



XRD

D8 ADVANCE HE and D8 DISCOVER HE

High Energy Diffraction Solutions

Innovation with Integrity



One Platform – Many Possibilities

High-energy diffraction opens new horizons for materials research that go far beyond the limits of conventional Cu-based systems. Greater sampling depth and expanded reciprocal-space coverage, combined with high-efficiency detectors, a wide range of sample environments, and advanced software solutions, enable the study of real materials under realistic conditions - from simple powders to fully assembled devices such as battery cells.

With the D8 ADVANCE HE and D8 DISCOVER HE, high-energy XRD becomes a truly versatile research tool across a broad range of applications - empowering researchers to see more, do more, and understand more.

See More

The use of Mo or Ag radiation reveals structures hidden to conventional X-ray diffraction. Short wavelengths enable non-destructive analysis through complex sample environments, while access to high-Q data improves real-space resolution and sensitivity to subtle structural features.

Do More

The D8 platform is designed for maximum flexibility. High-efficiency CdTe detectors and dedicated high-energy optics join an already comprehensive portfolio of sample stages and non-ambient environments, enabling users to tailor the system to virtually any experiment.

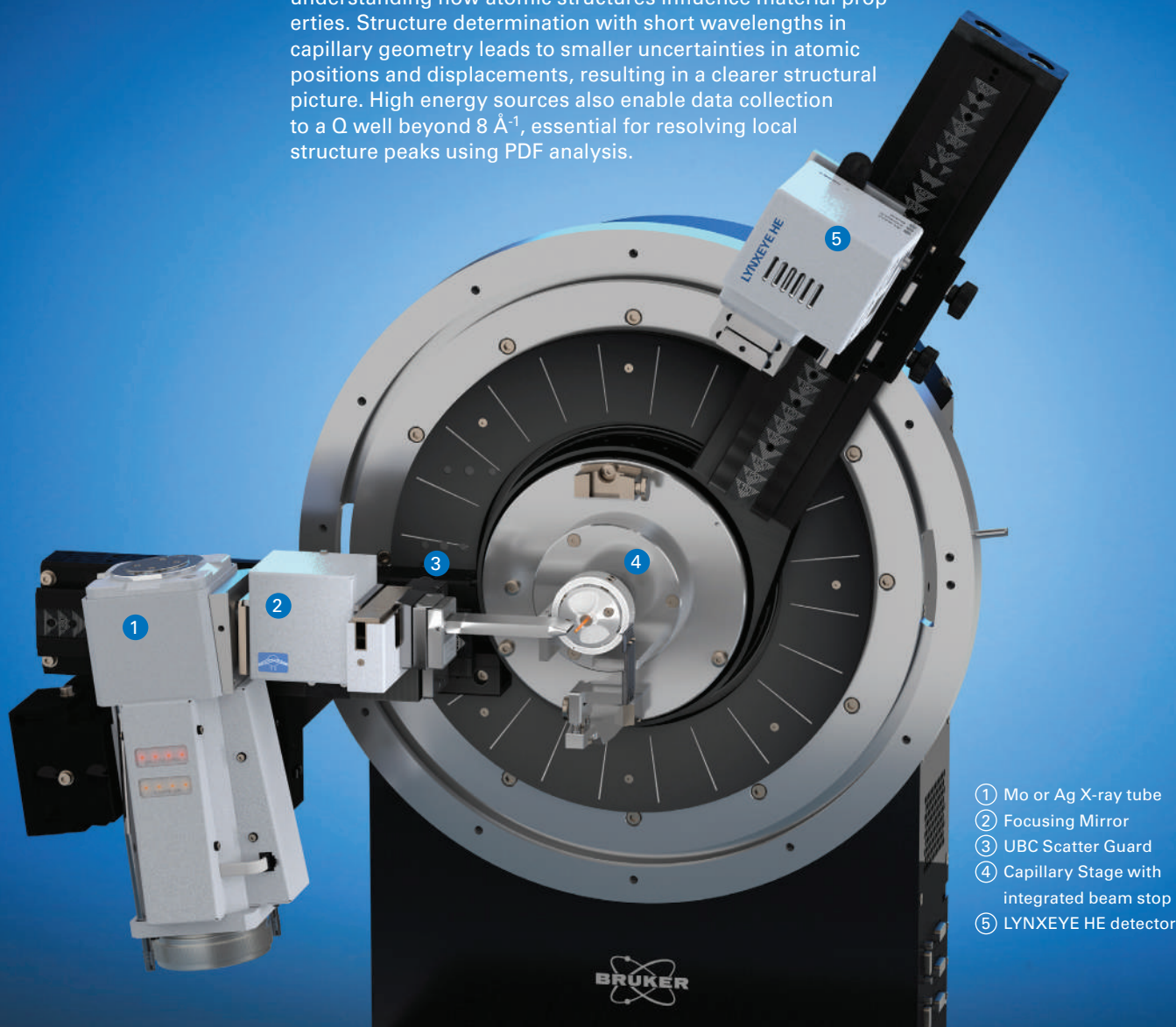
Understand More

