Product Overview

Advanced Analytical Solutions
We Exceed Your Expectations

Professional Competence
Bruker is a worldwide market leader in providing advanced X-ray and optical emission systems and complete solutions for structure and elemental analysis using X-Ray Diffraction (XRD), X-Ray Fluorescence (XRF/OES) and crystallographic diffraction techniques. We also offer the world’s largest selection of AFMs, stylus profilers, and 3D optical microscopes to enable nano- to macro-scale surface measurements for the widest range of scientific and industrial applications. Our microtomography desktop instruments even enable you to non-destructively acquire 3D images of your sample’s morphology and internal microstructure with resolution down to the sub-micron level.

Our products fit the analytical requirements of customers in materials research, life science, quality control, and process analysis. They provide essential information about the molecular structure, material and structural parameters of thin film and bulk material as well as elemental composition of solids and liquids.

High Performance
Bruker X-ray systems emphasize modularity and flexibility, enabling an entry-level system to be reconfigured or upgraded to meet changing requirements. We offer the widest available variety of X-ray sources, optics, sample environments and detectors, along with expert advice on configuring the optimal system. All of our systems and solutions are easy to operate, robust and compact, with degrees of automation ranging from none to one-button operation. Professional training and worldwide service is in place to support the customer.

A History of Innovation Leadership
Bruker is constantly redefining the performance and quality standards in X-ray analysis. Breakthrough innovations and continual improvements upon established techniques provide our customers with analytical possibilities that were considered beyond reach only a short while ago. Examples include our revolutionary detection technologies, multilayer X-ray optics, and ability to perform XRF analysis of light or trace elements. Further accomplishments are highlighted at the bottom of this and the following pages.

X-Ray Diffraction Solutions
Bruker sets new standards. Innovative sources and detectors ensure breathtaking speed at high sensitivity at best resolution – without sacrificing reliability and flexibility. Bruker AXS’ Diffraction Solutions enable an unprecedented throughput in research and development.

- High-brilliance TURBO X-RAY SOURCE and METALJET
- VÄNTEC-1 detector – instant diffraction snapshots
- LYNXEYETM detector family – rapid powder Diffraction
- PILATUS3 HPC detector for count rate sensible measurements
- VÄNTEC-500 detector – the extra dimension of XRD²
- VÄNTEC-2000 detector – Ultra sized SAXS²
X-Ray Powder Diffraction (XRPD)

X-ray diffraction expands analytical capabilities down to the nanometer range. Our highly accurate, reliable and fast diffraction solutions are accompanied by an intuitive and clearly laid-out user interface, easy handling, and individual data presentation, as well as perfect integration and communication capabilities.

Applications
- Crystalline phase identification
- Crystalline phase quantification
- % crystallinity
- Crystallite size determination
- Crystal structure analysis
- Crystal orientation
- Texture and preferred orientation
- Microstrain
- Residual stress
- Depth profiling
- Polymorph screening
- High temperature
- Low temperature
- Humidity
- Phase transition
- Nanoparticles

DAVINCI Design
The D8 ADVANCE with DAVINCI design facilitates a pioneering diffractometer concept, which eliminates the problems of awkward configuration and adjustments once and for all. It is extremely easy to exchange all components and geometries, thanks to the multi-level design:
- DAVINCI.SNAP-LOCK: alignment- and tool-free optics change
- DAVINCI.MODE: real-time component recognition, configuration and conflict detection
- DIFFRAC.DAVINCI: graphical representation of the actual goniometer showing all beam path components including their status, enabling immediate measurements as well as the creation of measurement methods
X-Ray Diffraction (XRD)

Quick-Change Artists without Limits

The capabilities provided by the D8 DISCOVER, laboratory X-ray diffraction enters new frontiers in the nano-world and materials research so that synchrotron measurement campaigns become obsolete in many cases.

Applications

- Crystalline phase identification
- Crystalline phase quantification
- % crystallinity
- Crystallite size determination
- Crystal structure analysis
- Texture and preferred orientation
- Microstrain and relaxation
- Residual stress
- Layer thickness
- Layer roughness
- Lattice parameter
- Chemical composition
- Lateral structures
- Defects
- Depth profiling
- Real space mapping
- Microdiffraction
- Polymorph screening
- High temperature
- Low temperature
- Humidity
- Phase transition
- Nanoparticles

High-Throughput Applications

Screening a large number of samples quickly and completely requires dedicated instrumentation and extensive knowledge of the analytical process. Extremely large amounts of data need to be handled, especially in catalyst development and pharmaceutical research. Unique applications from Bruker extract authoritative results from the most varied of sample characteristics, parameters and correlations, e.g.:

- Laser/Video system for precisely focused, automated alignment
- Eulerian cradles, 2D detectors
- Powerful X-ray sources, innovative detectors
- Integrated Analytical Intelligence with POLYSNAP software
Enter the universe of nanostructure Analysis

The innovative Small Angle X-ray Scattering (SAXS) systems N8 HORIZON, NANOSTAR and MICROpix are ideal tools for the non-destructive characterization of nanostructures on the order of 10 to 1000 Ångstrom, such as precipitates in bulk materials, proteins in solution, nanoparticles attached to a surface.

