It is our great pleasure to announce the self-sponsored short-term training course on **"X-ray Diffraction: Theory, Methods and Workflow" (XRD2024)** by the Department of Physics and Materials & Metallurgical Engineering (MME), Maulana Azad National Institute of Technology, Bhopal, during **8th-13th July 2024.**

Address for Correspondence:

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Course Summary

- Duration: Six days
- Experience level: Beginners and intermediate
- Course type: Hybrid (online & off line)
- Teaching Method: Offline
- Registration fee: Rs. 5000/-for students, Rs 6000/-for teaching faculties, researchers and Industrialist

What you will earn in this course

- Understanding the fundamentals of X-Ray Diffraction, preparing samples, collecting data, and interpreting results, identifying the errors and make corrections in the XRD data
- Determination of Crystal Structure, lattice parameter & Qualitative and Quantitative phase analysis
- Order-disorder transformations, Determination of crystallite size and strain
- Structural Refinement using Rietveld Method
- Residual Stress Analysis, Thin films and Texture Analysis, Case Studies

Contents

- Production and Detection of X-Rays,
- X-Ray diffraction Methods, Diffractometer Measurements (Tube design, Goniometer, Detector, sample holder)
- Intensity of Diffracted Beam, Determination of Crystal Structure, Precise Lattice Parameter
- Qualitative and Quantitative Phase Analysis, Calculation of Crystallite size and Lattice strain
- Determination of dislocation density
- Texture analysis, Stress analysis by xrd
- Determination of single crystal orientation by xrd
- Analysis of thin films, biological samples
- Chemical analysis by XRF, x-ray absorption
- Practical sessions includes - Lab Demonstration of Equipments, Data collection, optimization of scan parameters
- Sample preparation and understanding the experimental errors and corrections
- Simulation and Visualizing x-ray pattern from your samples, Profile Fitting of experimental data and calculations, RIR Method, Rietveld Refinement and analysis, Case studies

Who is this course for?

- Beginners: those who are new to x-ray diffraction Undergraduate and postgraduate students of science and engineering discipline looking for certified courses
- Research scholars looking for interpreting their xrd data
- Analysts or Technicians looking for refresher course
- Lab managers who are responsible for the instrument or generating data in production line
- Teaching faculty who are handling this course
- Researchers
- Service and Marketing Engineers of these instruments who need to update their understanding on structures

Note: Educational Institutes interested to conduct this course for their students may also contact the coordinators

How to register for the online XRD training course?

The link for the registration forms (online Google forms) https://docs.google.com/forms/d/e/1FAIpQLSca5pOcDU_OJQT204hP4nVbygZi7l4yTKbH1AKIL34sbV_x5Q/viewform?usp=sharing

The last date for the submission of application is 30TH June, 2024.

Tests and attendance are compulsory for the certification.

Registration fee:

Students and Research Scholars Rs.5000/-

Teaching/Research Faculties, Industry experts Rs 6000/-

2nd Summer Short-Term Training Course on X-ray Diffraction: Theory, Methods and Workflow (XRD2024)

(8–13th July, 2024)

