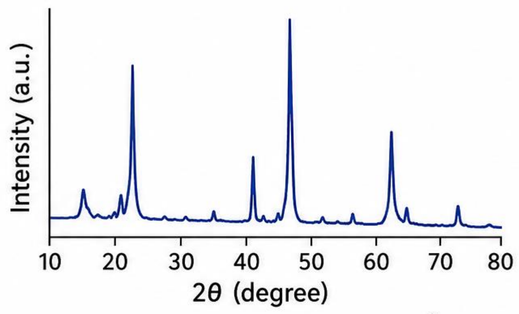
INDIAN INSTITUTE OF TECHNOLOGY
BHUBANESWAR
भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर

THREE-DAY WORKSHOP ON

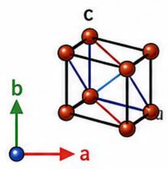
POWDER, THIN FILM, TEXTURE AND STRESS MEASUREMENT ANALYSIS USING XRD

16 – 18 DECEMBER 2026 | **IIT BHUBANESWAR**

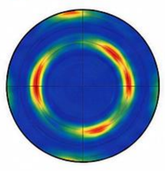
POWDER & THIN FILM



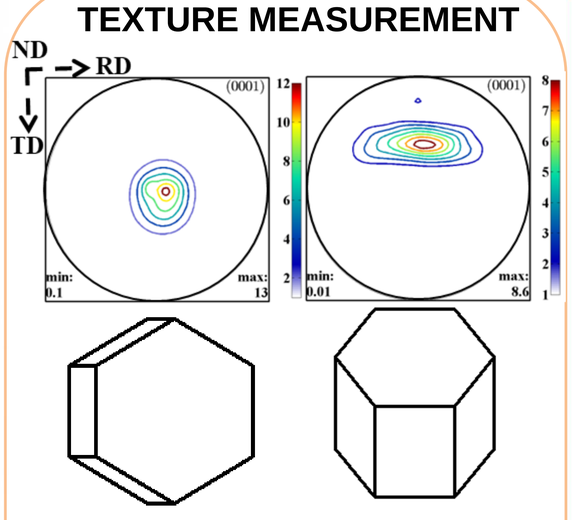
Powder XRD:
Identifies phases and provides structural information from randomly oriented crystallites.



Thin Film XRD:
Determines out-of-plane orientation, lattice parameters, texture, and stresses in thin films.



TEXTURE MEASUREMENT

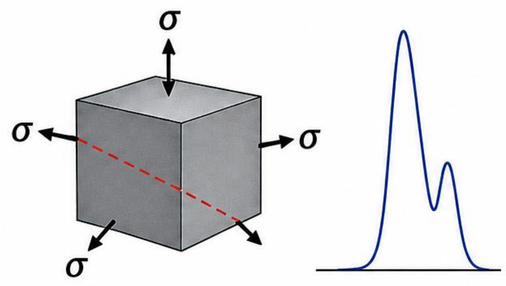


ND : Normal Direction

RD : Rolling Direction

TD : Transverse Direction

STRESS MEASUREMENT



Residual stress causes a shift in the diffraction peak position.

Method: $\sin^2\psi$ method

σ	:	in-plane stress (MPa)
E	:	Young's modulus (MPa)
ν	:	Poisson's ratio
$\varepsilon_{\phi\psi}$	:	lattice strain in direction ϕ at tilt ψ

16 – 18 DECEMBER 2026 | **DURATION 3 DAYS** | **MODE OFFLINE**

HIGHLIGHTS

- Data acquisition and analysis using industry-standard software
- Expert lectures by experienced faculty
- Certificate will be provided to all participants

WHO CAN PARTICIPATE?

Research scholars, Faculty members, Postgraduate students and Industry professionals working in the areas of Materials Science, Metallurgy, Physics, Chemistry, and related disciplines.

ABOUT THE COURSE

This hands-on training introduces the fundamentals and advanced methods of X-ray Diffraction (XRD) for a wide range of materials. Participants will gain practical experience on state-of-the-art XRD instruments for powder, thin film, stress measurement, and texture analysis using the PANalytical Empyrean XRD system.

Participants will learn to:

- *Understand the fundamentals of XRD and its applications.*
- *Operate XRD instruments and optimize measurement conditions.*
- *Perform powder diffraction and phase identification.*
- *Analyze thin film structures and properties.*
- *Measure residual stress using $\sin^2\psi$ method.*
- *Perform texture (crystallographic orientation) measurements.*
- *Process and interpret XRD data using High Score Plus software.*
- *Apply XRD techniques to real-world research problems.*

TOPICS TO BE COVERED

- Introduction to XRD: Principles and Instrumentation
- Bragg's Law and XRD Fundamentals
- Instrument Components & Operation
- Powder XRD: Data Collection & Phase Identification
- Thin Film XRD: Techniques & Analysis
- Grazing incidence X-ray diffraction (GIXRD)
- Residual Stress Measurement ($\sin^2\psi$ Method)
- Texture / Preferred Orientation Measurement
- Data Processing using X'Pert High Score Plus
- Data Interpretation and Reporting
- Hands-on Practical Sessions
- Troubleshooting and Best Practices

PARTICIPATION DETAILS

Maximum number of Participants : 100

Selection
First-Come, First-Served Basis

Registration Fee **Including GST**
- ₹ 4720 /- (Students/Research Scholars)
- ₹ 8260 /- (Faculty/Scientists)
- ₹ 11800 /- (Industry Professionals)

(Includes workshop kit, materials, lunch, dinner and refreshments)

IMPORTANT DATES

Last Date for Registration
25 November 2026

Information on Selection
30 November 2026

Workshop Dates
16-18 December 2026

VENUE

School of Minerals, Metallurgical and Materials Engineering, XRD Lab, IIT Bhubaneswar, 752051

Conveners

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Organized by: School of Minerals, Metallurgical and Materials Engineering (SMMME)
Indian Institute of Technology Bhubaneswar