The most powerful instrument platform is made even better with integrated software solutions that transform rich scattering data into meaningful structural understanding. From intuitive and automated workflows to advanced modeling and refinement capabilities, users can seamlessly extract, analyze, and interpret even the most complex data-sets.

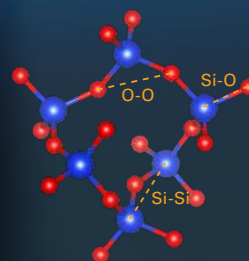
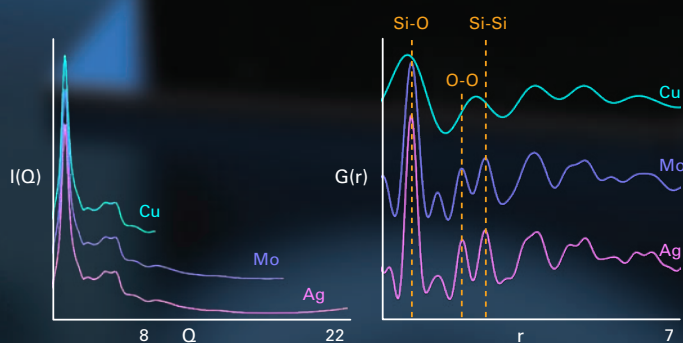
Expand Your Vision

High-Energy Crystallography

In the materials sciences, X-ray crystallography is crucial for understanding how atomic structures influence material properties. Structure determination with short wavelengths in capillary geometry leads to smaller uncertainties in atomic positions and displacements, resulting in a clearer structural picture. High energy sources also enable data collection to a Q well beyond $8 \text{ \AA}^{-1}$, essential for resolving local structure peaks using PDF analysis.



- ① Mo or Ag X-ray tube
- ② Focusing Mirror
- ③ UBC Scatter Guard
- ④ Capillary Stage with integrated beam stop
- ⑤ LYNXEYE HE detector



Raw diffraction data and PDFs of amorphous SiO_2

Make Every Photon Count



LYNXEYE HE

- Air-cooled 1000 μm CdTe sensor
- No water cooling or dry air required
- >99% detection efficiency for Cu, Mo, and Ag radiation
- Proprietary technology design (patent pending)
- Zero defective strips – guaranteed!

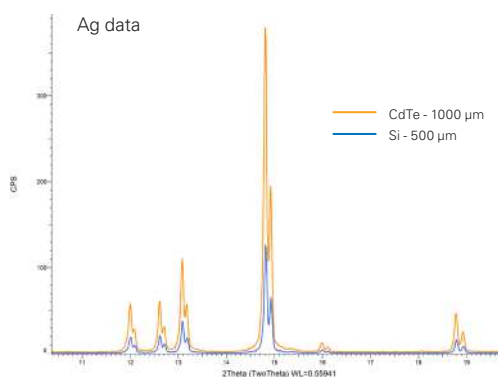
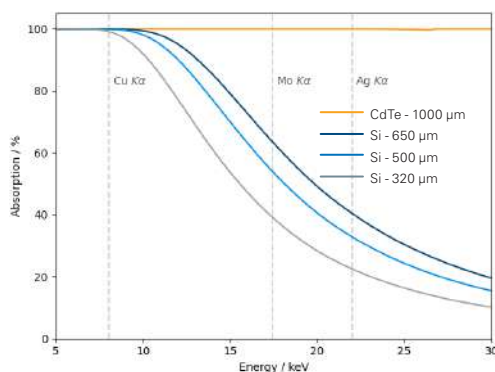