Patron

Prof.K.K. Shukla Director, MANIT Bhopal

Advisors

Prof. Rajnish Kurchania, HOD Physics

Prof. Sanjay Srivastava, HOD MME

Program Coordinators

Dr. C. Sasikumar

Dr. Piyush K.Patel

Dr. Jyoti Rani

Organized by

Department of Physics &

Materials and Metallurgical Engineering

Maulana Azad National Institute of Technology

Bhopal 462003

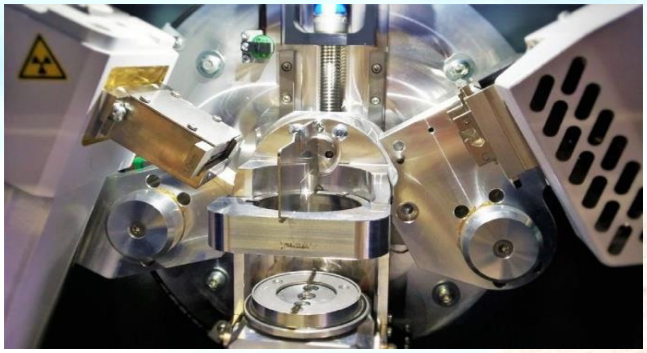
Website: www.manit.ac.in

About the institute

Maulana Azad National Institute of Technology (MANIT), an Institute of National Importance, is formerly known as Maulana Azad College of Technology (MACT). Institute is named after the great scholar and first education Minister of Govt. of India, Maulana Abul Kalam Azad. The Govt. of India and Govt. of Madhya Pradesh jointly sponsored the Institute in 1960 to attract bright young engineering students across the country. Institute is successfully producing highest quality skilled man power to cope up with challenges of modern technological advances with more than 200 faculties and 5500 students. The Institute offers 09 UG and 30 PG courses and also Ph. D. research programs. Currently, IIIT Bhopal is functioning inside the MANIT campus and MANIT Bhopal is the mentor institute of IIIT Bhopal.



About the Course



Different types of crystalline arrangements can be observed in various materials. The internal arrangement of atoms within these materials plays a significant role in determining their properties. To determine the specific way in which atoms are arranged in a crystalline structure, the X-ray diffraction technique is commonly used. This course aims to provide an introductory understanding of how X-ray diffraction can effectively address crystallographic challenges in both single and polycrystalline materials, starting from the fundamentals.

The technique began when von Laue discovered that crystals diffract x-rays in 1912. Since then, it has been applied to crystal structural analysis, stress and strain measurement, measurement of particle size etc. The scope of this course is firstly to acquaint participants with a fundamental understanding of the theoretical basis as well as the practical applications of powder diffractometry followed by a demonstration of XRD analysis techniques. Secondly, to provide hands-on training to determine the crystal and molecular structure from the measured X-ray diffraction data. During the course participant will learn about how to use crystallographic software for phase analysis as well as crystal structure analysis, Rietveld refinement, estimation of grain size, lattice parameters, lattice strain, substitution/doping analysis, etc. All the required software, sample data for analysis and other information will be provided during the training sessions. This school will also provide a platform to the participant to discuss their ideas and collaborate with renowned scientists of materials science

About the Department of MME

The Department of Materials and Metallurgical Engineering (MME) was established in the year 2007 with a vision of creating a world class environment for education and R&D in the field of Materials and Metallurgical Engineering. The department is working towards creating collaborative and supportive environment that ignites advances in materials research in India by developing fundamental understanding, adopting frontier technologies, providing education and enabling technological innovations. The department offers undergraduate program in Materials and Metallurgical Engineering, PG program in Materials Science and Technology and Ph.D. program. The Department has developed few state-of-art facilities in materials processing and characterization. These facilities includes Scanning Electron Microscope with EDX Facility, X-Ray Diffraction Facility, Thin Film Processing (PVD cum PECVD), Facilities for corrosion and electrochemical studies (Potentiostat/Galvanostat), Destructive and Non-Destructive Testing Facilities, Advanced Materials Processing Facilities (Planetary Bal Mills, High Temperature Furnaces, Microwave Processing)

About the Department of Physics

The department of Physics offers an M.Tech. course in Nanotechnology and M.Sc in Physics. A center of Nanoscience and Engineering is formed within the department in 2014. The Department and the centre are engaged in research leading to Ph.D. and teaching in the frontier areas of experimental sciences. It has well established laboratories at UG, PG and research level. Department has sophisticated instruments like AFM, BET, UV-visible spectroscopy etc.

REGISTRATIONFORM

Short-Term Training Course on X-ray Diffraction: Theory, Methods and Workflow (XRD2024)

(8-13th July,2024)

Name of the Candidate (Capital letters):

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Address:……..……

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Phone:(R)……. (O)……(with STD code)

E-mail:…….....

Qualification:……..

Present Position:……..

Relevant Experience:…….

Payment Details Bank

Name:

Amount:

Online Transaction ID/ Reference Number:

Date of Transaction:

Signature of Applicant with date

Google link for Registration

https://docs.google.com/forms/d/e/1FAIpQLSca5pOcDU_OJQT204hP4nVbygZi7I4yTKbH1AKIL34sbV_x5Q/viewform?usp=sharing

Details for online payments

Account Name: Director MANIT Bhopal
Bank Name: State Bank of India
Bank Address: MANIT(MACT) Bhopal,M.P.,India
AccountNo:10020150107
IFSC Code:SBIN0001608

Note: In netbanking money transfer clearly mention in the remark column as "Registration Fee for XRD2024.

The link for the registration forms (online Google forms) is available on Institute website www.manit.ac.in.

The last date for the submission of application is 30 June, 2024.