The unique MICROcalix combines SAXS with micro-calorimetry to extract nanostructure information at any temperature in a calorimetric scan, from one and the same sample.

Applications
- Small Angle X-ray Scattering (SAXS)
- Wide Angle X-ray Scattering (WAXS)
- BioSAXS
- Grazing Incidence Small Angle X-ray Scattering (GISAXS)
- Nanography
- Particle size and shape
- Particle size distribution
- Orientation distribution
- Particle distances
- High and low temperature
- Micro-calorimetry (DSC)

Nanostructure Analysis

Göbel and MONTEL Mirror

The highest performance can only be achieved with the most modern instruments. With the invention of the Göbel Mirror, Bruker raised the standards for diffraction and SAXS. Göbel Mirrors are X-ray optics with incomparable precision. In particular in combination with high-brilliance micro focus X-ray sources (μS) or rotating anode (HB-TXS), and liquid metal METALJET sources a beam with high-flux on a small spot is generated.

- Maximum flux
- Perfect beam homogeneity
- Highest spectral purity
- Bragg-Brentano, parallel beam, or focusing geometries
- High-flux densities for μXRD applications
X-Ray Fluorescence Analysis (XRF)

Defining the World of Elements in Seconds

X-ray fluorescence spectrometry is the most effective way to perform multi-elemental analysis determining concentrations in solids, powders and liquids. Based on the renowned XFlash® silicon drift detector technology Bruker’s Energy Dispersive X-Ray Fluorescence (EDXRF) systems offer highest analytical precision and stability. The S2 PICOFOX allows the analysis of thin films and trace elements down to 0.1 ppb using Total Reflection X-Ray Fluorescence (TXRF). The S2 PUMA with TouchControl™ provides you with instant answers for element concentrations from Na to U in unknown samples.

Applications
- Fresh water, sea water
- Sewage, sludge
- Pharmaceuticals
- Blood, urine
- Proteins, macromolecules
- Food, dietary supplements
- Wine, beverages
- Nanoparticles
- Washcoats
- Contaminations
- Aerosols
- Thin films

XFlash® LE SDD Detector

The XFlash® LE detector further expands the application range of Benchtop-EDXRF systems. Due to the ultrathin high transmission entrance window the XFlash® LE SDD with 50 W excitation power eliminates conventional limitations of EDXRF systems and significantly enhances the sensitivity for light elements, such as eight times more sensitivity for sodium and four times more sensitivity for magnesium. In addition the XFlash® LE achieves an excellent energy resolution of less than 129 eV for Mn Kα, at very high countrates due to the advanced MCA electronic enabling users to achieve excellent analytical precision.

Applications
- Petrochemicals
- Minerals and mining
- Slags
- Cement
- Geology
- Pharmaceuticals
- Metals and alloys
- Soil, sediments and waste
Unrivalled Analytical Performance

Our Wavelength Dispersive X-Ray Fluorescence (WDXRF) systems provide you with excellent analytical results for elements from Be to U in your samples. They feature high accuracy and the best achievable precision for effective process and quality control. They are reliable and robust for all industrial applications, yet flexible and powerful for all non-routine applications in research and development.

Real time Elemental Analysis for Mining and Coating
The new online multi-element analyzer S2 KODIAK uses X-ray fluorescence spectrometry to analyze the elemental concentrations in ores and other materials on conveyor belts in real time. Information about the element concentrations and layer thickness becomes immediately available with the S2 KODIAK helping to optimize production steps.

TouchControl™
Reliable results and error-free instrument operation is the key to success. This is why Bruker developed the intuitive instrument operation with touch screen. With minimum training, even inexperienced operators can obtain optimum results. And your analytical data are safe due to the unique TouchControl™ concept.