EIGER2 R CdTe 500K

- Largest CdTe detector for XRD in the market
- >99% detection efficiency for Cu, Mo, and Ag radiation
- 0D, 1D, and 2D measurements in step, continuous, and snapshot mode

Optimized for High Energy

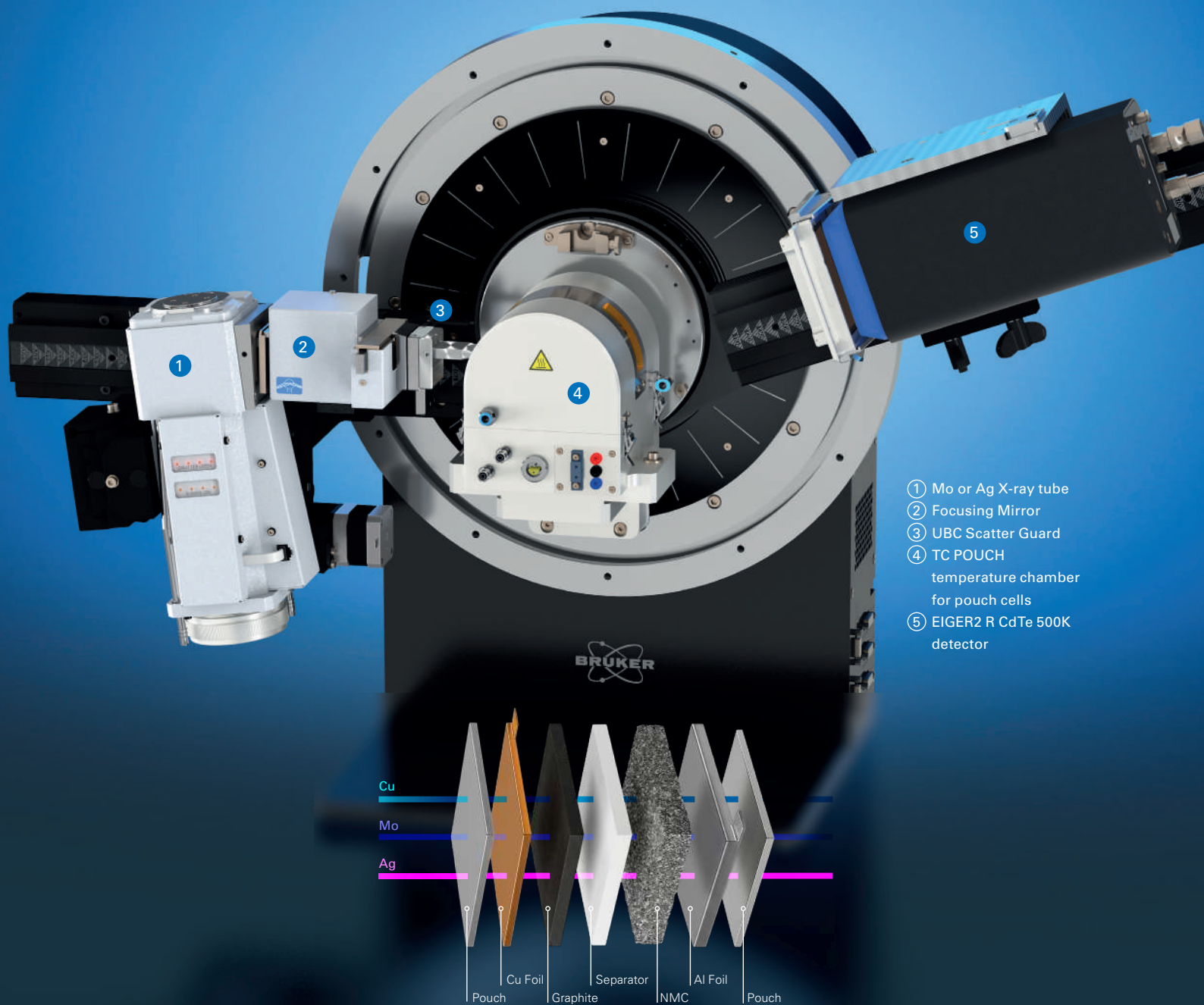
CdTe sensors offer unrivaled stopping power for high energy X-rays, resulting in up to 4x higher intensities compared to Si sensors used in conventional detectors.



