X-RAY DIFFRACTION & SCATTERING

D8 ADVANCE

Fine-tuned to peak performance

Innovation with Integrity


D8 ADVANCE
SSD 160-2
LYNXEYE-2
LYNXEYE XE-T

D8 ADVANCE – simply ingenious

D8 ADVANCE solutions are the recognized first choice when it comes to X-ray powder diffraction and scattering. The proven instrument and software design allows for the easy combination and optimization of components to measure first-class and reliable data for any application. D8 ADVANCE solutions are based on more than half a century of experience in development, manufacturing, and application, and they represent an investment asset that will safely enable current and future analytical tasks with an ever-evolving range of accessories.

The D8 ADVANCE offers fully automatic switching between up to 6 instrument geometries, complemented by a versatile selection of sample stages. This ensures that the instrument is optimally configured for a wide range of tasks. Thanks to Bruker's innovative DAVINCI design, the D8 ADVANCE is always perfectly configurable for a wide variety of samples and applications, consistently delivering top-notch analytical results. This capability is further enhanced by cutting-edge components, including TWIN, TRIO, PATHFINDER Plus, as well as the LYNXEYE and EIGER2 R detector families, which offer unrivaled functionality.

The quality of the analysis results is inherently linked to the quality of the measured data. D8 ADVANCE solutions offer a comprehensive package that includes in-house developed and customer-tailored optics, sample stages and holders, detectors, and software. This ensures the highest data quality available in the market in terms of absolute signal, angular, and intensity accuracy, resolution, and peak-to-background ratios.

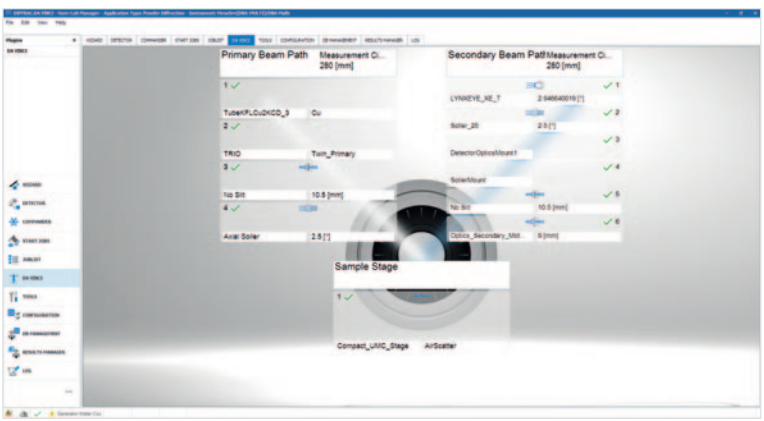
D8 ADVANCE: Everything is possible!

DAVINCI Design – proven ease-of-use

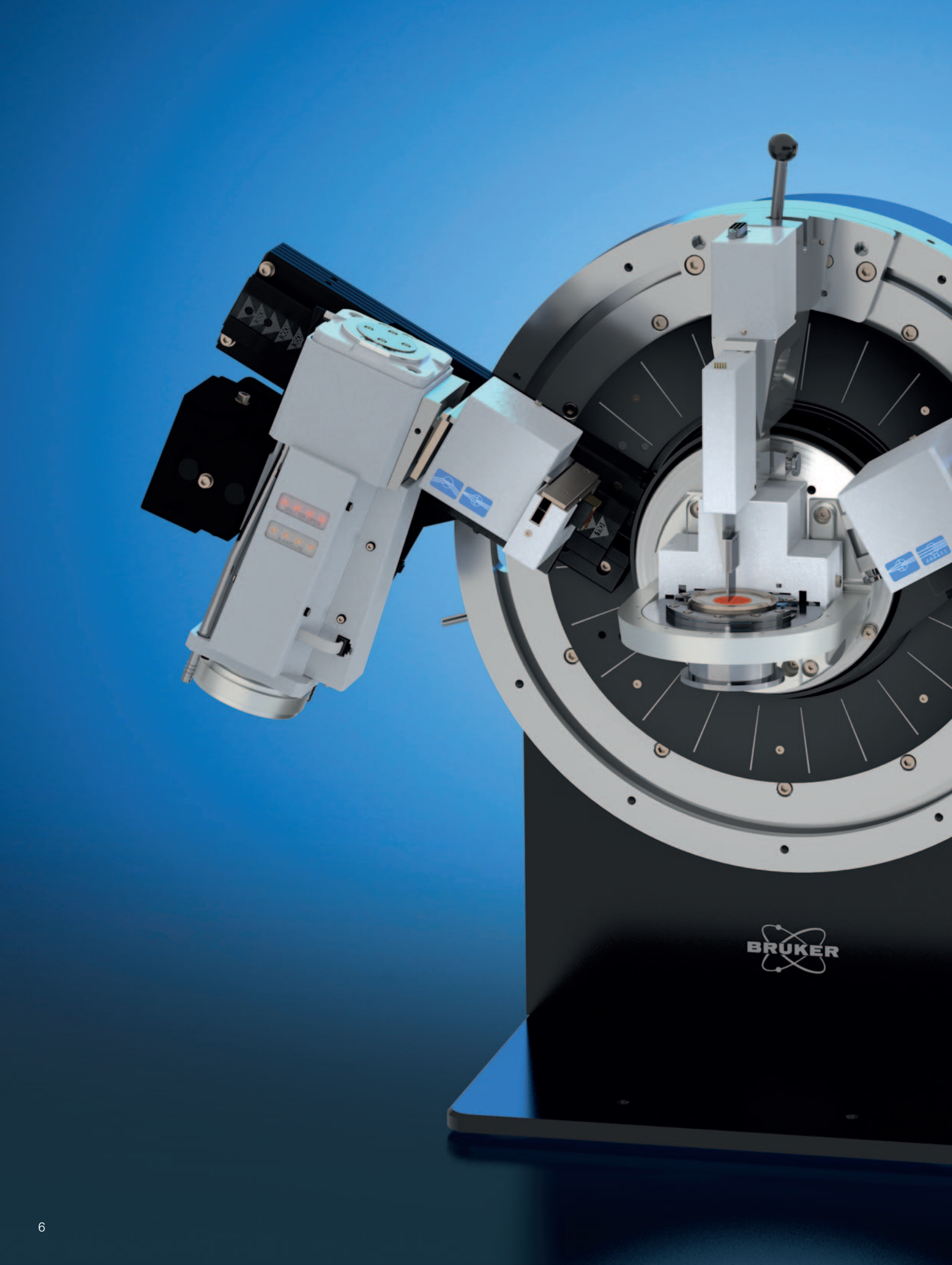
Leonardo Da Vinci contributed ingenious suggestions for the interaction of humans and machines, serving as inspiration for a distinctive X-ray diffractometer operation approach known as "DAVINCI Design". The D8 ADVANCE with DAVINCI Design achieves a perfect blend of user-friendly interface, guidance, and intuition, making it accessible to all users and applications.

The heart of DAVINCI Design is the software plug-in DIFFRAC.DAVINCI. Dependent on sample properties and the analytical task at hand, every user can quickly and easily optimize the D8 ADVANCE configuration and plan advanced methods in the DIFFRAC.WIZARD software. Motorized X-ray optics allow switching beam paths at the push of a button, each covering a spectrum of applications. Sample stages, as well as individually adapted beam path components, can be easily exchanged without realignment. Components are automatically recognized and validated in real time.

DAVINCI Design puts decades of application expertise at your disposal, ensuring success in every endeavor!



"Leonardo da Vinci is revered for his technological ingenuity and his extra-ordinary powers of invention. Leonardo developed a unique new attitude towards machines. He reasoned that by understanding how each separate machine part worked, he could modify them and combine them in different ways to improve existing machines. Leonardo set out to write the first systematic explanations of how machines work and how the elements of machines can be combined."


BRUKER

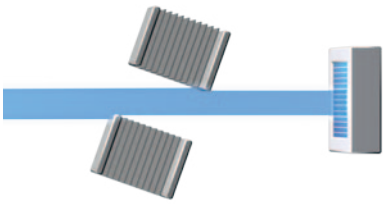
D8 ADVANCE TWIN–TWIN configuration

- Phase Identification & Quantification
- Crystal Structure Determination & Refinement
- Microstructure Analysis
- Pair Distribution Function Analysis
- Stress Analysis
- Texture Analysis
- Grazing Incidence Diffraction
- X-ray Reflectometry
- Small Angle X-ray Scattering
- Wide Angle X-ray Scattering

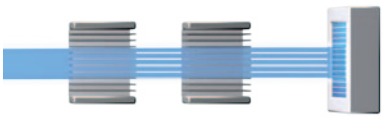
The **D8 ADVANCE** is suitable for all X-ray powder diffraction and scattering applications. It can accommodate X-ray tubes ranging from Cr to Ag, with power options including a **1 kW ECO environmentally friendly generator** or the **standard 3 kW generator**. The **TWIN–TWIN** geometry allows for fully automatic switching between four different divergent beam (Bragg-Brentano) and parallel beam geometries. Additionally, it features the innovative motorized anti-scatter screen, **MASS**, which enables data acquisition free from air and instrument background scatter. The energy dispersive **LYNXEYE XE-T** detector provides for superb filtering of sample fluorescence and Kβ-radiation.

Parallel Beam

Divergent Beam



Variable Slit



Equatorial Soller Collimator

TWIN–TWIN – one for all

Whatever the sample type, the D8 ADVANCE delivers the best possible data quality in the shortest time. Whether it's ideal powders, irregularly shaped samples, or thin films, the TWIN–TWIN optics allow automatic switching between divergent and parallel beam geometries to obtain maximum peak intensity and resolution. Any sample can be measured using either geometry, and back-to-back measurements can be programmed to get the best of all setups. With the AUTOCHANGER option, up to 90 different samples can be measured in different instrument geometries – all within in a single batch.

Dynamic Beam Optimization (DBO) reduces air and instrument scattering to virtually zero and allows data acquisition from smallest to highest angles 2θ. This is accomplished through software controlled synchronization of a variable divergence slit, motorized air scatter screen, and variable detector field of view. Additionally, the energy-dispersive LYNXEYE XE-T detector provides industry leading filtering of X-ray fluorescence as well as white and Kβ-radiation. Together, the D8 ADVANCE sets the industry standard for intensity and signal-to-background ratio, surpassing the capabilities of conventional instruments.

The D8 ADVANCE offers X-ray sources that support all commonly used wavelengths, providing up to 3 kW of power. Alternatively, the D8 ADVANCE ECO features a 1 kW generator option, enabling operation without the need for an external water supply and reducing energy consumption for a smaller CO_2 footprint.