- Easy-to-use – intuitive operation
- No mouse or keyboard needed
- Minimal training required
- Immediate results on the touch screen
- Compact all-in-one design

Applications
- Petrochemicals
- Plastics and polymers
- Cement
- Geology
- Metals and alloys
- Precious metals
- Minerals and mining
- Glass and ceramics
- Chemicals and catalysts
- Pharmaceuticals
- Soil, sediments and waste
- Foods
Micro-X-Ray Fluorescence Analysis (Micro-XRF)

Micro-XRF is the method of choice for the elemental analysis of non-homogeneous or irregularly shaped samples as well as small samples or even inclusions. The fields of application comprise analyses of jewelry (M1 ORA), bulk materials and metallic coatings in routine and quality control (M1 MISTRAL, M2 BLIZZARD), and high speed “on the fly” measurements of virtually any kind of inorganic and organic sample (M4 TORNADO).

The ARTAX and the M6 JETSTREAM are unique, portable Micro-XRF spectrometers for the non-destructive analysis of immobile and valuable objects on site, i.e. in archeometry and restoration. They can be used for both spot measurements and high-resolution 1D and 2D mapping.

The M6 JETSTREAM can operate with several spot sizes either in horizontal or vertical positions.

Applications
- Minerals
- Metals and alloys
- Electronic components (RoHS)
- Particles
- Forensics
- Coatings and metallic multilayer stacks
- Non-destructive element analysis in art conservation, archeology and archeometry

Speed and Spatial Resolution
Using polycapillary optics Bruker’s Micro-XRF spectrometers can illuminate areas down to 20 µm in diameter with maximum X-ray intensity. The integrated Peltier-cooled XFlash® silicon drift detectors process highest count rates at optimal energy resolution.

Short measurement times and fast sample stages lead to extremely quick results regarding the elemental composition of a sample.

- Spatially resolved analysis of arbitrarily shaped samples, including fine structures
- No cooling media or consumables required
- Non-destructive measurement without sample preparation
- Outstanding analytical flexibility
Handheld Elemental Spectrometry

XRF Elemental Analyzer
- Light element analysis – Mg, Al, Si, P, S and Cl without vacuum or He
- SDD provides rapid analysis and ID of alloys
- TÜV SÜD certification – trusted the world over!
- Joint Bruker/NASA patent, earned NASAs Space Seal for vacuum technology
- Tube-based XRF for handheld elemental analysis – no radioactive materials

LIBS Elemental Analyzer
- No X-ray regulations
- Preferred for Li, Mg, Al, Si
- Fast Grade ID & Chemistry
- Flexible battery design
  - 1 battery operation for reduced weight
  - 2 battery operation for 12hr run-time
  - “Hot-swap” capability

Bruker’s handheld elemental analyzers provide quick and easy non-destructive analysis. The S1 TITAN enables fast analysis and ID of most alloys. The TRACER III-V+ and III-SD systems include the Bruker/NASA joint patented vacuum system and high-resolution detector allows for laboratory grade results of elements from Mg to U. The EOS 500 gives fast (3-5 seconds) grade ID and chemistry of Al, Ti, and Mg alloys.
Optical Emission Spectrometry (OES)

High-End Elemental Analysis of Metals

Spark optical emission spectrometers (S-OES) are the ideal instruments for all types of metals. From pure metal trace analysis to high alloyed grades, spark OES covers the complete range from sub-ppm to percentage levels. All relevant elements can directly be analyzed simultaneously.

Spark spectrometer instruments cover all types of metal applications. Our range of high-end instruments allows our customers to elevate their business into new levels of quality and process control.

Applications Q2 ION
- Iron and steel and alloys
- Aluminum and alloys
- Copper and alloys
- Zinc and alloys

Applications Q4 TASMAN
- Iron and steel and alloys
- Aluminum and alloys
- Copper and alloys
- Nickel and alloys
- Cobalt and alloys
- Magnesium and alloys
- Lead and alloys
- Tin and alloys
- Titanium and alloys
- Zinc and alloys

Applications Q4 MOBILE
- Positive Material Identification (PMI) of metals
- Sorting of metals
- Analysis of metals including short wavelengths elements P, S, B, Sn

New Freedom in Mobile OES – Q4 MOBILE is Offering Innovative Solutions:
- Patented CCD optic
- Special power management
- Hybrid cable for more flexible probe cabling
- Ultra-light probe
- Arc/spark probe with quick adapter change

Spark Stand With Co-axial Argon Flow
The innovative co-axial Argon flow represents the culmination of our efforts to further improve performance:
- Extended cleaning intervals
- Low Argon consumption
- Better analytical quality especially on curved surfaces
- Reduced operation costs
High-end Photomultiplier Spectrometers