Expand Your Reach

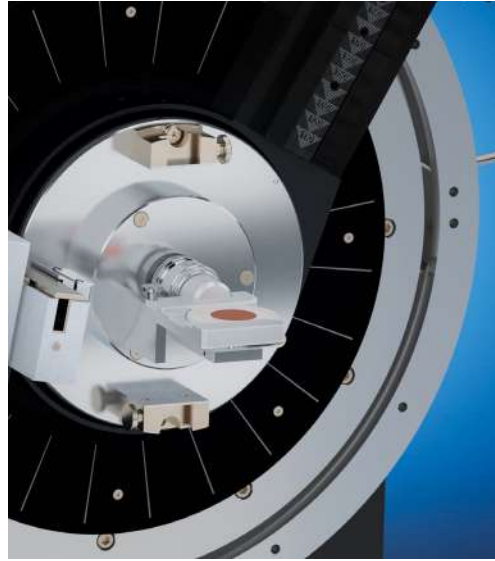
Beyond Ideal Samples

The increased penetration of high energy X-rays enables diffraction experiments in realistic sample environments that are inaccessible with conventional systems. Intact devices and complex setups – such as Li-ion batteries during charge–discharge cycling or catalysts under elevated temperatures – can be studied nondestructively, without compromising data quality. This expanded experimental reach supports operando and time resolved studies under real working conditions.



Typical pouch cell construction

Smart Sample Handling



3 sample stages in 1

- Capillary, reflection, foil transmission
- Alignment-free capillary mounting
- Magnetic components for easy handling
- Compatible with goniometer heads from Huber



High Throughput Sample Changers

- UMC 150 HTS-3: high throughput screening of 3 well plates and 288 samples
- AUTOCHANGER: up to 6 exchangeable towers for a total capacity of 90 samples



Battery Research

- Electrochemical cell designed by battery experts
- Flexible pouch cell holder for various sizes
- Fully software integrated potentiostat



Non-Ambient Solutions

- Capillary furnace for measurements from RT up to +1000 °C
- Electrochemical experiments on pouch cells from -10 to +110 °C
- Modular temperature chambers, reconfigurable from -180 to +2000 °C

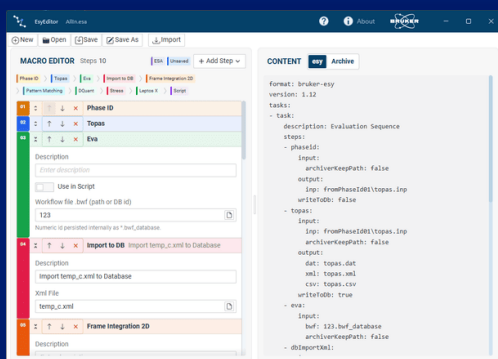
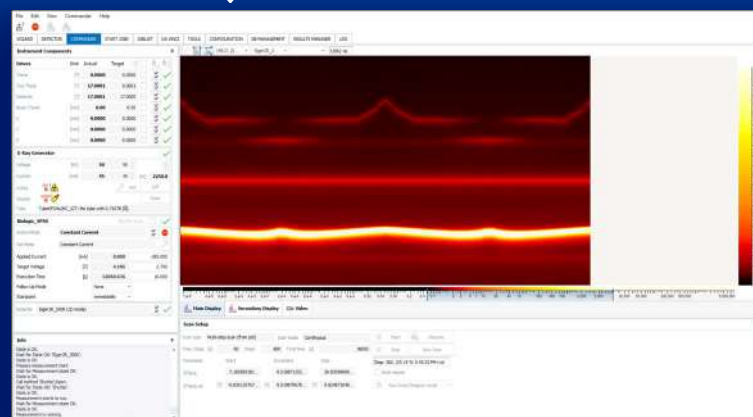
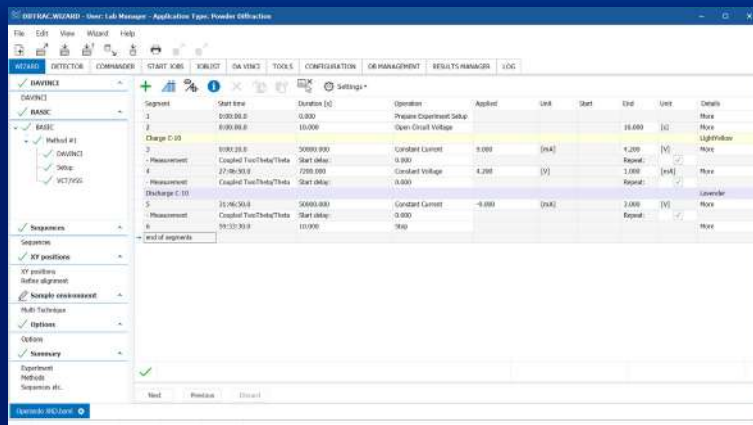
The Path to Deeper Insights Plan. Measure. Analyze.

