemical composition plays a key role in systematic development of materials, their behaviour in practical applications and understanding of materials processing technologies. Besides synthesis, characterization is becoming increasingly important in the development of new materials.

The workshop is an effort to bring together on one platform, experts from the characterization field, academicians and research scholars to interact with each other in the area of materials characterization. This ten day's workshop will cover fundamentals of different characterization techniques, few case studies, hands on training on different characterization equipment and analysis of experimental results, presentation of the data in journal papers.

SCOPE OF THE WORKSHOP:

The workshop focuses on theory and hands on training on:

- Sample Preparation Techniques like cutting, polishing (both manual and electropolishing) and etching techniques.
- Microstructural characterization techniques like scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS) .
- X-ray diffraction (XRD) for phase identification and texture analysis of different materials.
- Advanced microstructural characterization techniques like electron backscattered diffraction (EBSD).
- Analysis and interpretation of the data obtained from XRD, SEM, EDS and EBSD.

TARGET AUDIENCE FOR THE WORKSHOP

UG final year students, PG and PhD students working towards research in the area of microstructural structural analysis in Materials Science, Metallurgy and Mechanical Engineering.

BENEFIT TO PARTICIPANTS

- Opportunity to have hand on experience on SEM, EDS and EBSD.
- Participants will be given opportunity to characterize their samples in our laboratory.
- Certificate from karyashala.

REGISTRATION DETAILS

- The course is completely free of cost for all shortlisted participants. The workshop is sponsored by SERB.

- Traveling expenditure of 3AC railway journey fare will be reimbursed to all selected participants upon submission of valid train tickets by the shortest route to and from Nagpur.
- Accommodation will be provided free of cost to all selected candidates by VNIT during the course in the hostels on a sharing basis subject to availability.
- The number of participants is limited to 25 candidates only. Interested participants can register at the earliest through the Google form. <https://forms.gle/ULrX97qqRa85uKWb9>
- Registration form duly signed by Recommending Authority/Head of the Department/ Institute to be mailed to the event organizers (rajeshk@mme.vnit.ac.in). The participants are also required to fill the google form.
- Shortlisted participants will be informed by email/phone. A valid E-mail ID and a mobile number should be provided during registration. Participants will have to acknowledge and accept the offer for participating in the workshop through a return email, failing which the waitlisted candidates may be called for the workshop.

Chief Patron

Prof. P.M. Padole
Director, VNIT Nagpur

Event Organizers

Prof. Rajesh K. Khatirkar
Dr. Seelam R. Reddy
Dr. Abhinav Arya

Chairman

Prof. D.R. Peshwe
Head, Metallurgical and Materials Engineering
VNIT Nagpur

Course Assessment & Feedback

- Active participation in lectures and hands-on training sessions along with basic level evaluation shall fetch KARYASHALA Course Completion Certificate.
- As per SERB guidelines, mandatory anonymous course feedback shall be taken in the stipulated format.

REGISTRATION FORM*

Visvesvaraya National Institute of Technology (VNIT), Nagpur

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING

**Mastering Microstructural Characterization: A Hands-On
Workshop on SEM, EDS and EBSD (MCWS-2024)**

(Under DST-SERB, Accelerate Vigyan Sponsored-Karyashala Scheme)

Feb 26- Mar 6, 2024

- 1) Full Name:
- 2) Student Status (FINAL YEAR UG/PG/Ph.D.):
- 3) Current Institution/Organization:
- 4) Department:
- 5) Thesis title/Area of Research:
- 6) Specialization:
- 7) Communication Address:
- 8) Mobile No:
- 9) Email ID:
- 10) Gender (Male/Female):

Applicant's Signature with Date

Signature of HoD/Principal/Director (with Seal)

* Photocopy or print of this form can be used.

Registration form duly signed by Recommending Authority to be mailed to, rajeshk@mme.vnit.ac.in on or before **15th Feb 2024**.