Q8 MAGELLAN features the latest technology in photomultiplier detectors:

- Lowest dark current
- Large dynamic range
- Highest sensitivity
- Improved limits of detection
- Impressive stability and repeatability

Automation Control Software QMATION

The Q8 CORONADO is controlled by the powerful QMATION software:

- .Net framework technology
- Graphical user interface for providing system status

Applications

Q8 MAGELLAN

- Iron and steel alloys and traces
- Nitrogen in steel
- Cleanliness and inclusion determination in steel
- Zinc alloys and traces
- Aluminum alloys and traces
- Copper alloys and traces
- Oxygen in copper
- Nickel alloys and traces
- Cobalt alloys and traces
- Magnesium alloys and traces
- Tin alloys and traces
- Lead alloys and traces
- Titanium alloys and traces

Q8 CORONADO

- Process analysis of steels
- Process analysis of cast iron
- Process analysis of aluminum
- Process analysis of copper

OES
Combustion Gas Analysis (CGA)

CGA Combustion and Gas Analyzers – fast and accurate

Based on the know-how of many decades Bruker Elemental offers innovative solutions for rapid and precise elemental analysis.

The state-of-the-art technologies for fast and reliable determination of Carbon, Sulfur, Oxygen, Nitrogen and Hydrogen with simple and user-friendly operation provide highly accurate results for process and quality control as well as for materials research and development.

The clearly and simply structured Bruker “One-4-All” software interface for the CGA analyzers with intuitive operation via an external PC with Windows© software maximizes convenience and productivity.

Applications
- Iron, steel, cast iron
- Ferroalloys
- Aluminum and alloys
- Titanium, zirconium and alloys
- Ores, minerals
- Cement, lime, limestone, clays
- Coal, coke, fly ash
- Catalysts

CS Analysis

The G4 ICARUS HF combustion analyzer with high frequency induction furnace and infrared detection is the instrument of choice for rapid and precise, simultaneous analysis of carbon and sulfur down to ppm levels in a large variety of solid materials.

By introducing key technology advances, the G4 ICARUS HF creates a new dimension of usability and productivity.

The innovative combustion zone design combined with a unique, fully automatic cleaning system with brush- and vacuum-free dust removal leads to significantly reduced maintenance, thus maximizing productivity, applicability and component lifetime.

CS-Analysis

The G4 ICARUS HF analyzer is designed for simultaneous, fast and accurate determination of carbon and sulfur in a large variety of metallic and nonmetallic materials. G4 ICARUS features:

- Innovative design of the combustion zone with gas extraction nozzle (pat. pending) provides lance-free operation, reduced maintenance, higher productivity
- Fully automatic cleaning system with noiseless, brush- and vacuum-free dust removal into the used crucible
- Double dual range solid-state NDIR detector with two measuring ranges for CO₂ and SO₂ as standard
- Zero-flow mode saves oxygen during break periods, in standby mode additionally no reagent consumption
ONH Analysis

The high-end G8 GALILEO ONH analyzer is designed for rapid and automatic determination of oxygen, nitrogen and hydrogen in solid materials, based on the inert gas fusion (IGF) principle, which involves fusion of the sample material in a graphite crucible at high temperatures. When combined with an external, temperature-programmable infrared heated furnace, the G8 GALILEO can measure the diffusible hydrogen content in many sample materials, e.g., in welds according to ISO 3690 and AWS 4.3 as well as in high-strength steel.

The G4 PHOENIX DH carrier gas hot extraction analyzer is the right solution for accurate and rapid diffusible hydrogen measurement in a wide variety of matrices. The quartz tube diameter of 30 mm of the temperature-programmable infrared furnace enables the analysis of large samples such as steel sheet strips and weld coupons according to AWS A4.3 and ISO 3690.

Coupling a mass spectrometer to the analyzers leads to a substantially improved detection limit for the determination of ultra-low diffusible hydrogen concentrations, e.g., in high-strength steels by Thermal Desorption Mass Spectrometry (TDMS).