The DIFFRAC.SUITE software platform offers a comprehensive set of modular tools for intuitive data acquisition and evaluation.

Experiments are planned using the step-by-step guidance of WIZARD, supporting everything from straightforward powder diffraction scans to complex electrochemical measurements with temperature profiles.

Planned experiments can be executed via the START JOBS interface, using either a spreadsheet-style overview or simple push-button control, or launched directly through the powerful and intuitive COMMANDER interface for maximum flexibility.

All completed measurements are stored in the RESULTS MANAGER database, combining scan data with complete metadata, including instrument configuration and user settings. Alternatively, data can be exported as individual files for offline analysis or further processing.



Scalable Automation for Modern XRD Workflows

DIFFRAC.BBE (Black Box Evaluation) is the automation backbone of DIFFRAC.SUITE, orchestrating complex, multi-step evaluation workflows at scale. It enables reproducible analysis of large datasets and advanced research scenarios with minimal manual effort—while also automating DIFFRAC.EVA workflows and DIFFRAC.TOPAS batch operations in launch mode to scale even the most sophisticated evaluation recipes across large data volumes.

- Standardize expert knowledge
- Scale without complexity
- Reduce operator dependency

Industry-Leading Software Solutions

DIFFRAC.EVA

DIFFRAC.EVA is the versatile X-ray diffraction analysis software for fast, reliable evaluation of 1D and 2D diffraction data. Supporting all detectors and scan types, DIFFRAC.EVA covers the full analysis workflow and provides a powerful, end-to-end solution for routine analysis and advanced research alike.

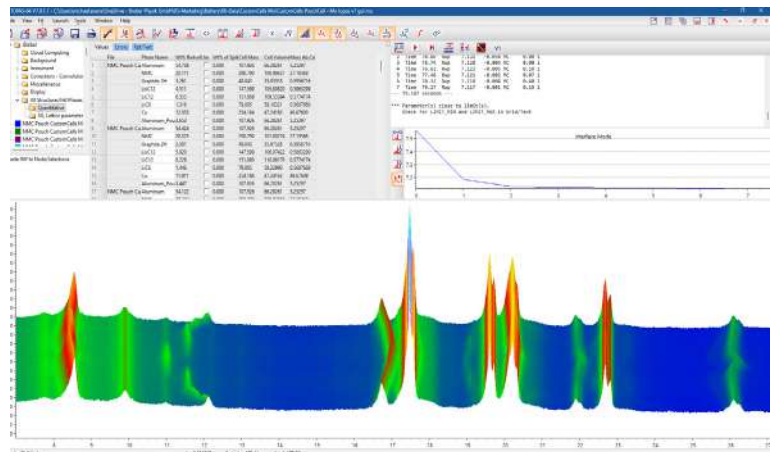
- Data reduction, basic scan evaluation, and presentation
- Phase identification, profile fitting, and quantification
- Pair distribution function (PDF) generation and evaluation
- Workflow recording and automation
- Large dataset handling and visualization, with supplementary information such as temperature, pressure, humidity, voltage, current, etc.



