

# Applications of X-Ray Diffraction (XRD)

Unlocking Innovation:

Harnessing X-Ray Diffraction (XRD) for Research Excellence and Quality Assurance

Date: March 20, 2025 - UPR Mayaguez  
9:00am-12:30pm



## Applications of X-Ray Diffraction (XRD) in Research and Product Quality

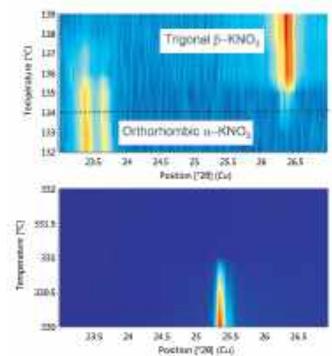
Join us for an informative seminar presented by Malvern Panalytical in collaboration with their local representative in Mitel. This session will delve into the critical technique of X-Ray Diffraction (XRD), a powerful analytical tool widely used in materials science, pharmaceuticals, chemistry, and various industrial applications.

This seminar will cover the foundational principles of XRD, highlighting its significance in characterizing crystalline materials and understanding their structural properties. Attendees will gain insights into the latest advancements in XRD technology and methodologies, with a focus on their applications in research and development.

We will explore how XRD can be utilized to optimize product quality and ensure compliance with industry standards. Practical case studies will illustrate the effectiveness of XRD in materials characterization, phase identification, and the analysis of polymorphism in pharmaceuticals. Participants will also learn about best practices for using XRD data to inform development strategies and enhance product performance.

Whether you are a researcher, quality control professional, or industry leader, this seminar will equip you with the knowledge and tools to leverage XRD effectively in your work. Join us to enhance your understanding and discover how XRD can drive innovation and improve product quality in your organization.

We look forward to your participation!



For Support:  
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# Agenda / Topics

## Topics :

X ray Crystallography Basic | Xray Diffraction Pattern & Diffractometer Sample

Considerations: Thin films, Powders, Single Crystals, Nanomaterials

Main Applications: SAXS / WAXS, Bio-SAXS, USAXS, Total Scattering (PDF Analysis)

Data Analysis-High Score

Examples: Structural biology, Batteries, Graphene, Biomass, Nanomaterials, Liposomes, Protein Solutions, Pharma (Polymorph Identification) etc.

Questions & Event Evaluations

Event Duration: 3 hrs - 3.5hrs



## Our Solutions:



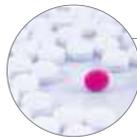
### ACADEMIA

Get the best data for your publications with Empyrean; train and inspire your students. Acquisition of comprehensive information about a material is the key for successful research. Empyrean will give you the highest data quality, letting you see the finest details of your precious samples by performing non-destructive, cutting-edge characterization studies.



### ENERGY STORAGE / BATTERIES

Get a better understanding of your battery materials. Analysis of battery material using X-ray diffraction provides component phase purity and the crystallite size of anode and cathode compounds. Empyrean equipped with the GaliPIX<sup>3D</sup> detector also allows *in situ* and *in operando* measurements of long-lasting cells using hard X-radiation.



### PHARMACEUTICALS

Accomplish advanced characterization of your pharmaceuticals. X-ray powder diffraction, a rapid non-destructive analytical technique, is widely applied in drug discovery, formulation, stability testing and final product quality control. The proven and comprehensive method is available with 21 CFR Part 11 Audit Trail support. Empyrean can also perform *in situ* non-ambient analysis without manual intervention and high-throughput measurements on well-plates.



### SPECIALTY CHEMICALS

Assess crystal structure or structure-property relationship in crystalline and semi-crystalline compounds. Specialty chemicals, also referred to as effect or performance chemicals, are often custom-manufactured materials with unique properties or performance effects to materials or formulation. Empyrean can be used for a detailed phase identification and understanding of these valuable compounds.



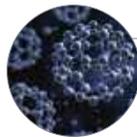
### FORENSICS

Reveal the smallest traces of evidence. The use of non-destructive analytical instrumentation plays a key role in today's forensic laboratories where full chain of custody and data control is desired across all stages of the process. Empyrean can provide information that is vital in criminal investigations and forensic science.



### METALS

Determine retained austenite, stress and texture during metal production. Process control and quality control in the metal industry - whether it concerns primary metals or special products - need rapid and accurate chemical analysis as well as microstructural characterization of metals and alloys. Empyrean can take care of these needs.



### NANOMATERIALS

Reveal dimensions and structures in all types of nanomaterials. X-ray scattering and diffraction are powerful and versatile nanometrology tools for the determination of nanoscale dimensions, shapes and structures, as well as the analysis of crystalline phases and local atomic structures. Empyrean delivers most accurate scattering data.



### THIN FILM METROLOGY

Get access to critical parameters of thin films ranging from ultra-thin single layers to complex multilayer stacks. X-ray diffraction and X-ray reflectivity can provide non-destructive, reliable and accurate data for the characterization of thin films. Empyrean enables the determination of ultra-fast reciprocal space maps, X-ray reflectivity and rocking curve analysis.



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