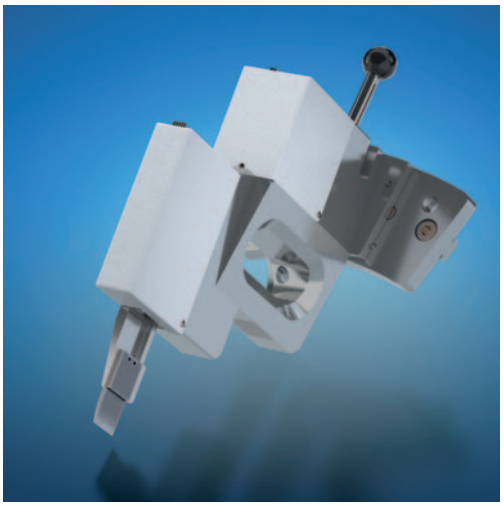
D8 ADVANCE with TWIN–TWIN – always the best configuration, always the best results.

Primary TWIN Optics

- Motorized divergence slit for Bragg-Brentano geometry
- Göbel mirror for parallel-beam geometry
- Fully software controlled

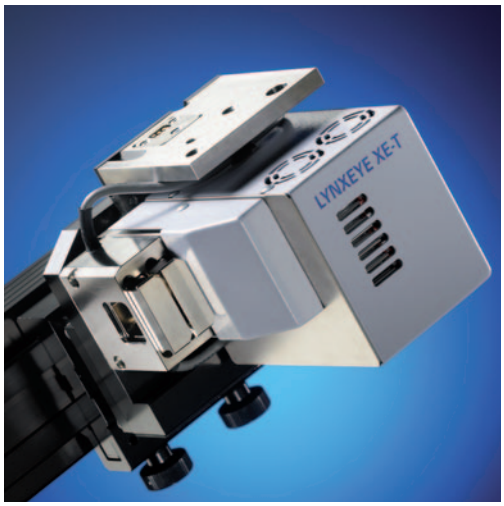
Secondary TWIN Optics

- Motorized anti-scatter slit
- Equatorial 0.2° Soller collimator
- Fully software controlled



Dynamic Beam Optimization

- Combination of a Motorized Antiscatter Screen (MASS), variable slit and variable detector field-of-view (LYNXEYE and EIGER2 R families)
  - Full software-synchronization with 2θ
  - No beam cropping at higher angles
  - Background-free data at all angles 2θ
- Exceptionally good very low angle data quality < 1° 2θ
- Significantly enhanced lower limits of detection and quantification

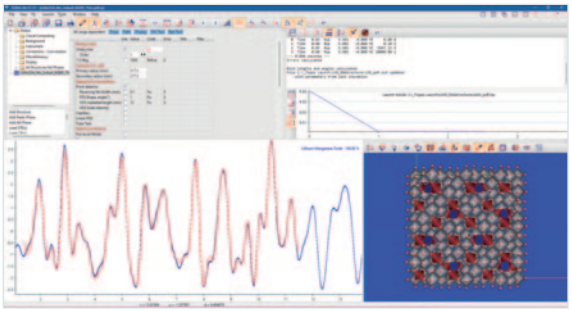


LYNXEYE XE-T

- No need for Kβ filters and secondary monochromators
  - 100% filtering of Fe-fluorescence (Cu)
  - Kβ-filtering equal or better than 0.1% versus Kα (Cu)
- Data collection in 0D, 1D, and 2D mode
- Supports all wavelengths from Cr to Ag
- Zero defective strips

Optimized for transmission

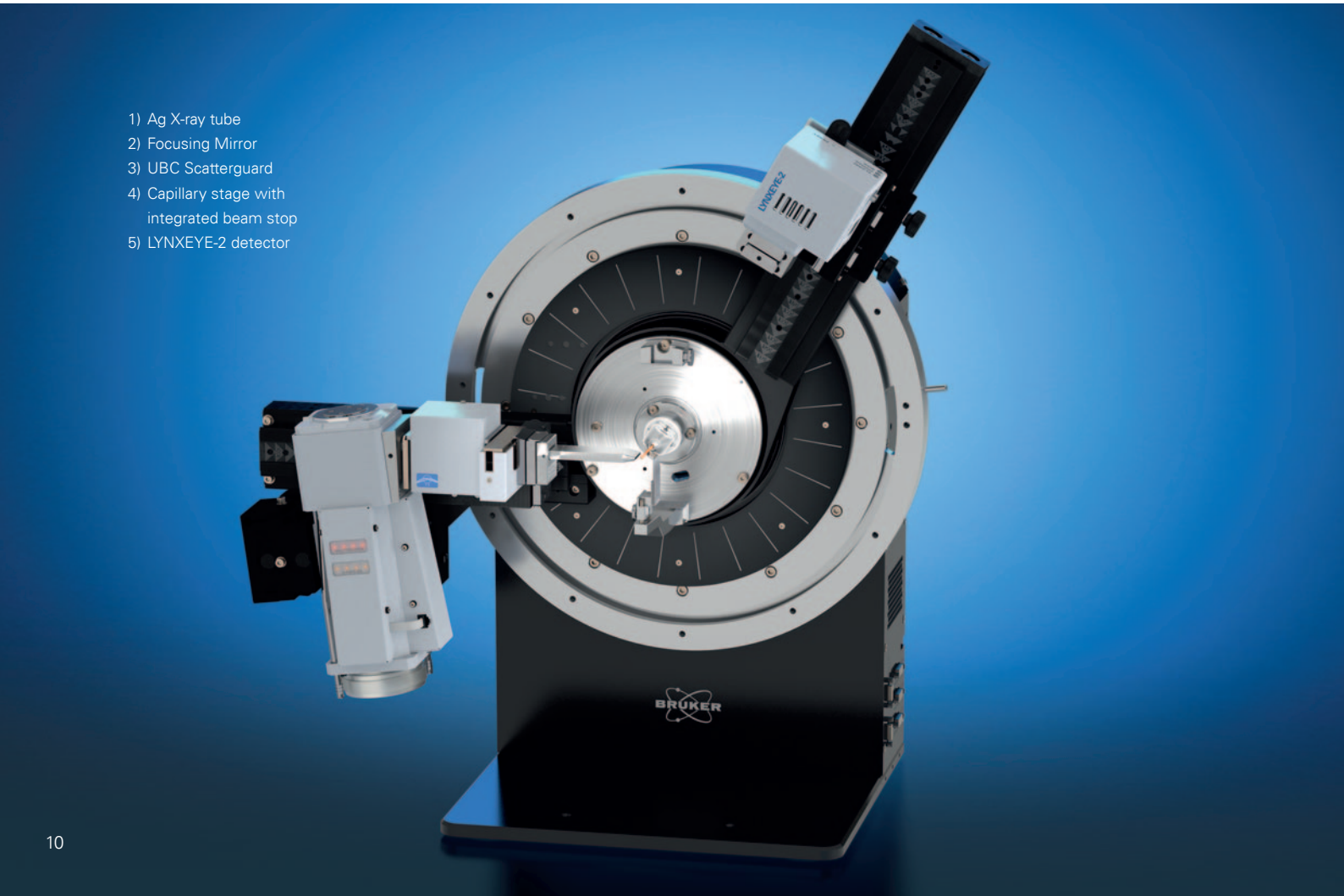
For materials with low absorption coefficients and environmental sensitivity or for advanced applications like structure determination, small angle X-ray scattering (SAXS), and pair distribution function (PDF) analysis, measurements in transmission geometry are the preferred choice. Samples can be solids, powders, or suspensions – prepared in capillaries, between foils, or measured as-is.



These applications often benefit from tailored solutions with dedicated optics that focus on the detector, including focusing Göbel mirrors or Johansson $K\alpha_1$ monochromators. They may require high X-ray energies to expand the measurable Q-range or to penetrate through multiple layers of a pouch cell. Whatever the application, the D8 ADVANCE has it covered, with optics for wavelengths ranging from Cr to Ag and full support from the LYNXEYE and EIGER2 R family of detectors.

Meeting the challenge – D8 ADVANCE for transmission.

1) Ag X-ray tube
2) Focusing Mirror
3) UBC Scatterguard
4) Capillary stage with integrated beam stop
5) LYNXEYE-2 detector



1) Cu X-ray tube
2) Primary TWIN optics
3) Motorized Air Scatter Screen
4) AUTOCHANGER
5) Secondary TWIN optics
6) LYNXEYE XE-T detector

Maximum sample throughput at highest data quality

For applications ranging from quality control of cathode materials to mineral exploration, the key is sample throughput. This applies to research and development, process and quality control, as well as to service laboratories and multi-user facilities. With innovations such as Dynamic Beam Optimization (DBO) and fluorescence-filtering detectors like the LYNXEYE XE-T, data quality has never been better, and consequently, high-quality diffraction patterns can be collected with remarkable speed. The AUTOCHANGER is the perfect companion to DBO, accommodating up to 6 exchangeable magazine towers, with a total capacity of 90 samples.

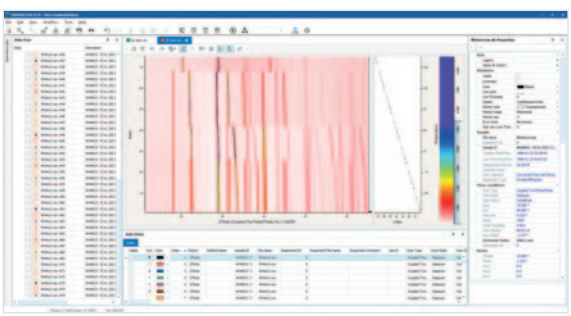
The AUTOCHANGER is also well-suited for transmission measurements, the preferred geometry for low absorption coefficient materials like pharmaceuticals or food products. Combined with TWIN–TWIN optics and the versatile D8 goniometer design, multiple scattering geometries can be supported without user intervention.

1) X-ray tube
2) Variable slit
3) MTC chamber
4) Motorized Air Scatter Slit
5) LYNXEYE XE-T detector

Measurement beyond ambient conditions

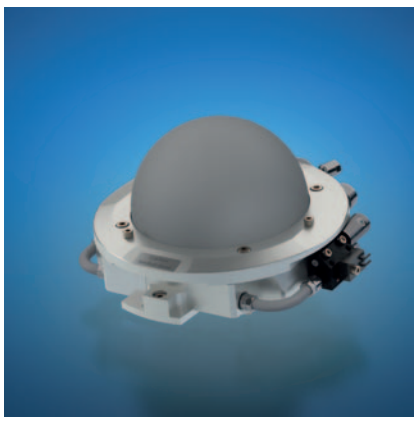
The performance of a material is significantly influenced by the environmental conditions it is exposed to, whether it involves exploring the polymorphic landscape of active pharmaceutical ingredients, subjecting refractory materials to high temperatures in an iron furnace, or repeatedly charging and discharging batteries. Understanding structural changes is paramount to optimizing performance.