All correspondence is to be addressed to:

Dr. Rajesh K. Khatirkar

Professor

Department of Metallurgical and Materials Engineering

VNIT Nagpur - 440010

Phone: 0712 – 280-1508, Mobile: 9960973599, Email: rajeshk@mme.vnit.ac.in

Note: Scanned copy (pdf) to be uploaded in the google form link <https://forms.gle/ULrX97qqRa85uKWb9>

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Undertaking by the Candidate

I _____, from _____ (name of Institute/College) S/o., D/o., Mr./Ms. _____ hereby confirm my understanding and acceptance of the following terms and conditions regarding my participation in the “Mastering Microstructural Characterization: A Hands-On Workshop on SEM, EDS and EBSD” workshop.

In the event of being selected for the workshop:

1. I understand that I am required to pay a fee of ₹2000 for confirmation of my participation of the workshop within 2 working days and share the details with the workshop coordinator.
2. I further understand that the ₹2000 fee will be reimbursed to me upon successful completion of the entire workshop and the reimbursement will be subject to fund availability with the organizers.
3. Upon selection and completion of the workshop, I understand that I may be eligible for travel reimbursement. This reimbursement will be based on the submission of valid train tickets for the shortest route to and from Nagpur.
4. To claim travel reimbursement copies of valid train tickets for the shortest route to and from Nagpur within a specified timeframe should be submitted.
5. I will follow all the Institute guidelines during my stay at VNIT and abide by the rules of the Institute.
6. I will be responsible for my personal belongings and activities.

Signature of the Student with date _____

Full name of the student _____

Address and phone number _____



DST-SERB, Accelerate Vigyan Sponsored (Karyashala Scheme)

Mastering Microstructural Characterization: A Hands-On Workshop on SEM, EDS and EBSD (MCWS-2024)

26th February to 6th March 2024



Technical Sessions (tentative schedule)

Day/Slot	9:30-11:00		11:30-13:00		14:30-16:00		16:15-18:00
Day 1 (MON)	Introduction to Microscopy	Tea Break	Role of Microstructural Characterization	LUNCH BREAK	Physical Metallurgy Lab Visit and Equipment Demonstration	Tea Break	Demo of Scanning Electron Microscope and Lab safety
Day 2 (TUE)	Crystallography in Electron Microscopy		Theory of Sample preparation Techniques		Demo of Sample Preparation Equipment		Hands on training on Sample Preparation
Day 3 (WED)	An overview of Diffraction		Instrumental details and Electron Sources		Hands on training on Sample Preparation		Hands-on training on Light Optical Microscopy
Day 4 (THU)	Electron-solid interactions and properties of electrons		How to analyse SEM Images and Data		Session on Hands on operation of SEM		Session on Hands on operation of SEM
Day 5 (FRI)	Electron specimen interaction and Image formation (SE, BSE, etc.), In situ Experiments		SEM-EDS and EBSD Characterization		SEM-EDS data Acquisition		SEM-EDS Data Analysis
Day 6 (SAT)	Materials Processing Techniques		Understanding the evolution of Microstructure		Demonstration of Rolling Mill and Preparation of differently processed Materials		Preparation of differently processed Materials using rolling mill
Day 7 (SUN)	Discussion on utilization of SEM, EDS and EBSD for research (half day)						
Day 8 (MON)	Texture and Microstructural Analysis using EBSD	Tea Break	Structure-Property Correlation	LUNCH BREAK	SEM-EBSD data Acquisition	Tea Break	SEM-EBSD data Analysis using TSL OIM
Day 9 (TUE)	Interpreting the results obtained in SEM		Microstructural Analysis of unknown samples		SEM-EBSD Data Analysis using TSL OIM		Reporting SEM-EBSD data
Day 10 (WED)	Report Preparation, Manuscript Submission Guidelines		Introduction to TEM		Final Closure, Brain Storming on MCWS-2023; Workshop Feed Back		

BENEFIT TO PARTICIPANTS

- Fully sponsored by SERB (Food, accommodation as well as travel)
- Opportunity to have hand on experience on SEM, EDS and EBSD.
- Participants will be given opportunity to characterize their samples in our laboratory.
- Certificate from karyashala.