DIFFRAC.TOPAS

The most popular Rietveld refinement software in both academia and industry, DIFFRAC.TOPAS is built around a general non-linear least squares system designed to integrate all types of diffraction and scattering data. Its flexible macro language allows users to implement custom refinement strategies and develop user-defined models, empowering the solution of highly specialized and advanced research problems. Combined with unrivaled speed and flexibility, no problem is too big to handle.

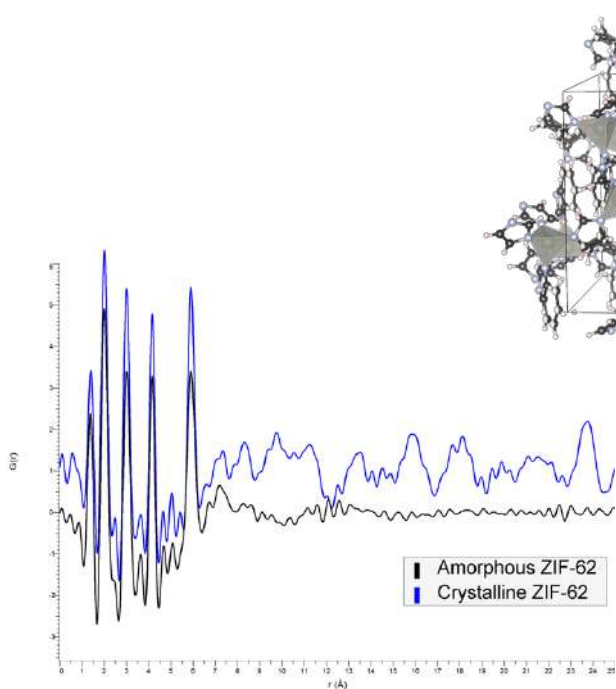
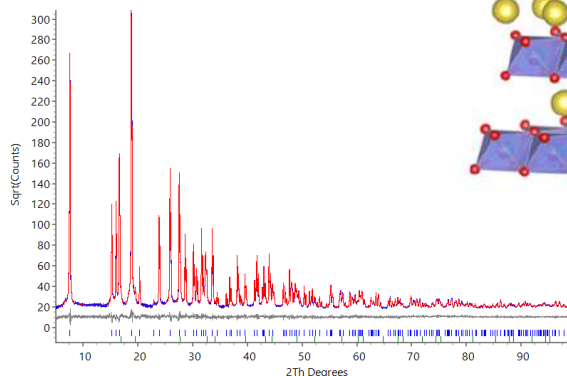
- Rietveld quantitative phase analysis
- Structure determination and refinement
- Pair Distribution Function (PDF) data generation and refinement
- Partial PDF calculation and display
- Analyze thousands of datasets in seconds



Reveal Hidden Detail

Improved Structure Refinement

High-energy radiation offers several advantages for crystallographic investigations of inorganic materials. The short wavelength resolves shorter d-spacings, while also reducing sample absorption and fluorescence effects, leading to lower background levels and improved signal-to-noise ratios.

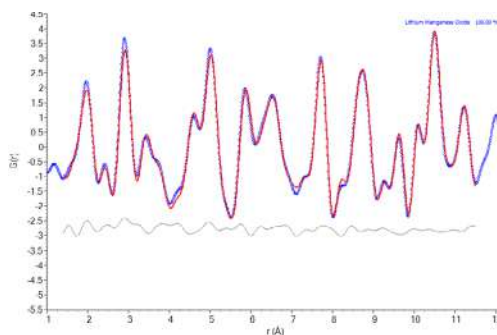


Amorphous Material Structure Analysis

With PDF analysis, the short-range atomic ordering of amorphous materials can be seen and used for structure evaluation. In MOF glasses like ZIF-62, the PDF confirms the network of tetrahedrally coordinated metal cations remain intact, while the long-range periodicity has been lost, influencing the material's porosity.

Disordered Materials

Interesting material properties can manifest due to small distortions in the crystal structure. Structure refinements using both PDF and reciprocal space data highlight differences between the local and long-range ordering in LiMn_2O_4 .