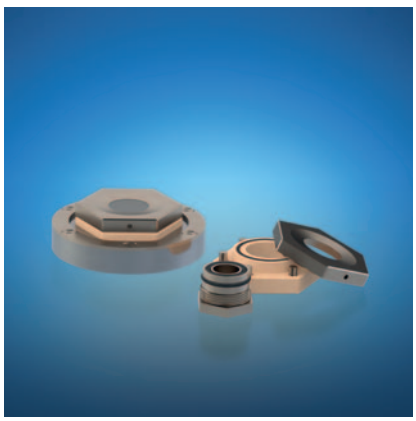
The D8 ADVANCE offers a wide range of attachments that can be utilized to replicate these conditions, allowing for XRD studies to be conducted either "in-situ" or "in-operando." In addition to offerings from third-party suppliers, including Anton Paar and Oxford Cryosystems, BRUKER's Modular Temperature Chamber (MTC) concept provides the flexibility to reconfigure a single chamber to accommodate temperatures ranging from -180 to 2,000 °C, with fully software-controlled operation. Alternatively, it is possible to monitor the dynamic behavior of battery performance using the electrochemical cell with a fully integrated potentiostat.



Modular Temperature Chamber (MTC)

Modular chamber design that can be reconfigured for:
- Low temperatures (-180 to 450 °C)
- Radiation heating (RT to 1,100 °C)
- Direct heating (RT to 1,600 °C)
- Ultra-high temperatures (RT to 2,000 °C)





TC TRANSMISSION

- From room temperature up to 1,000 °C
- Excellent sample temperature uniformity
- Free-sliding oven housing for easy exchange of samples or ambient data collection

TC Dome Stage

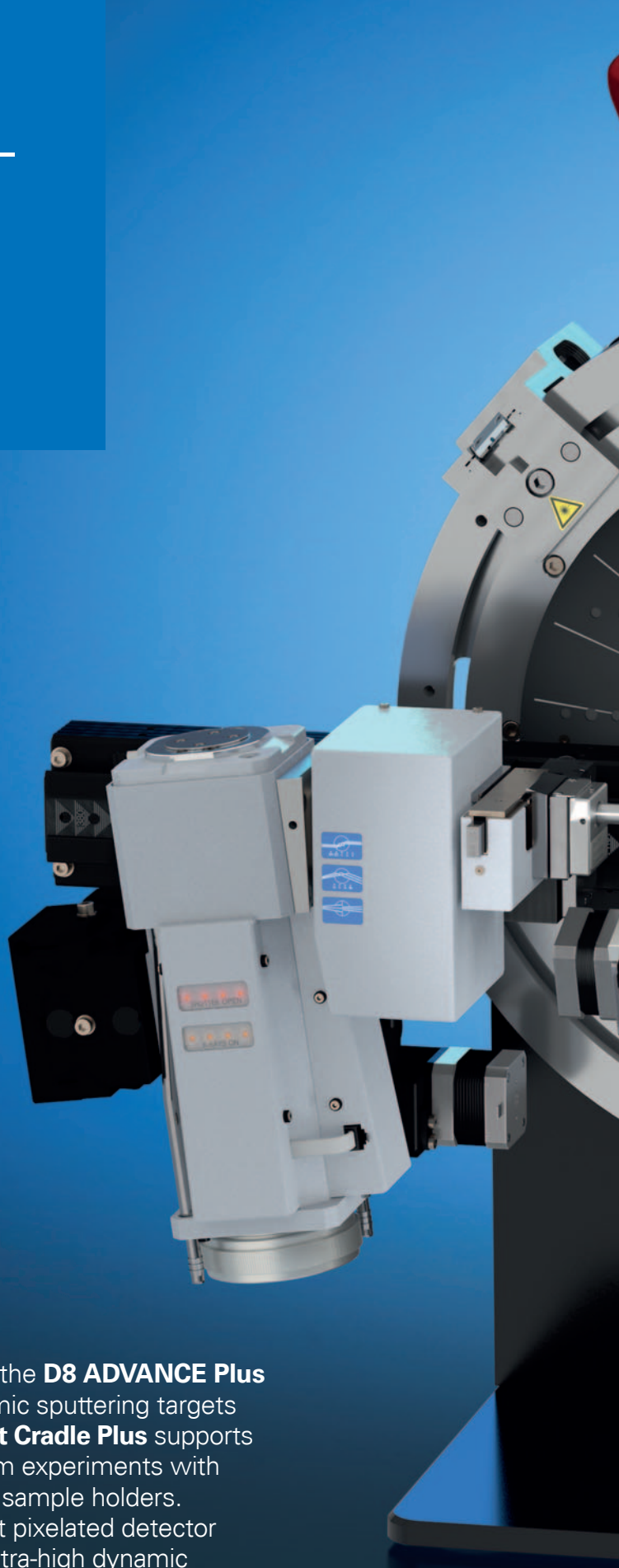
Modular dome stage with X-ray transparent Be dome that can be reconfigured for:
- Powder samples (RT to 1,400 °C)
- Thin film samples (-180 to 1,100 °C)
- Low temperature operation (-180 to 400 °C)

Solutions for Battery Research

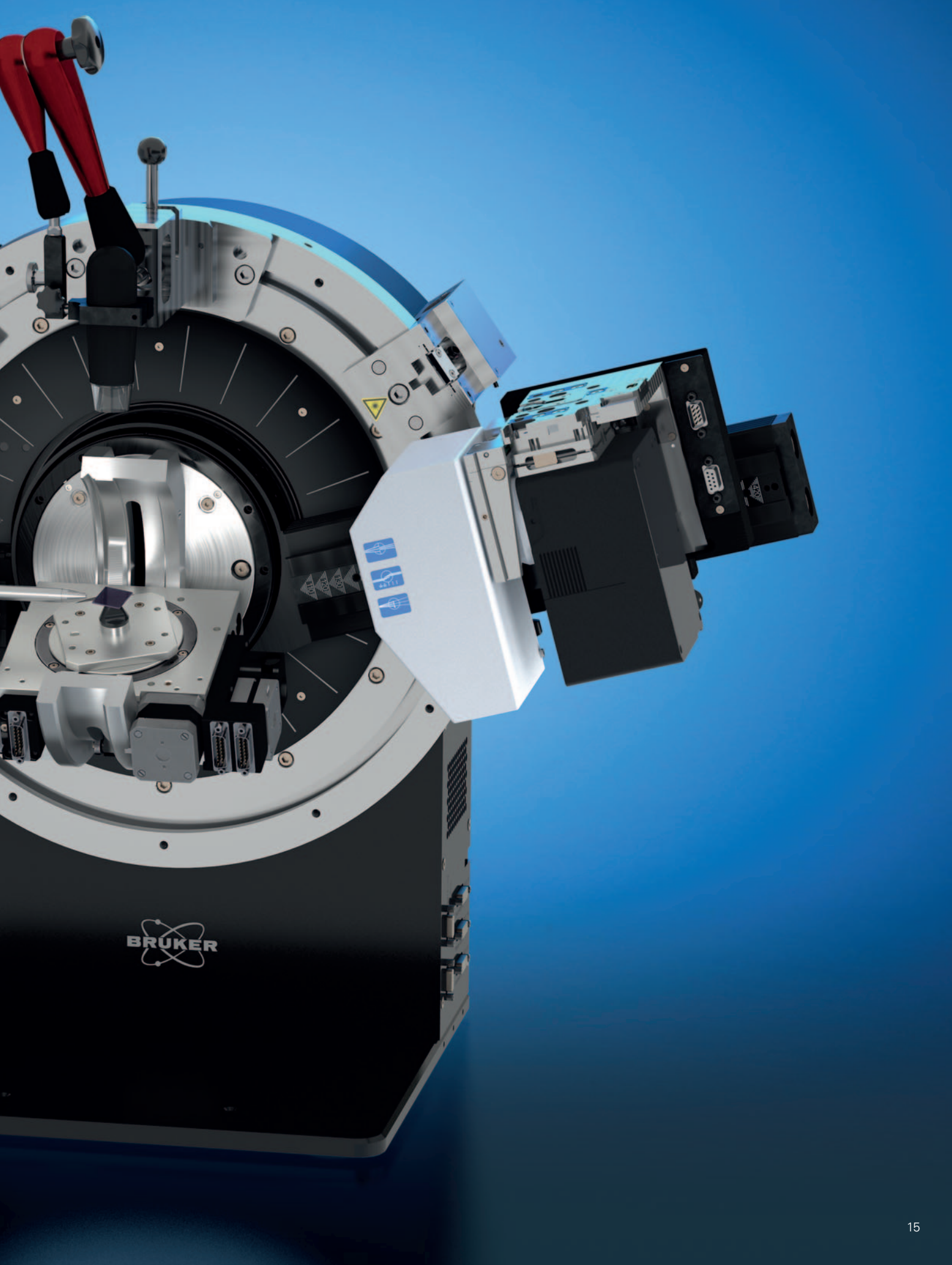
- Electrochemical cell designed by battery experts for reflection and transmission
- Flexible pouch cell holder for various sizes
- Fully software integrated potentiostat
- Attachments for UMC stages

D8 ADVANCE Plus – resolution at your command

- Phase Identification & Quantification
- Crystal Structure Determination & Refinement
- Microstructure Analysis
- Pair Distribution Function Analysis
- Stress Analysis
- Texture Analysis
- Grazing Incidence Diffraction
- X-ray Reflectometry
- Small Angle X-ray Scattering
- Wide Angle X-ray Scattering
- High-Resolution X-ray Diffraction
- Ultra Small Angle X-ray Scattering
- Grazing Incidence Small Angle X-ray Scattering
- Micro Diffraction



With optics like the **TRIO** and **PATHFINDER Plus**, the **D8 ADVANCE Plus** is equipped to handle samples ranging from ceramic sputtering targets to quantum well thin film structures. The **Compact Cradle Plus** supports side inclination stress, texture, and off-axis thin film experiments with integrated vacuum sample fixation and a range of sample holders. The **EIGER2 R** not only represents the preeminent pixelated detector technology for 2D diffraction, but also access to ultra-high dynamic range for XRR and HRXRD.