Applications
- Iron, steel and alloys
- Copper and alloys
- Aluminum and alloys
- Titanium, zirconium and alloys
- Ores, minerals
- Ceramics, minerals
- Coal, coke, fly ash
- Catalysts

ONH Analysis

The G8 GALILEO ONH analyzer is available in different configurations for simultaneous or single element determination. Besides the analysis of total hydrogen by melt extraction it enables the analysis of diffusible hydrogen by hot extraction with the external tube furnace. G8 GALILEO features:
- Programmable temperature of the electrode furnace, contact-free optical sensor for temperature measurement and precise control
- High stability detection system with NDIR detector for CO and thermal conductivity cell for N₂ and H₂
- Optional automatic furnace cleaning with dust removal, automatic crucible changer and sample loader
- Optional quadrupole mass spectrometer enables the measurement of ultra-low diffusible hydrogen concentrations

Applications
- Steel
- Aluminum
- Weld material
- Welds acc. to ISO 3690/AWS A4.3
Atomic Force Microscopy (AFM)

The Highest Performance AFMs, Powered by PeakForce Tapping

Bruker’s industry-best atomic force microscopes (AFMs) incorporate the very latest advances in atomic force microscopy techniques, including proprietary PeakForce Tapping™ technology, enabling researchers to discover new possibilities in mechanical, electrical and chemical applications. As the only major AFM manufacturer with a state-of-the-art probes nanofabrication facility and world-wide, application-specific customer support, Bruker is uniquely positioned to provide users the equipment, guidance, and support for all their nanoscale research needs.

Groundbreaking systems include the Dimension FastScan®, which combines the highest resolution capabilities found in a large-sample AFM with unmatched bandwidth to enable a wider range of materials science applications than is possible with competing systems. FastScan goes beyond topography to provide quantitative nanomechanical and nanelectrical data of real-time changes.

The BioScope Resolve® BioAFM provides the highest resolution imaging, most complete biomechanics capabilities, and fastest scanning of any bioAFM available. Specifically designed for integration onto inverted optical light and confocal microscopes, it enables investigation of a wide range of biological samples, from cells and tissues to molecular and protein structures.

Bruker-Exclusive PeakForce Tapping Technology

PeakForce Tapping is the most significant scientific breakthrough in AFM technology since the introduction of TappingMode™. PeakForce Tapping enables researchers of all experience levels to precisely control probe-to-sample interaction enabling the lowest available forces for the most consistent, highest resolution AFM imaging over the widest range of sample types, from the softest biological samples to very hard materials. PeakForce Tapping has led to over 1,000 peer-reviewed publications in the first five years since its release, generating nearly 3000 citations, making it today’s principal AFM mode with the fastest growing publication record.
Pioneering Performance in Super-Resolution Imaging, Multiphoton Imaging, and Live-Cell Imaging

Bruker’s suite of fluorescence microscopy systems provides a full range of solutions for life science researchers.

Bruker’s Vutara 352 is the world’s first quantitative super-resolution microscope. It provides an entirely new dimension of functionality in super-resolution microscopy, including the ability to perform pair-correlation, co-location, cluster, and live-cell analysis with super resolution.

Bruker’s family of Ultima Multiphoton Microscope Systems deliver a unique combination of flexibility, imaging depth, speed and resolution required for intravital imaging applications in neuroscience, oncology and immunology. Three basic configurations make it easy for researchers to optimize their system to specific requirements, for example, for in vivo applications utilizing live animals across a range of model systems or for detailed investigation of tissue slices, tissue explants, and cell cultures.

The Opterra II Multipoint Scanning Confocal Microscope enables cell biologists to study function and structure using live-cell imaging in cell cultures and invertebrate model organisms at speeds and durations previously not possible. With its short acquisition times and cell-protecting minimization of photobleaching and phototoxicity, Opterra II is ideal for advanced live-sample studies, including protein localization and trafficking, intracellular ion imaging, microtubule and vesicle dynamics, and nuclear structure and dynamics.

Feature-Rich Life Sciences Software That’s Easy to Use

Bruker’s fluorescence microscopes incorporate proprietary software that flattens the learning curve for all users without lessening the advanced capabilities and custom programming that cutting-edge research in biology requires. The platforms are specifically designed with an open architecture that allows researchers to work seamlessly with a host of third-party programs, so they can concentrate fully on their research.
Tribology and Stylus and Optical Metrology (TSOM)

Over 30 Years of Surface Metrology and Mechanical Testing Innovation

Bruker is the worldwide leader in surface measurement and inspection, offering fast, contact and non-contact analyses for samples ranging in size from microscopic MEMS to entire engine blocks. Our profilers and tribometers are the culmination of generations of proprietary technology advances, providing precision measurements and mechanical tests in applications and environments that are challenging for other competing systems. With specialized instruments for advanced QA/QC and R&D precision machining and manufacturing applications within the automotive/aerospace, high-brightness LED, solar, semiconductor, and medical device markets, Bruker has a metrology and testing solution that will fit your application and budget.

