



GITAM
SCHOOL OF SCIENCE



Three-Day National Workshop on X-Ray Diffraction for Structural Analysis of Materials

26th to 28th March 2025

Organized by

Department of Physics and Chemistry

School of Science, GITAM (Deemed to be University), Hyderabad Campus - 502329

Coordinators

Dr. K. Vijayanandhini
Associate Professor
Department of Physics

Dr. Annapragada Ratnamala
Associate Professor
Department of Chemistry

Dr. Sayan Chaudhary
Assistant Professor
Department of Physics

About the Workshop

X-ray diffraction (XRD) is a powerful non-destructive technique widely used by the researchers for materials analysis that includes phase identification, stress measurement, particle size analysis, etc. By analyzing how the X-rays interact with the atoms in a material, one can get valuable insights into various structural properties of material. This workshop will provide lecture sessions to understand the physics of X-ray diffraction and diffractometer geometries used for structural analysis of materials. These sessions will be followed by hands-on training sessions on peak analysis methods of the XRD data, structural refinement packages and tools. The participants of the workshop will gain a deeper understanding on how to effectively interpret the X-ray data from various perspectives and to apply the same for wide range of functional materials.

Resource Person

Prof. Ranjith Ramadurai
**Materials Science &
Metallurgical Engineering,
Indian Institute of Technology (IITH)
Kandi, Hyderabad**

<https://www.iith.ac.in/msme/ranjith/>



Ranjith Ramadurai is currently working as Professor in the Department of Materials Science and Metallurgical Engineering at the Indian Institute of Technology Hyderabad (IITH). His research focuses on the fabrication of thin films, with a particular emphasis on multiferroic and piezoelectric nanostructures for high-k dielectrics, sensors and actuators. He is also involved in the development of flexible ferroelectric polymers for biomedical applications.

He has received his Ph.D. from the Indian Institute of Science (IISc), Bangalore. Before joining IIT Hyderabad, he conducted post-doctoral research at CRISMAT Laboratory in France and Leibniz University of Hannover in Germany. He has completed funded research projects from prestigious government organizations, including DST, DRDO, DMRL, DAE, and UGC-DAE. Throughout his career he has received several prestigious honors, including the Alexander-Von Humboldt Fellowship, the Materials Research Society of India (MRSI) Medal and the DAE-BRNS Young Scientist Research Award. He is passionate about teaching, having conducted numerous workshops and faculty training programs for students, researchers and faculty across wide range of disciplines.

Major topics to be covered

- Physics behind X-Ray Diffraction and optics
- X-Ray Interaction with Matter, Reciprocal Space, Ewald Sphere, Laue and Bragg Diffraction
- Practical Sessions on X-Ray diffractometer (Instrumentation),
- Theory and Hands-on sessions on
 - X-Ray peak analysis Methods
 - Structural Phase Transformation and Phase fraction analysis
 - Structural Refinement packages

Scope

- Lecture and Hands-On training Sessions to analyze X-Ray diffraction data.
- Interactive discussions to clarify concepts and troubleshoot challenges.

Target Audience

This workshop is open to Faculty Members, PhD Research Scholars and Research Fellows from Institutes, Universities and Colleges working in the field of Materials Science, Physics and Chemistry, etc.

This workshop provides participants with the basic knowledge, hands-on training sessions to conduct and interpret the XRD data effectively, making it a valuable opportunity for researchers, students, and faculty professionals

Registration Fee

The number of attendees in the workshop is limited to 30-35. Selection Procedure: First come first served basis.

- Students/Research fellows - Rs. 1000 + 18 % GST
- Faculty / Academic Professionals - Rs. 1500 + 18 % GST
- Industry Professionals - Rs. 2000 + 18 % GST

Important Dates

Start date of Registration: 18th February, 2025

Last date of Registration: 24 March, 2025

Date of Workshop ; 26 to 28 March 2025

Note

- Completion certificate will be issued to the participants.
- Participants will be provided with computer facility
- Participants have to submit UTR No./Transaction receipt as the proof of payment during registration.

Accommodation

Accommodation will be provided on payment basis.

Student's Hostel: Rs. 500 /- per day

Guest House: Rs. 1,425 /- per day

Fill the form for Accommodation

<https://forms.gle/o6i5git4QbC89QUU7>

For more details Contact (Mobile): +91-986 078 2128

For further details Contact program coordinators:

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Program Schedule

Time (IST)	Session Details
Day - 1: 26 March 2025 (Wednesday)	
8.30 AM – 9.00 AM	Registration Venue: Purna Hall, E-Block, E-113, GITAM Hyderabad
9.30 AM – 10.00 AM	Inauguration
10.00 AM – 11.30 AM	Session – 1 Lecture on “Physics behind X-Ray Production and Optics”
11.30 AM – 11.45 AM	Tea Break
11.45 AM – 01.00 PM	Session – 2 Lecture on “X-Ray Interaction with Matter: Insights on Atomic Scattering, Crystal Symmetry, Laue and Bragg Diffraction”
1.00 PM – 2.00 PM	Lunch Break
2.00 PM – 3.15 PM	Session– 3 Practical demonstration on “Geometries of X-Ray diffractometers: Sources, Filters and Detectors”
3.15 PM – 3.30 PM	Tea Break
3.30 PM – 4.30 PM	Session– 4 Practical demonstration on “X-Ray Diffraction, Sample Preparation, Mounting, Data Collection Procedures”

Program Schedule

Day – 2: 27 March 2025 (Thursday)	
9.00 AM – 11.00 AM	Session – 5 Lecture on “Physics behind X-ray Diffraction, Reciprocal lattice, Ewald Sphere and Diffraction Conditions”
11.00 AM – 11.15 AM	Tea Break
11.15 – 01.00 PM	Session – 6 Lecture on “Theory of Structural Phase transformations and Systematic Absences”
1.00 PM – 2.00 PM	Lunch Break
2.00 PM – 3.15 PM	Session – 7 Hands-on training on “X-Ray Peak Analysis - Peak Intensity and Broadening, Strain measurements, Crystallite Size using Williamson Hall Plot”
3.15 PM – 3.30 PM	Tea Break
3.30 PM – 4.30 PM	Session – 8 Hands-on training on “Structural phase transformation and phase fraction analysis”

Program Schedule

Day – 3: 28 March 2025 (Friday)

9.00 AM – 11.00 AM	Session – 9 Hands-on training on “Theoretical Principles of Structural Refinement and Software tools”
11.00 AM – 11.30 AM	Tea Break
11.30 – 01.00 PM	Session – 10 Hands-on training on “Structural Refinement Packages: Data Input and Unit-Cell construction”
1.00 PM – 2.00 PM	Lunch Break
2.00 PM – 3.30 PM	Session – 11 Hands-on training on “Influence of Input and Refinement Parameters in Structural Refinement Packages”
3.30 PM – 3.45 PM	Tea Break
3.45 PM – 4.30PM	Feedback and Valedictory