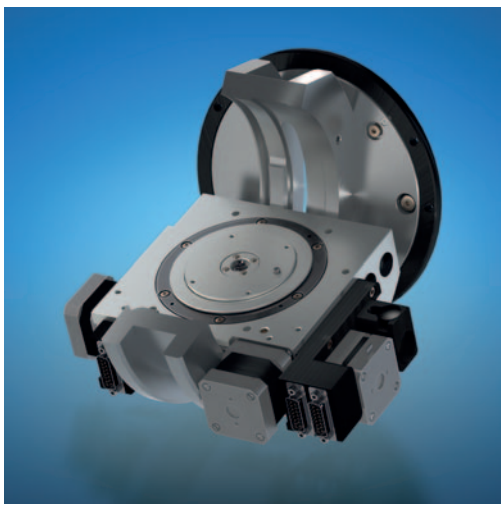

BRUKER

TRIO

- Fully software controlled multi beam path optics
- Motorized divergence slit for Bragg-Bentano measurements
- Göbel mirror for high intensity parallel beam applications like XRR and GID
- Ge(004) monochromator for a highly parallel $K\alpha_1$ beam

PATHFINDER Plus

- Fully controlled multi beampath optics
- High intensity beampath with motorized slits for applications like XRR or HRXRD
- High resolution beampath with Ge(220) analyzer
- Auto absorber to ensure detector linearity



Compact Cradle Plus

- 3 axis sample stage to cover the full application range including stress, texture, and high-resolution XRD
- Integrated vacuum feedthrough for sample fixation
- Psi range: -5° to 95°
- Unlimited Phi rotation
- Z range: 2 mm
- For samples up to 250 g and 70 mm in diameter

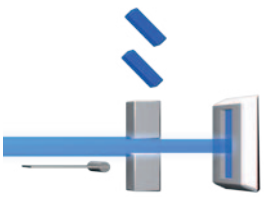
EIGER2 R

- One detector for all applications
- Available in two sizes with 250K and 500K pixels
- 0D, 1D, and 2D measurements in step, continuous, and snapshot mode
- Large active area up to 2,978 mm^2 (500K)
- Pixel size: 75 x 75 μm^2
- Supports all wavelengths from Cr to Ag

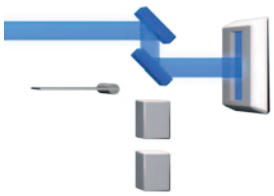
Divergent Beam

High Intensity
Parallel Beam

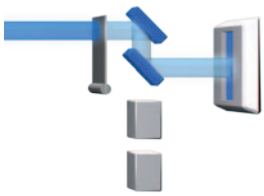
High Resolution
$K\alpha_1$ Beam



Large Aperture
Variable Slit



Triple Axis
Analyzer Crystal



Automatic
Absorber

TRIO and PATHFINDER Plus – the performance beam path

Taking multipurpose a step beyond the primary TWIN optics, the TRIO optics adds a 2-bounce monochromator after the parallel mirror. With the push of a button, the crystal moves into place further refining divergence and eliminating $K\alpha_2$. This beam is ideal for high resolution applications such as X-ray diffraction studies of epitaxial thin films or large scale ultra small angle X-ray scattering investigations. As with the primary TWIN, a variable slit is included for divergent beam powder work and a high intensity parallel mirror beam path for applications such as X-ray reflectometry.

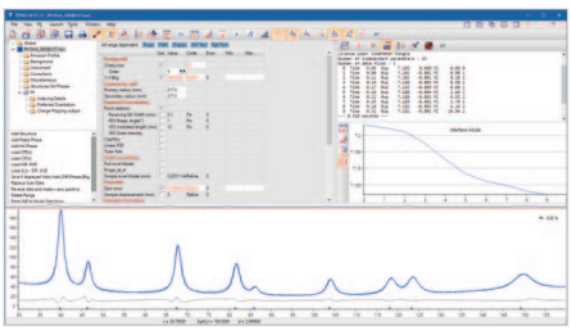
The PATHFINDER Plus optics includes an analyzer crystal on the detector side to improve the instrumental resolution. This triple-axis geometry allows for high-resolution applications like decoupling strain and composition effects in rocking curves or reciprocal space mapping. A large motorized slit for double-axis geometry and an automatic absorber are also included, allowing automated sample alignment scripts to be executed without manual intervention.

To take full advantage of the TRIO and PATHFINDER Plus, the Compact Cradle Plus and EIGER2 R complete a true multipurpose materials research system.

1) Cu TWIST-TUBE
2) TRIO optics
3) Compact Cradle Plus
4) TWIN optics
5) EIGER2 R 250K/500K detector

Grazing techniques for thin film and coating characterization

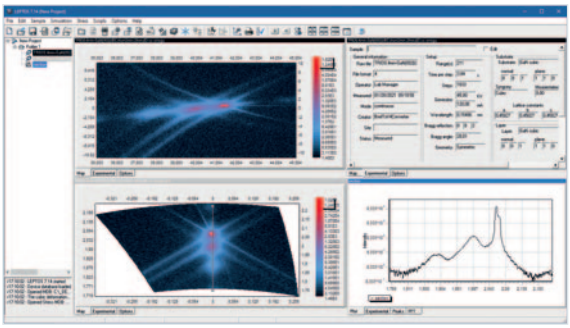
To enhance sensitivity to thin surface layers, the X-ray beam should be kept at a low angle of incidence, while the detector equipped with an equatorial Soller is scanned. The D8 ADVANCE and D8 ADVANCE Plus, with its robust goniometer design, allows for grazing incidence diffraction (GID) measurements over an exceptionally wide angular range with unparalleled accuracy.



Like GID, X-ray reflectometry (XRR) is another surface sensitive technique that uses the specularly reflected beam at low angles to determine the thickness, roughness, and density of films up to 150 nm in thickness. Unlike techniques using particles or light in the single digit eV energy range, XRR analysis is non-destructive and calibration-free, providing information not only about the film surface, but also the entire film stack.

The data quality and measurement speed of GID and XRR benefit greatly from the quality of the X-ray mirrors used. In cooperation with our in-house competence center INCOATEC, we ensure from development to production that optimum mirrors with the properties required for the application are available. For highest resolution in XRR, the TRIO optic with integrated mirror and 2-bounce monochromator is available. For XRR, both the LYNXEYE detectors and the EIGER2 R offer exceptional dynamic range.

Ready to explore epitaxial films



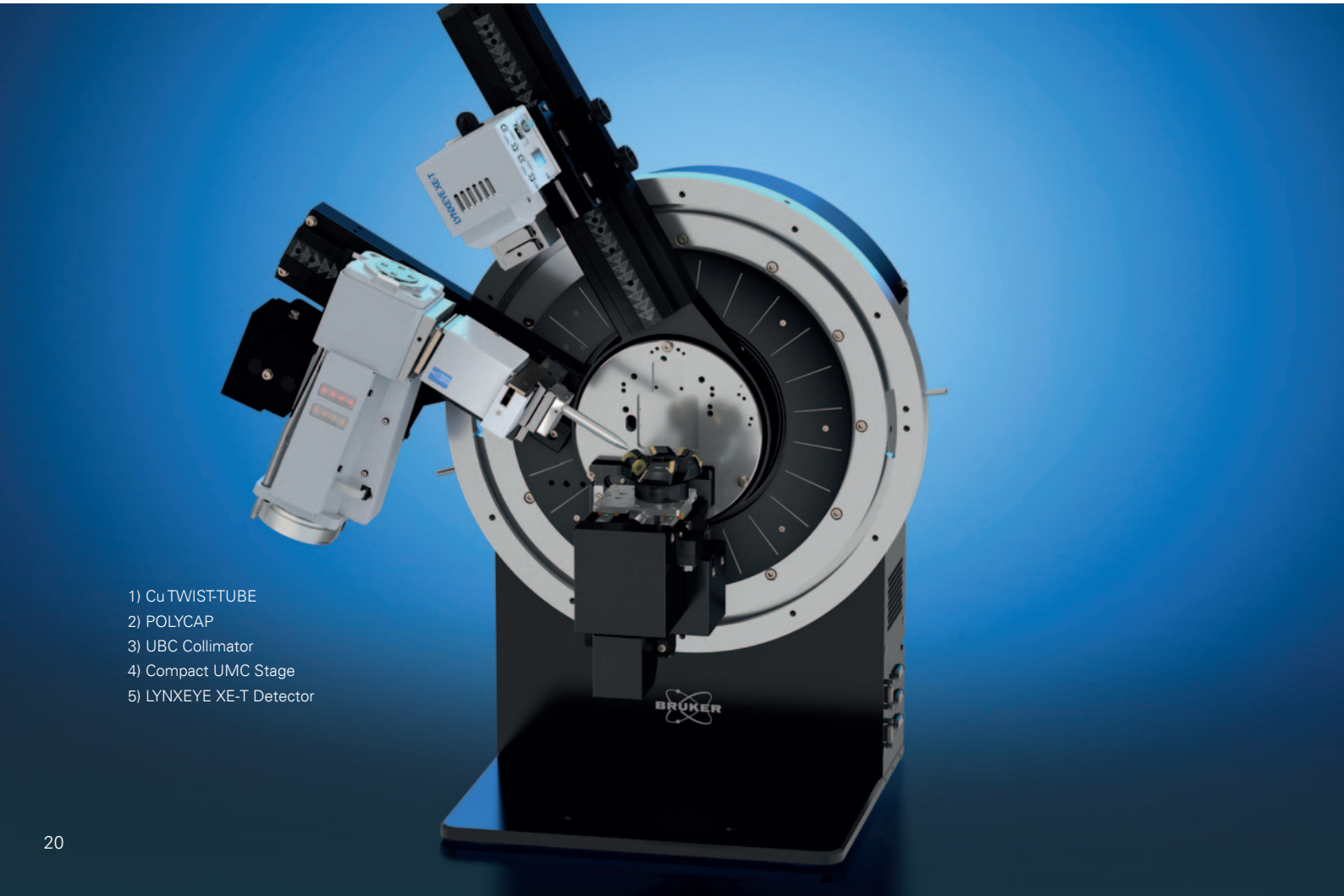
From III-V power converters to silicon-based microprocessors and multiferroic sensors, device optimization requires careful characterization of nanometer scale single crystal thin films. The high resolution $K\alpha_1$ beam path of the TRIO optic expands the capability of the D8 ADVANCE Plus to the full suite of thin film characterization, from rocking curves for assessing crystallographic quality to reciprocal space mapping for composition and strain determination. The Compact Cradle Plus features a vacuum feedthrough, perfect for fixing samples, and unlimited phi rotation, psi tilt, motorized z-movement. On the secondary side, the PATHFINDER Plus optics allows switching between double-axis and triple-axis geometries with the click of a mouse.