Bruker’s Dektak® Stylus Profilers provide repeatable, accurate measurements on varied surfaces, from traditional 2D surface roughness characterization and step height measurements to advanced 3D mapping and film stress analyses. Dektak surface profilers have been widely accepted as a superior solution for measuring thin film thickness, stress, and surface roughness and form in applications ranging from educational research verification to semiconductor process control.

Bruker’s Contour Elite™ 3D Optical Microscopes combine proven industry-leading interferometric metrology, intuitive Vision64® analysis software, and exceptional new imaging capabilities. Contour Elite systems deliver the high-speed operation, accuracy, and repeatability that top-level R&D and production requires, and adds the imaging and display advantages commonly associated with confocal microscopy.

Bruker’s UMT TriboLab Mechanical Tester and Tribometer offers higher speeds, more torque, and better force measurement than any of its predecessors or competitors, plus it introduces powerful new features for improved efficiency and ease-of-use. TriboLab can perform practically every common tribological test on nano and micro scales, and due to its range of testing abilities and configurations, is used extensively across a wide variety of industries, including biomedical, microelectronics, paper, and coatings, and throughout common industrial processes in petroleum, aerospace, automobile, engine, bearing, and fastener manufacturing.

Security of Bruker’s Industry-Best Service and Support

Across a very large and varied base of installed systems, Bruker enjoys a strong reputation for having highly trained and experienced support staff, most of whom have one or more advanced degrees in science or engineering, with many years of experience solving real-world application problems. With training and service centers around the globe, every Bruker customer is ensured of receiving timely and personalized user and system support.
Unique 5-on-1 Range of EM Analyzers

Bruker is the world’s only manufacturer to offer five analysis methods for materials characterization on electron microscopes. They cover the majority of applications and tackle even your toughest challenges with unprecedented speed, accuracy and ease of use.

The full integration of EDS, WDS, EBSD/TKD, and Micro-XRF into the ESPRIT 2 software allows the combination of data obtained by these complementary methods. For Transmission Kikuchi Diffraction analysis (TKD) in SEM, the EBSD system can be configured with the OPTIMUS™ TKD detector head that was specifically designed for best sample-detector geometry.

The innovative SDDs designed especially for TEM (XFlash® 6T I 30 and 6T I 60) offer minimum mechanical and electromagnetic interference, provide optimum take-off angle, and avoid the necessity of sample tilt.

Applications
- Metals and alloys
- Semiconductors
- Layers and coatings
- Thin films
- Minerals
- Glasses
- Nanomaterials
- Plastics and organic solids
- Biological samples
- Forensics

QUANTAX for Nano-Analysis
- Worldwide leading technologies for SEM and TEM
- EDS systems with XFlash® 6 detectors provide highest energy resolution, maximum throughput and optimum geometry with active areas from 10 to 100 mm²
- XSense – Ultra-sensitive parallel beam WD spectrometer for X-ray microanalysis in the low energy range
- High-end EBSD/TKD system with technologically leading e-Flash detectors, OPTIMUS™ TKD detector head, and TKD Professional Toolkit for fastest simultaneous EBSD/EDS and TKD/EDS analysis
- XTrace – high performance micro-spot X-ray source for Micro-XRF analysis in SEM
- Micro-CT for SEM – true 3D microscopy for non-destructive analysis on a sample’s internal morphology
Single Crystal X-Ray Diffraction (SC-XRD)

Crystallography: Driving Modern Science
Detailed insight into the relationship between structure, function, and reactivity is crucial for the success of modern science. Crystallography is one of the most powerful, unambiguous methods for generating this vital information. It provides accurate and precise measurements of molecular dimensions from small molecules and macromolecules in a way that no other science can begin to approach and remains the method of choice for studying chemical structures in atomic detail.

To get the maximum benefit out of this technique, scientists need the latest analytical tools. This is the driving vision of our development team for the D8 Crystallography Solutions: to provide your cutting-edge research with the superior tools it deserves.

The D8 QUEST and the D8 VENTURE – constituting the D8 Crystallography Solutions family – can be perfectly configured for the demands of any imaginable application in SC-XRD.