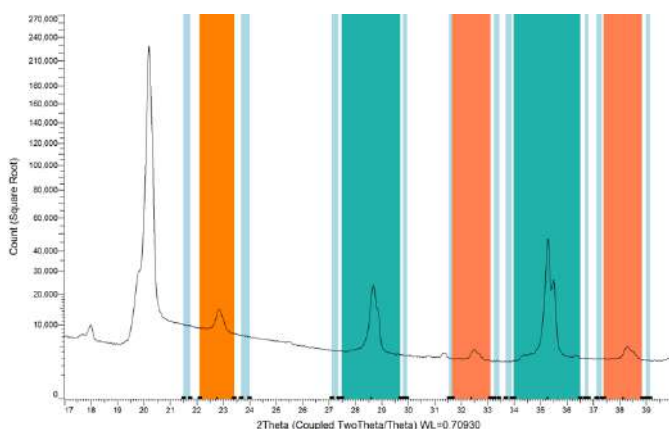
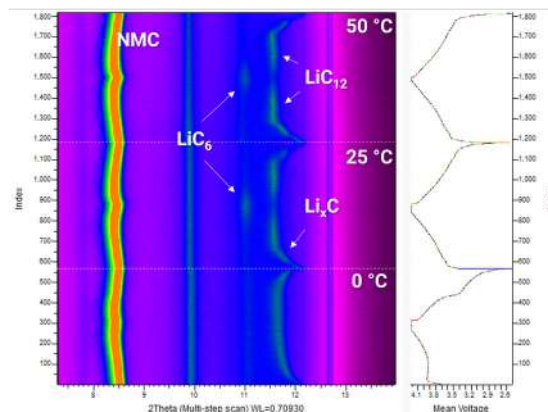
Structure model images created using VESTA

K. Momma and F. Izumi, "VESTA 3 for three-dimensional visualization of crystal, volumetric and morphology data," J. Appl. Crystallogr., 44, 1272-1276 (2011).

Look Deeper

Battery Performance under Real Conditions

Study intact battery assemblies under realistic conditions, like charging at temperature extremes. High-energy X-rays penetrate current collectors and housings, enabling operando insight into both anode and cathode materials during cycling.

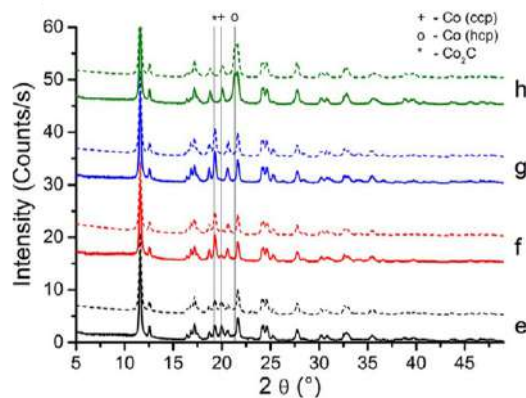


Better Sample Statistics

High-energy diffraction minimizes surface effects and increases sampling depth. Retained austenite quantification using Mo radiation provides improved bulk diffraction signal, while compressing the diffraction pattern, meaning more peaks can be analyzed in shorter measurement times.

Detailed Insight in the Home Lab

Long-term deactivation catalysis experiments can often last several days, which can be impractical at facilities where beamtime is at a premium. A laboratory high-energy diffraction setup offers maximum flexibility and ample time-on-stream, allowing monitoring of catalytic reactions for extended times.



Diffraction Without Limits

High-energy XRD on the D8 ADVANCE HE and D8 DISCOVER HE is fully integrated into the D8 platform, enabling seamless combination with the full range of diffraction applications.

From compact benchtop to fully configurable floor-standing systems, all instruments share a common foundation of innovation, software integration, and application expertise—ensuring consistent workflows, scalable performance, and future-proof flexibility as your analytical needs evolve.

Every system is supported by the Bruker Alignment Guarantee, delivering trusted performance and confidence in every measurement.

D8 ADVANCE
Versatile and Future-Proof

D8 DISCOVER
All-Purpose Cutting Edge



Bruker AXS is continually improving its products and reserves the right to change specifications without notice.
Order No. DOC-B88-EXS031 © 2026 Bruker AXS SE.

Bruker AXS SE
Östliche Rheinbrückenstraße 49
76187 Karlsruhe
Germany

info.baxs@bruker.com
bruker.com

Worldwide offices
bruker.com/baxs-offices

Online information
bruker.com/d8advanceHE