The compact measurement radius of the D8 ADVANCE Plus means that signal is maximized, and measurement times are reduced. The EIGER2 R's ultra-high dynamic range, enormous angular coverage, high resolution, and exceptionally low background allow collection of both film and substrate signals in fast 1D reciprocal space maps.

Reveal hidden forces with residual stress analysis

When investigating the structural integrity of welded components or the impact of ageing and corrosion on materials, the ability to map residual stresses is key. The Compact UMC stage can support samples up to 2 kg, and together with the double-laser system, allows for precise sample positioning and mapping. With the patented TWIST-TUBE technology, the source can be quickly and easily switched to point-focus orientation. And the POLYCAP optics direct the beam from the X-ray spot and boosts intensity on the sample, no matter which wavelength is used.

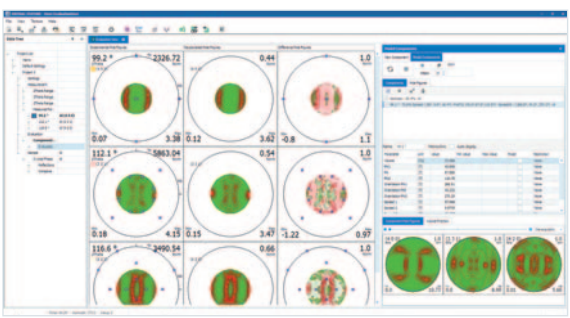
On the detection side, the EIGER2 R allows collection of 2D data sets for stress, resulting in measurement time reduction to a matter of minutes. Both the EIGER2 R and LYNXEYE detectors are compatible with a wide range of radiations including Cr for the analysis of ferrous alloys.



1) Cu TWIST-TUBE
2) POLYCAP
3) UBC Collimator
4) Compact UMC Stage
5) LYNXEYE XE-T Detector

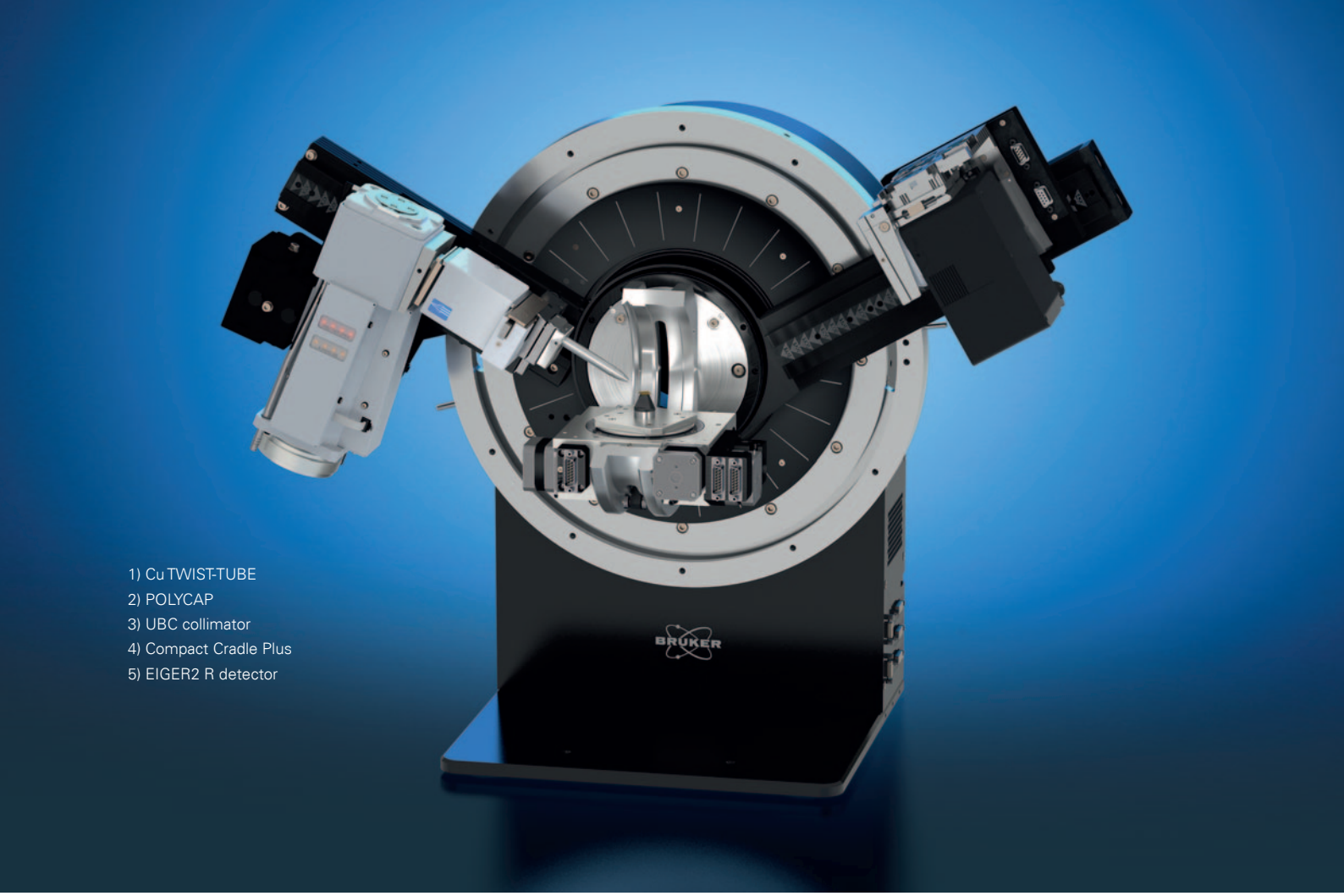
1) Cu TWIST-TUBE
2) POLYCAP
3) UBC Collimator
4) Compact Cradle Plus
5) EIGER2 R 500K Detector

Component optimization with texture



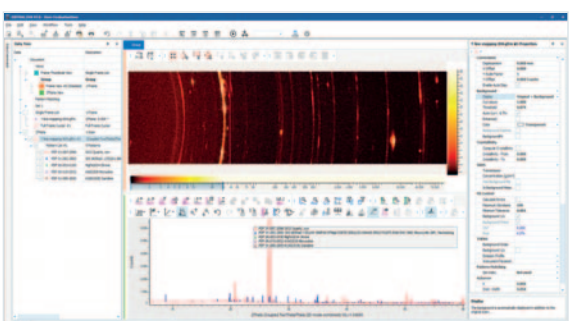
Whether it's the formability, ductility, and anisotropic mechanical properties of sheet metals or the efficiency of solar cells, understanding the texture in materials is vital to performance. The D8 ADVANCE equipped with Compact Cradle Plus enables texture measurements in side-inclination geometry, giving access to the full pole figure. TWIST-TUBE technology allows for quick exchange from line to point-focus geometry, which combined with UBC collimators means that the beam size can be accommodated to any sample. To increase performance, a POLYCAP optics can be added to boost intensity and reduce measurement times.

Texture measurements also benefit from large, 2D detectors like the EIGER2 R, which can collect a large solid angle in 2theta and gamma in a single measurement, dramatically reducing measurement time and increasing sample throughput.



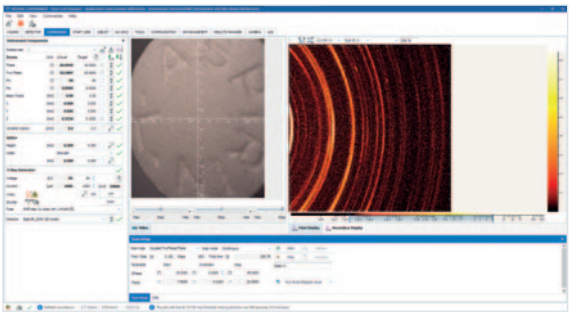
Micro-XRD – investigating down to microns

When working with tiny samples or when focusing on specific regions of interest on larger samples, achieving high spatial resolution requires an X-ray beam with a small diameter and high flux density. With the patented TWIST-TUBE design, changing from line-focus to a high-brilliance point-focus X-ray beam can be done in just a few seconds. Combined with the POLYCAP optics, which produces a circular beam cross-section with isotropic divergence and high intensities, and a magnetically fixed UBC collimator with sizes from 20µm to 2mm, the D8 ADVANCE is the ideal tool for any micro-XRD (µXRD) application.



Another option is to utilize the Göbel mirror beam path integrated into the TWIN or TRIO optic. When combined with a micro mask and a UBC collimator, it conditions a parallel, point-like incident beam. This setup is particularly well-suited for µXRD, offering the advantage of Kβ-radiation suppression without the need for a metal filter.

XRD² – the extra dimension for understanding



The investigation of small sample volumes always poses a challenge for XRD due to the low diffraction signal distributed along 2D Debye-Scherrer rings. This can be compensated using large 2D detectors, capturing more diffraction signal at once and providing additional information along the gamma direction. This is particularly useful not only for µXRD, but also for applications like residual stress and texture analyses where 2D measurements can vastly increase measurement speeds. The EIGER2 R detector, with its large field-of-view, is the ideal solution for XRD² applications.

Every D8 ADVANCE is capable of 2D XRD measurements, regardless of the detector. BRAGG2D allows collection of 2D scans using a divergent beam for diagnosing sample preparation issues like large crystallite size and preferred orientation.

To ensure user-friendly operation, the double-laser unit provides pinpoint accuracy for specimen positioning, while facilitating automated height alignment and sample image collection.