Applications
- Structure determination in Chemistry, Pharmacology and Mineralogy
- Absolute structure determination on molybdenum and copper radiation
- Metal-organic frameworks, crystalline sponges & coordination Chemistry
- Electron Density studies by high-angle and short wavelength diffraction
- Structural investigation of high pressure phases
- Integrated treatment of up to eight-fold twinned samples
- Phase transitions
- Modulated structures
- Diffuse scattering
- Powder (e.g. in capillary)

Riding the Perfect Wave
Matching the right wavelength to your sample can significantly improve the quality of the experiment. Molybdenum radiation is most often the wavelength of choice for chemical crystallography.
- Sealed tube spot focus for Cu and Mo radiation (flat graphite or TRIUMPH monochromator)
- IμS microfocus sources for Cu, Mo or Ag radiation
- TURBO X-RAY SOURCE microfocus rotating anode for Cu and Mo radiation
- METALJET, liquid-metal jet source for Ga and In radiation
When Details Matter – Biological Crystallography

Continued technological advances in macromolecular crystallography have enabled structural biologists to tackle projects of ever-greater ambition. At the same time, modern structural genomics and drug discovery initiatives are striving for ever-greater productivity and efficiency. This is placing significantly greater demands on researchers and instrumentation. The second generation D8 VENTURE again feature new technologies that will further help the researcher to address the most challenging samples.

Brighten up your home lab – METALJET, TXS and IµS, all with HELIOS MX

High flux, small beam size and stability are essential for collecting quality data from challenging crystals. These requirements have driven developments in synchrotron design, and Bruker applies these important lessons to home-lab source technology. Our sources now deliver X-ray intensities comparable to those of typical bending-magnet beamlines. The modern METALJET now crosses the next boundary matching diffraction limits previously only seen at third generation synchrotrons.

Applications
- Substrate binding
- Membrane proteins
- Molecular replacement
- Protein microcrystals
- Multi-protein complexes
- High-resolution protein structures
- SAD-phasing
- Molecular motors
- Twinned protein samples
- Protein-DNA complexes
- Long unit cell axes
- Structural enzymology
- In-situ screening
- LCP samples

CPAD—From 4th Generation XFEL to Your Home Laboratory

As every photon diffracted from a sample provides a quantum of information that describes the sample’s structure, an ideal X-ray detector must faithfully record each and every photon in order to preserve this precious information. Our new PHOTON II Charge-Integrating Pixel Array Detector (CPAD) detector comes very close to this ideal, with speed, sensitivity, and accuracy superior to any other detector available in the home laboratory.

- The largest monolithic active area of any pixel array (140 × 100 mm²)
- No gaps due to the use of a single wafer-scale silicon sensor
- Single-photon sensitivity
- No charge sharing effects, zero counting losses
- Large dynamic range, high uniformity
ECO Systems for XRD, XRF and SC-XRD

**Designed for the ecological and economical needs of today**

The **D8 ADVANCE ECO** extends the D8 ADVANCE diffractometer family towards 1kW and a minimum ecological footprint. Its high-brilliance line focus X-ray source has very low energy consumption, does not require external water cooling, and has no special needs concerning lab infrastructure. The D8 ADVANCE ECO is fully compatible to the D8 diffractometer family guaranteeing flexibility for the future. The system can be easily upgraded at any time for new applications, allowing you to take maximum advantage of your investment.

The **S8 TIGER ECO** offers wavelength dispersive X-ray fluorescence (WDXRF) performance at a unique low cost of ownership. Based on Bruker’s established “Plug ‘n Analyze” technology the S8 TIGER ECO operates with little power and without any need for cooling water or compressed air. With the S8 TIGER ECO configurations Bruker addresses the demand for economical instruments for process and quality control in cement plants, the petrochemical industry and for industrial minerals.

The **D8 QUEST ECO** is designed to provide the maximum performance cost balance, and features the PHOTON 50 CMOS detector with a sensor that is two times larger compared to traditional CCDs and allows data collection in shutterless mode. This ensures excellent data quality and unprecedented data acquisition speed. The D8 QUEST ECO has an automation plugin, a great tool for both expert crystallographers and users that are less familiar with single crystal diffraction systems. If experimental requirements change in the future the D8 QUEST ECO can be upgraded with a number of high performance source and detector options including the IµS 3.0 microfocus source and the PHOTON 100 CMOS or PHOTON II CPAD detector.

**ECO Line**

The ECO Line features an innovative design enabling low cost of ownership, minimized consumption of resources, while providing superior analytical performance: ECOlogical, ECO-performance, ECOnomical. At the same time, all instruments within the ECO Line provide uncompromised ease-of-use combined with outstanding analytical results. Unparalleled instrument uptime is assured with superior instrument quality – backed up by unrivaled component guarantees.
X-Ray Micro Computed Tomography (Micro-CT)

Bruker microtomography is available in a range of easy-to-use desktop instruments, which generate 3D images of your sample’s morphology and internal microstructure with resolution down to the sub-micron level. Each system includes advanced software for visualization and analysis in 3D.