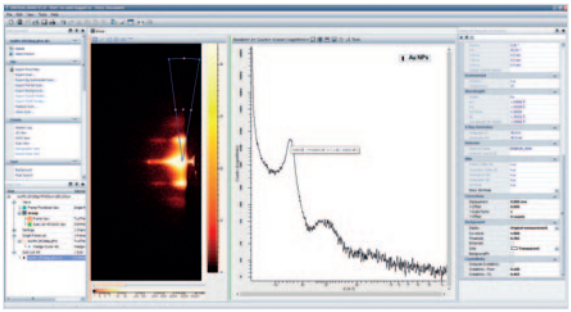
1) Cu TWIST-TUBE
2) Göbel mirror
3) UBC collimator
4) Compact UMC
5) Double-laser unit with camera
6) EIGER2 R detector

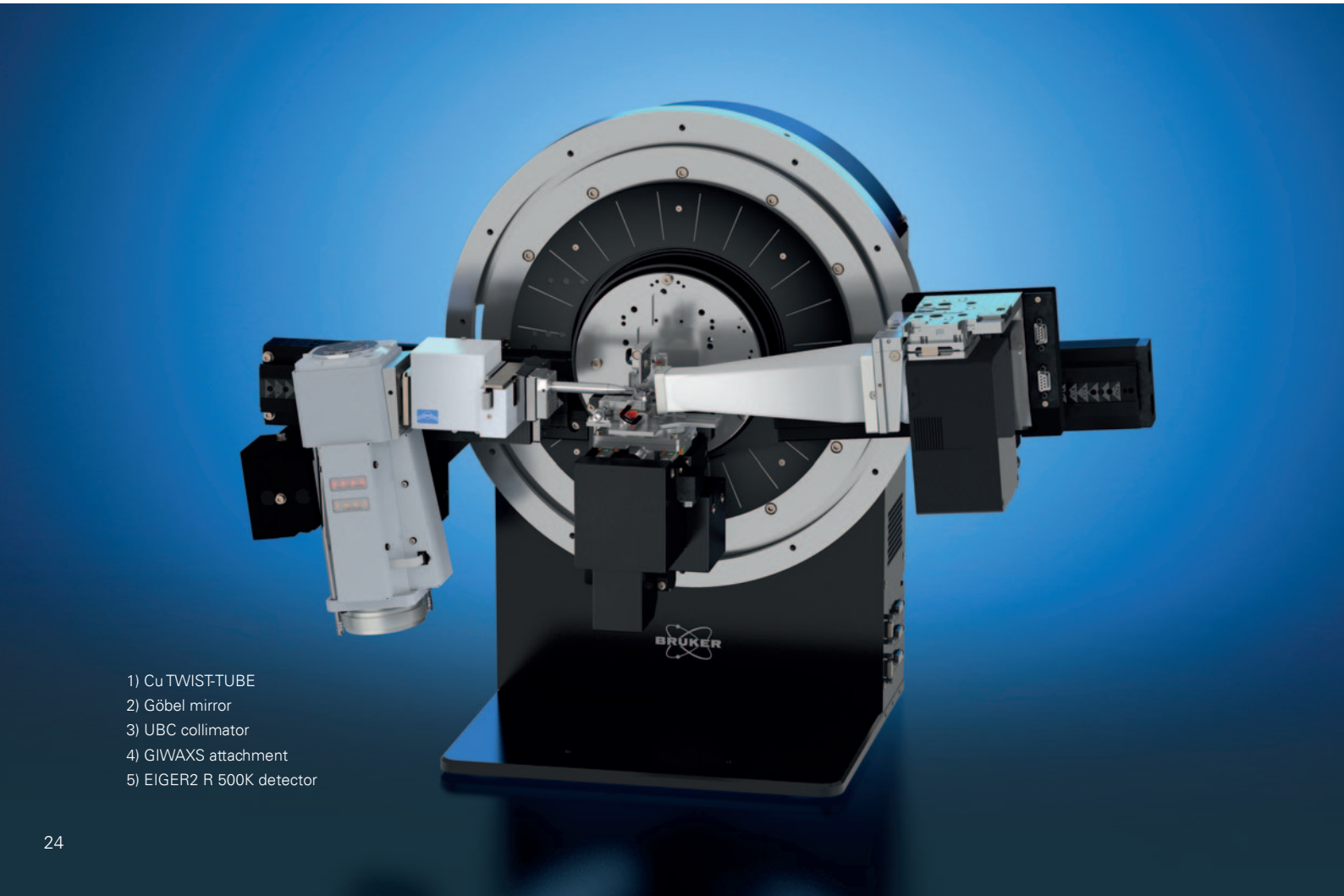
Think big in nanometers

Analysis of X-ray scattering data acquired at wide, small, and ultra-small angles enables the determination of nano-scale structures, shapes, and distributions. Applications include the characterization of nanoparticle systems, colloids, surfactants, protein solutions, polymers, liquid crystals, nanocomposites, and porous materials.

Small Angle X-ray Scattering (SAXS) utilizes data collected between 0.1 and 5° 2θ, providing information on structural features in the order up to about 80 nm, and is complemented by Wide Angle X-ray Scattering (WAXS), which provides information on the periodic arrangement of structures. To investigate larger structures up to the micron range, the high-resolution beam path provided by the TRIO optics and USAXS module adds Ultra Small Angle X-ray Scattering (USAXS) capabilities to the D8 ADVANCE.

For studying nanoscale structures on thin films, the GIWAXS stage has a built-in knife edge collimator and beam stop for superb background suppression, crucial for observing weak signals typical for GISAXS and GIWAXS applications. The stage design allows for minimum sample-to-detector distance to maximize angular coverage. Alternatively for GISAXS measurements, the EIGER2 R can be placed far away from the sample to increase resolution.



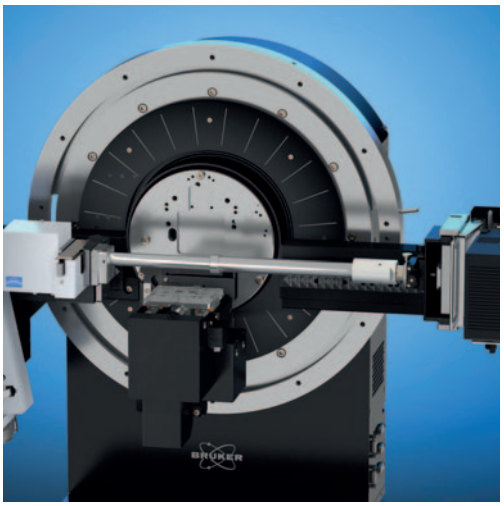


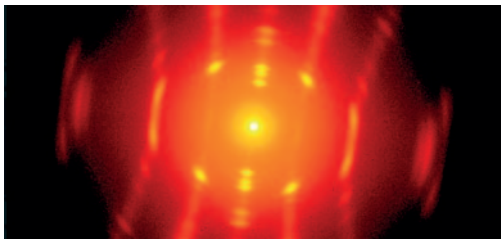
1) Cu TWIST-TUBE
2) Göbel mirror
3) UBC collimator
4) GIWAXS attachment
5) EIGER2 R 500K detector

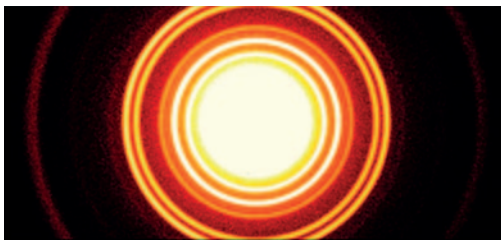
UWAXS, Ultra Wide Angle X-ray Scattering

UWAXS attachment:

- Angular coverage up to 77° in 2θ with EIGER2 R 500K.
- Adjustable sample-to-detector distances to optimize angular coverage vs. resolution.
- Pinholes from 0.3 mm to 1 mm to fine-tune the beam size at the sample.
- Alignment of the position of the pinholes with µm precision.



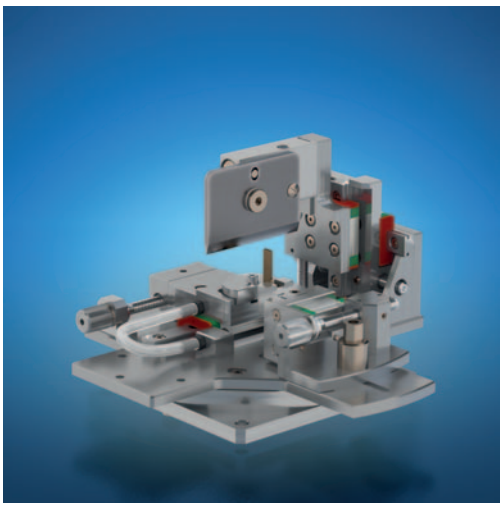


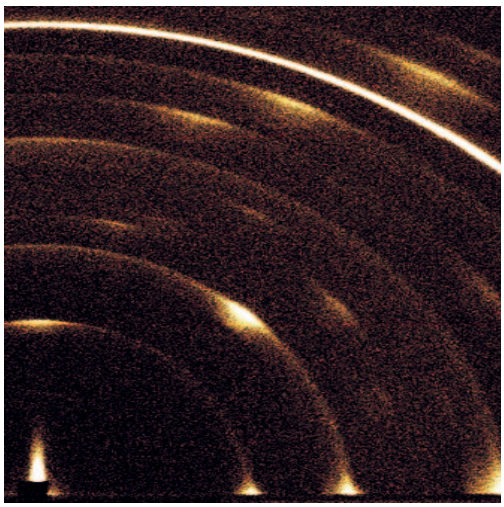


GIWAXS, Grazing Incidence Wide Angle X-ray Scattering

GIWAXS attachment

- Unified design for both GIWAXS and GISAXS measurements.
- Dimensioned for optimized pinhole-to-sample and sample-to-beam stop distances for best data quality
- Adjustable and exchangeable beam stops for best reduction of the direct and specular reflected beam
- Knife edge collimator to minimize parasitic scatter and optimize signal-to-noise.
- Ease-to-use vacuum nozzles for flexible fixation of different sized samples

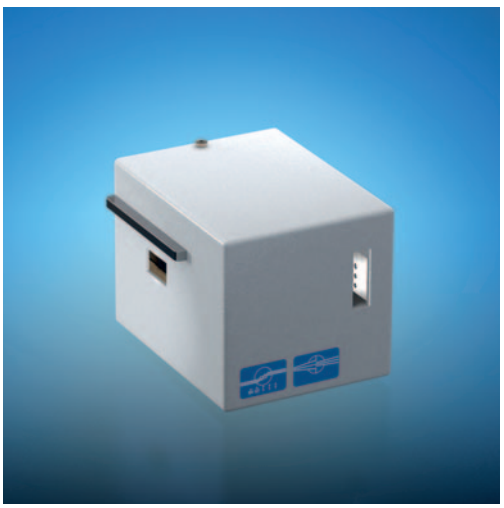


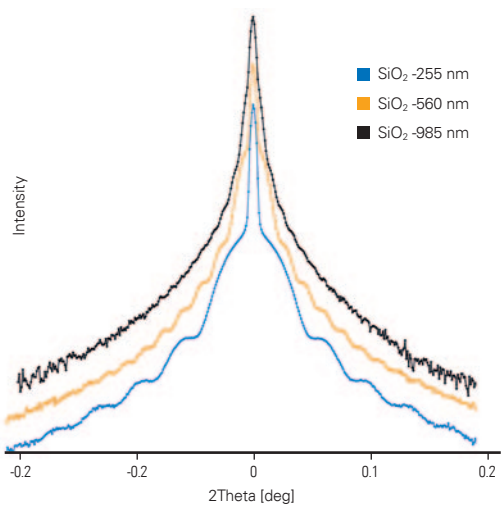


USAXS, Ultra Small Angle X-ray Scattering

USAXS optics

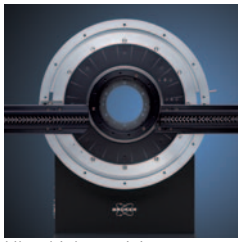
- High-resolution and high-flux 2-bounce Ge(004) analyzer crystal and anti-scatter slit combination to optimize signal-to-noise.
- In combination with TRIO primary optics, particle sizes larger than 1µm can be resolved.
- Compatible with LYNXEYE and EIGER2 R detectors.





X-ray tube LED status display


Instrument ON status


Ultra-high precision goniometer


Smart screen keys for instrument status display

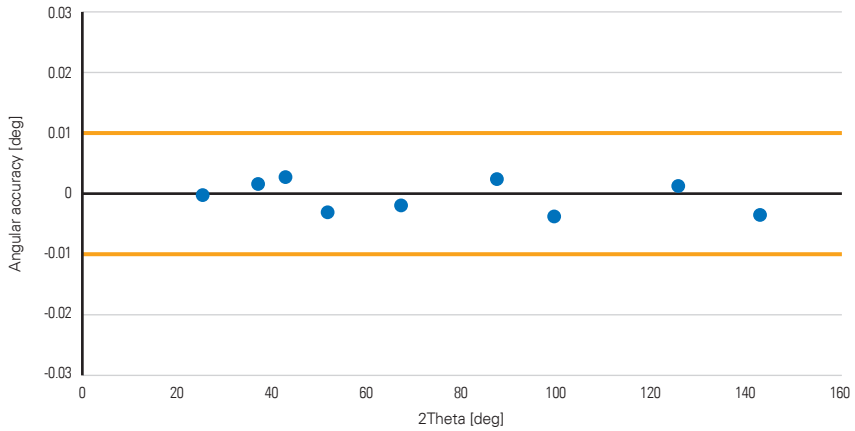
Security and data quality is a priority

The D8 ADVANCE has been tested by independent technical inspection centers for compatibility with EU standards and directives regarding electromagnetic compatibility, electrical safety of laboratory equipment, safety of machinery, and X-ray radiation safety. This is demonstrated with type approval for X-ray safety by the German National Metrology Institute (PTB). This significantly minimizes efforts to obtain approval by your national authorities.

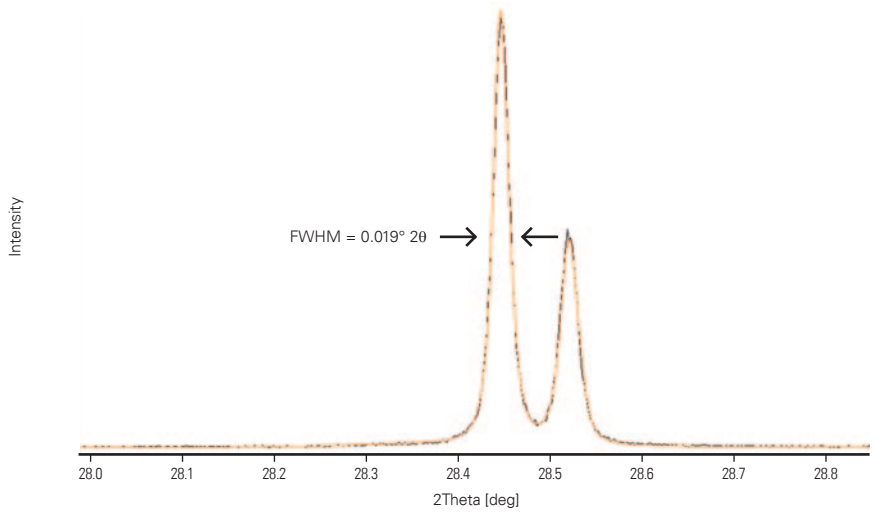
The D8 ADVANCE is pre-aligned and comes with a unique alignment guarantee that is verified against the internationally accepted standard reference material of the SRM1976 series from the National Institute of Standards and Technology (NIST). A verification can also be adapted to the D8 ADVANCE configuration tailored to customer requirements. This SRM is included with every system, enabling you to monitor and document instrument performance at any time. The Bruker instrument guarantee ensures alignment equal or better than ±0.01° 2θ over the entire angular range. Unlike other systems on the market where instrument quality is reduced to goniometer accuracy alone, the Bruker guarantee covers the whole instrument performance across the entire measurement range.

At Bruker AXS our commitment to quality goes far beyond the instrument itself. All hardware and software are developed following a formal design process and product development life cycle compliant with the latest ISO and cGAMP processes and procedures. The D8 ADVANCE perfectly integrates in cGxP/21CFR Part11 regulated environments.

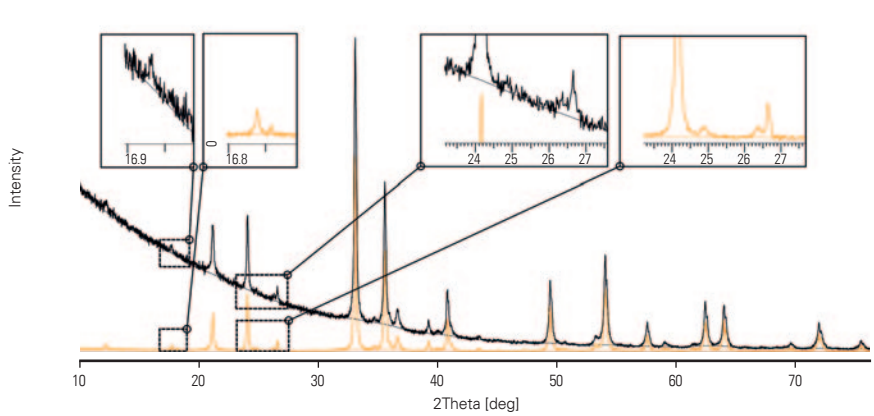
A network of highly experienced application experts and service professionals provide additional value. Our worldwide organization provides local support, maximizing instrument uptime and allowing you to get the most from your investment.



Superior 2θ linearity < 0.01° 2θ over the whole angular range. Warranted by BRUKER's unique alignment guarantee using NIST SRM 1976c.



Exceptional instrument resolution.NIST SRM 640c (Silicon) data with a full width at half maximum of 0.019° 2θ.



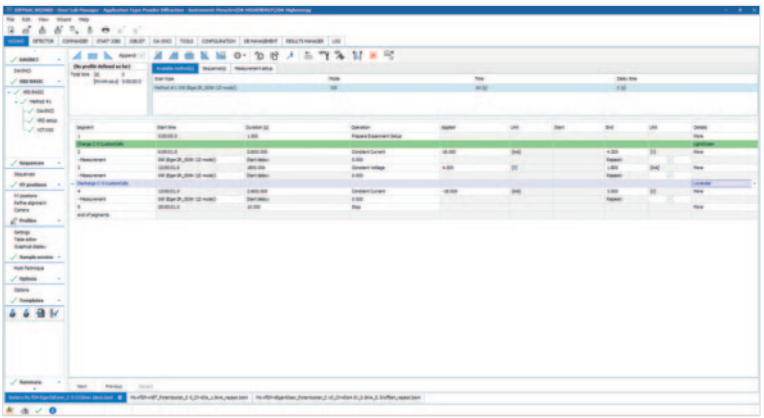
Superior low angle and general low background performance thanks to Dynamic Beam Optimization. Using the Motorized Anti-Scatter Screen, instrument background is reduced to the bare minimum, boosting lower limits of detection and quantification.


LYNXEYE XE-T
BRUKER

D8 ADVANCE
everything is possible

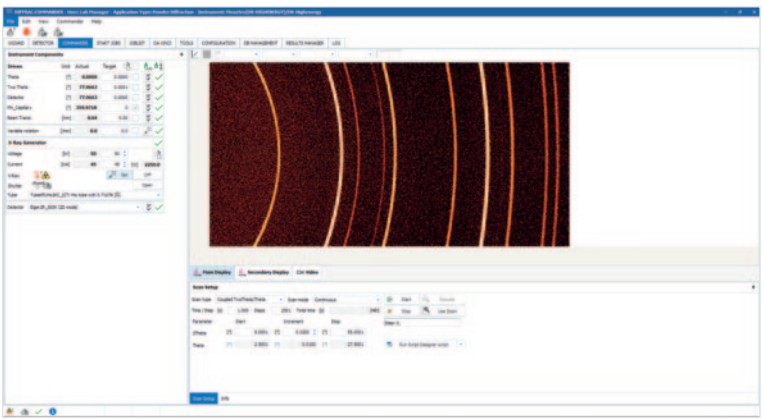
PLAN

WIZARD offers step-by-step guidance to walk users through the setup of methods. These can range from a single powder diffraction scan to a complex temperature profile or a texture measurement sequence. WIZARD represents the compiled knowledge of decades of experience from our application experts.



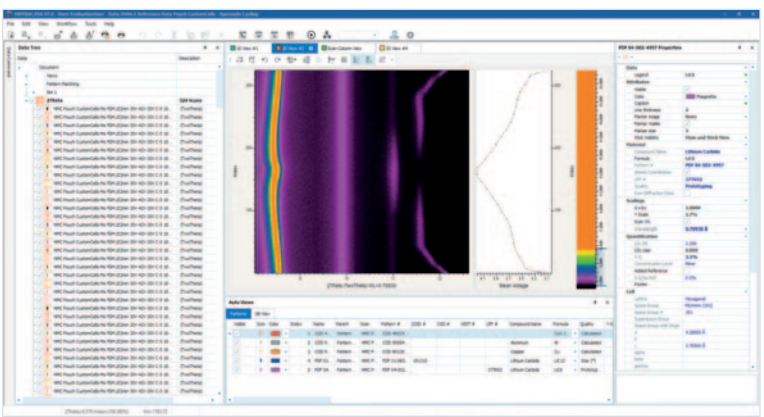
MEASURE

Measurements can be launched directly via the intuitive COMMANDER interface where direct control of the instrument is readily available. The JOBS interface allows execution of planned measurements, either through a spreadsheet style form or via push-button interface.