- SKYSCAN 1172 – high resolution micro-CT
- SKYSCAN 1173 – high energy micro-CT
- SKYSCAN 1174 – most compact micro-CT
- SKYSCAN 2140 – combined micro-CT and micro-XRF
- SKYSCAN 2011 – laboratory nano-CT

Non-destructive 3D Imaging with X-rays

Micro computed tomography (Micro-CT) is X-ray imaging in 3D, by the same method used in hospital CT scans, but on a small scale with massively increased resolution. It really represents 3D microscopy, where very fine scale internal structure of objects is imaged non-destructively.
Bruker X-ray instruments are designed with high flexibility for future requirements. They can be upgraded to automatic operation. All Bruker X-ray solutions allow seamless and flexible integration into laboratory and total automation solutions.

Automation Solution using D8 and S8
- Sample transportation
- Sample preparation
- Sample handling robotics
- Automation software
- Seamless integration into laboratories
- Total automation solutions e.g. for the cement, aluminum and semiconductor industry
- Container laboratories
- Flexible integration packages
- Upgrade packages
- Powerful Automation Control Software AXSLAB
- Interfacing to plant control system or LIMS (Laboratory Information Management System)

Automation Control Software AXSLAB
The laboratory automation is controlled by the powerful AXSLAB software. From any PC in the network, single jobs or batches can be started and the status can be easily checked. Intelligent sample management allows the highest sample throughput and immediate access to priority samples.

The Whole Spectrum with SPECTRA\textsuperscript{+}
The fully IAI Integrated Analytical Intelligence in SPECTRA\textsuperscript{+} is based on more than 50 years of experience in XRF analysis – for standardless XRF analysis for all types of materials. Corrections can be made automatically.
Contact Us for More Information

For more detailed information on specific Bruker products and systems, please complete and return this form. Check the box corresponding to the products that interest you and mail or fax the form back to us. On the back cover of this brochure, you will find the address and fax number of our nearest Bruker branch office. If you would like technical assistance, we will be happy to answer questions and suggest options that will successfully integrate Bruker solutions into your work process.

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| ARTAX (Micro-XRF)  | FastScan Bio (AFM)  | NanoForce (TSOM)  |
| BioScope Resolve (AFM) | Icon-Raman (AFM)  | NPFLEX (TSOM)  |
| Contour CMM (TSOM) | Inspire (AFM)  | Opterra II (FM) |
| Contour Elite (TSOM) | NANOSTAR (SAXS)  | QUANTAX (EDS/WDS/EBSM/Micro-XRF) |
| ContourSP (TSOM) | MICROpix/MICROcalix (SAXS) | Q2 ION (OES) |
| D2 PHASER (XRD) | N8 HORIZON (SAXS/WAXS/GISAXS) | Q4 MOBILE (OES) |
| D8 ENDEAVOR (XRD) | G4 ICARUS HF (CGA)  | Q4 TASMAN (OES) |
| D8 ADVANCE (XRD) | G4 PHOENIX DH (CGA) | Q8 MAGELLAN (OES) |
| D8 ADVANCE ECO (XRD) | G8 GALILEO ONH (CGA) | Q8 CORONADO (OES) |
| D8 DISCOVER (XRD) | Innova (AFM)  | S1 TITAN (HH-XRF) |
| D8 DISCOVER (XRD2) | Innova-IRIS (AFM) | S2 PUMA (XRF) |
| D8 QUEST (SC-XRD) | M1 MISTRAL/M1 ORA (Micro-XRF) | S2 KODIAK (XRF) |
| D8 QUEST ECO (SC-XRD) | M2 BLIZZARD (Micro-XRF) | S2 PICOFOX (TXRF) |
| D8 VENTURE (SC-XRD) | M4 TORNADO (Micro-XRF) | S8 TIGER (XRF) |
| DektakXT (TSOM) | M6 JETSTREAM (Micro-XRF) | S8 TIGER ECO (XRF) |
| Dektak XTL (TSOM) | MultiMode 8-HR (AFM) | S8 LION (XRF) |
| Dimension Edge (AFM) |              | SKYSCAN (CT) |
| Dimension FastScan (AFM) |              | TRACER Series (HH-XRF) |
| Dimension Icon (AFM) |              | Ultima Intravital (FM) |
| EOS 500 (HH-LIBS) |              | Ultima In Vitro (FM) |
|                     |              | Vutara 352 (FM) |

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