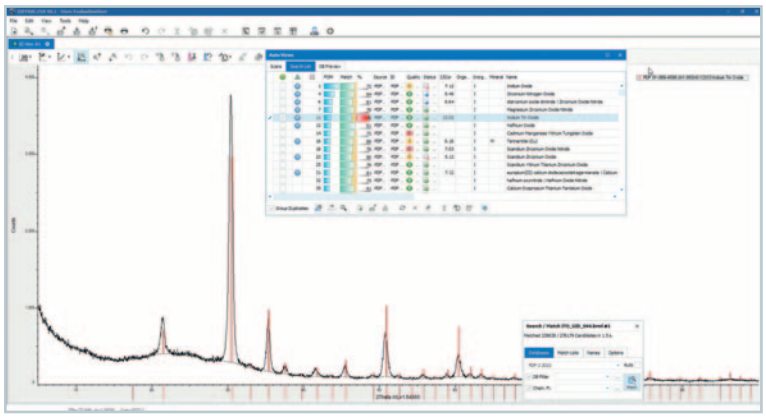
ANALYZE

Once measurements are completed, they are stored in the RESULTS MANAGER database. This not only includes the scan data, but also metadata such as instrument and user settings. Alternatively, measurement data can be saved as separate files. Analysis programs range from phase identification and quantification to residual stress, orientation distribution, and film thickness analysis.



DIFFRAC.EVA

- Data reduction, basic scan evaluation and presentation
- Phase identification and quantification
- Crystallinity and crystallite size determination
- Cluster analysis for sorting and analyzing large datasets

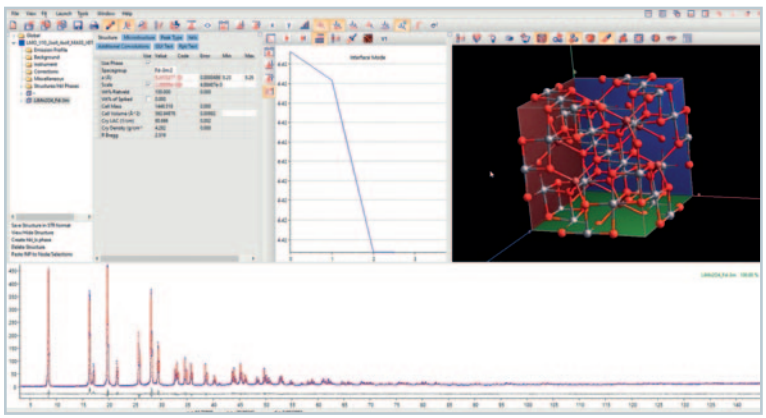


DIFFRAC.DQUANT

- Calibration with reference materials
- Drift correction
- Modules and logical sequences
- Addition method
- Absorption method for filters
- Ratio method

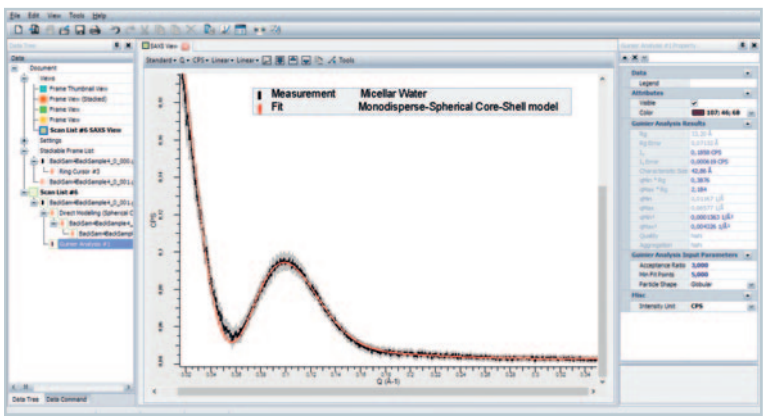
DIFFRAC.TOPAS

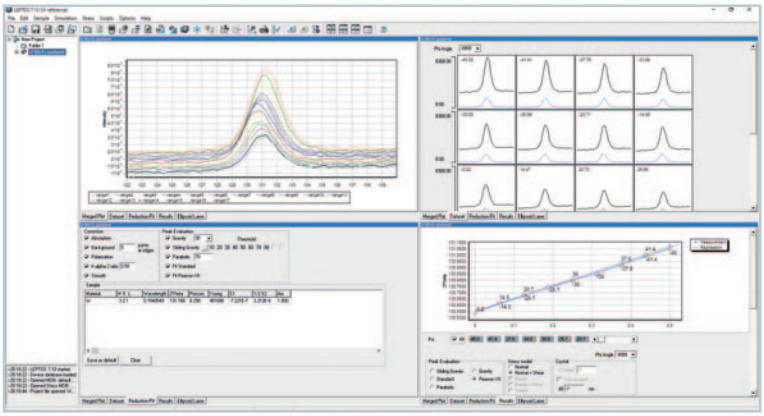
- Most popular Rietveld refinement software in industry and academia
- Quantitative phase analysis
- Structure determination and refinement
- Pair Distribution Function (PDF) data analysis
- Flexible macro language



DIFFRAC.SAXS

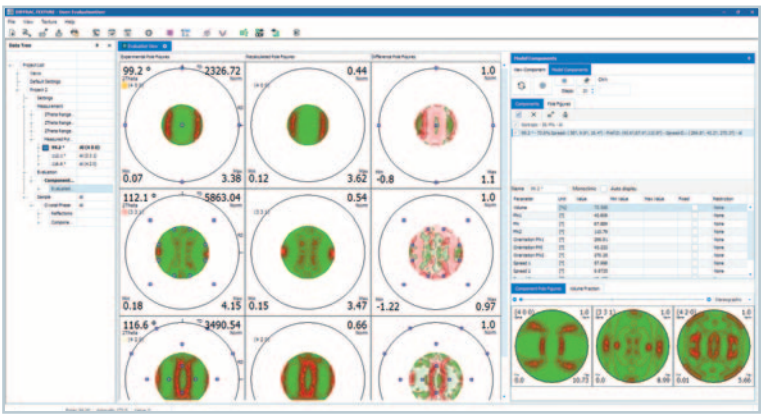
- Easy, fast and accurate interpretation of 1D and 2D SAXS data
- SAXS specific plots and evaluations (Guinier, Porod, Kratky)
- Model-based fitting of nano-structures in solution
- Nanography maps
- Pair distance distribution function (PDDF)





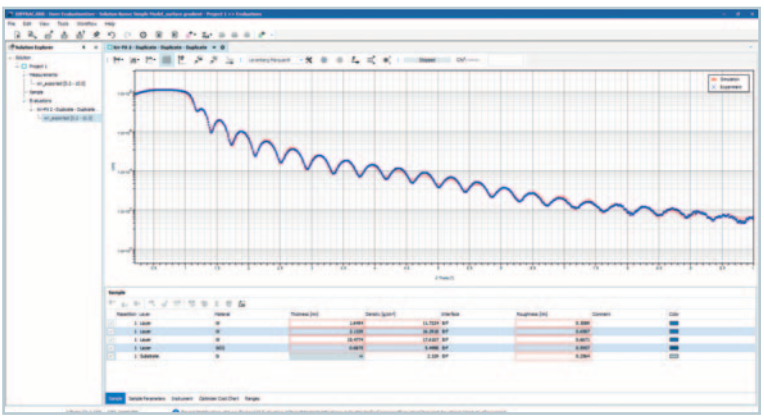
DIFFRAC.LEPTOS S

- Residual stress analysis from 0D, 1D, or 2D data
- Classic $\sin^2\Psi$ and extended XRD^2 methods
- Evaluate stress gradients from multiple {hkl} in polycrystalline coatings
- Model-based fitting, including sample effects like absorption, refraction and coating thickness



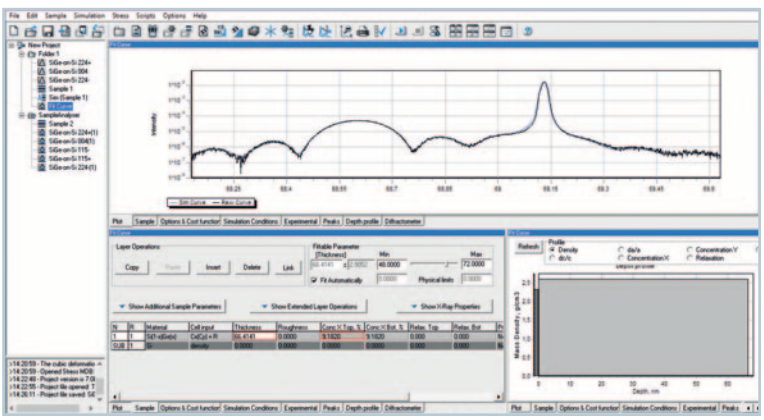
DIFFRAC.TEXTURE

- Straightforward creation of pole figures from 0D, 1D, and 2D measurements with automatic indexing
- Spherical Harmonics method for direct computation of the Orientation Distribution Function (ODF)
- Component method for quantitative model-based texture analysis
- Comprehensive, extensible Material Database
- Powerful texture representation with extensive report generation capability



DIFFRAC.XRR

- Flexible modeling of samples
- Comprehensive and extendable databases for materials and samples
- Advanced automation and workflow capabilities
- Automated analysis and display of series of reflectivity measurements
- Evaluation of wafer mapping data including customizable contour plots and statistical analysis



DIFFRAC.LEPTOS H

- Powerful analysis software for high-resolution X-ray diffraction data
- Crystallographic material database
- Advanced X-ray scattering theories and numerical methods for estimation, simulation and fitting of data
- Sample analyzer for simultaneous fitting of multiple measurements
- Area mapping tool for evaluation of data obtained from sample areas like wafers

Technical Data

Geometries	Vertical goniometer, Theta/Theta or Theta/2Theta geometries
Measuring diameter (depending on setup)	Predefined at 500, 560, and 600 mm or any intermediate setting
Max. usable angular range	–110° to 168° 2θ
Angle positioning	Stepper motors with optical encoders
Max. angular speed (depending on accessories)	20°/s
Accuracy	± 0.01° throughout the entire angular range
X-ray wavelengths	Cr, Co, Cu, Mo, Ag (others on request)
X-ray generator options	1 kW (ECO) or 3 kW
Detector options	SSD 160-2, LYNXEYE-2, LYNXEYE XE-T EIGER2 R 250K, EIGER2 R 500K
Exterior dimension (h x d x w)	186.8 cm (73.5") x 113.5 cm (44.7") x 130.0 cm (51.2")
Weight (depending on configuration)	≥ 770 kg (1,697 lbs)
Power supply	Single phase 208 – 240 V Three phase 120 V, 230 V, 240 V; 47 – 63 Hz
Max. power consumption	6.5 kVA
Cooling water supply	1kW (ECO): No external water cooling required 3kW: Min. 4l/min. at 4 – 7.5 bar, 10 – 25°C
Computer	PC connected via LAN interface
Patents	Primary TWIN: US 6665372, DE 10141958; secondary TWIN: US 7983389 B2; TRIO: US 10429326; Encapsulated X-ray mirror: EP 1 503 386 B1; LYNXEYE Family turned 90°: EP 1 647 840 A2 and EP 1 510 811 B1; 2D data correction algorithm: US 9897559

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