Anton Paar

The Compact Laboratory SAXS/WAXS/GISAXS System

SAXSpoint

SAXSpoint

The world‘s brightest footprint

It’s a common mindset that small-angle X-ray scattering experiments of high resolution require synchrotron radiation or massive instrumentation in the lab.

With the novel SAXSpoint system for SAXS, WAXS and grazing-incidence (GI) SAXS, Anton Paar revises this view: for the first time high-resolution SAXS data are available on an innovative compact laboratory SAXS/WAXS/GISAXS system.

The pioneering SAXSpoint system makes your life easier and ensures precise and straightforward analysis of nanostructured materials.

Go for the world’s brightest footprint in SAXS!

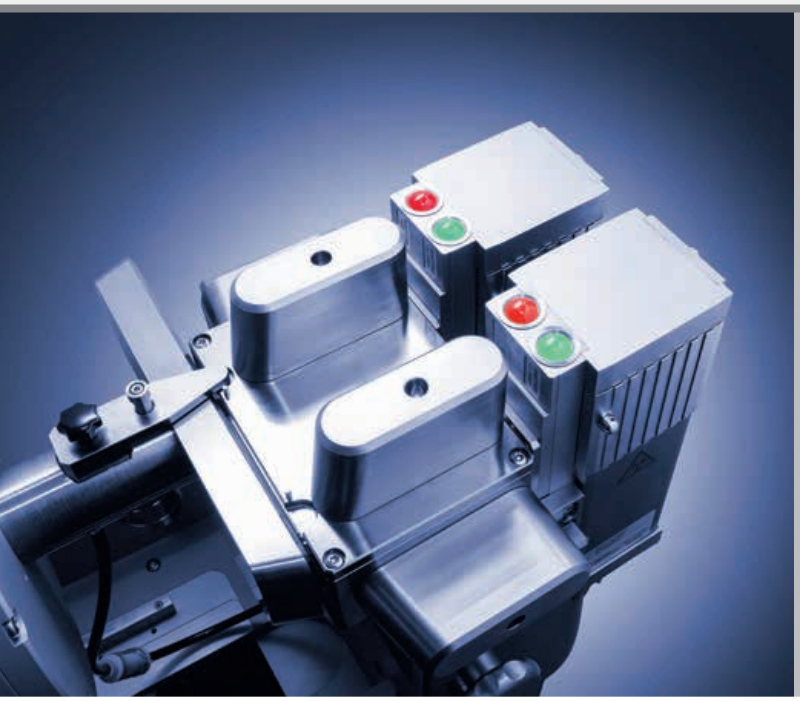
SAXSpoint meets the highest demands of scientists working with nanomaterials on a SAXS/WAXS/GISAXS system:

- ➤ Excellent resolution at a compact size
- ➤ Best SAXS/WAXS/GISAXS data quality
- ➤ Short measurement time
- ➤ Full experimental flexibility
- ➤ Ease of operation
- ➤ High system uptime

The main motivation for the development of SAXSpoint was to provide scientists with the most innovative and compact SAXS/WAXS/GISAXS laboratory system for exploring the structure of nanosized materials.

SAXSpoint is your reliable partner for daily nano research in the home lab!

SAXSpoint benefits – Meeting your needs



Brilliant X-rays – brilliant results

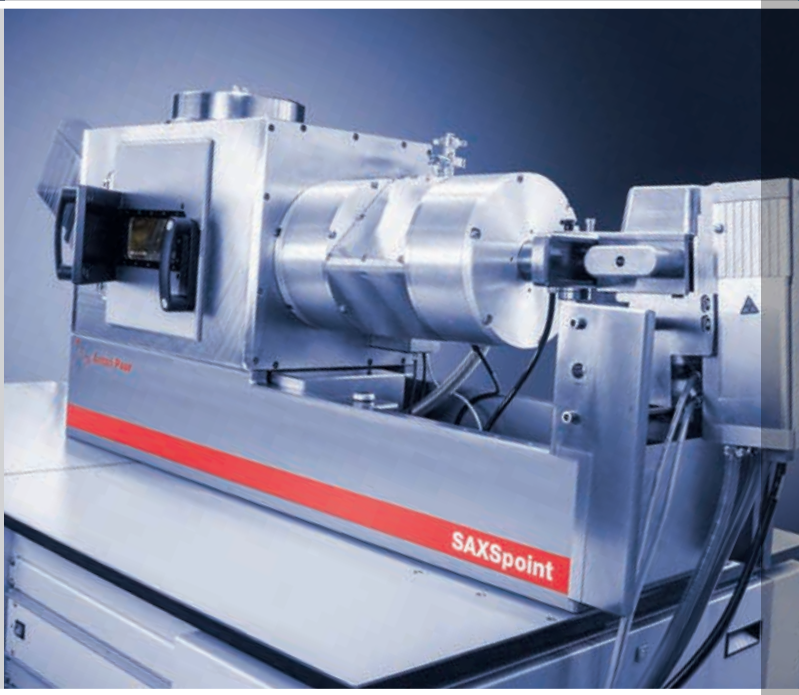
SAXSpoint employs brilliant X-ray sources and optics providing outstanding flux and spectral purity. For extended experimental flexibility Cu and Mo sources are available, optionally as a combined dual source.

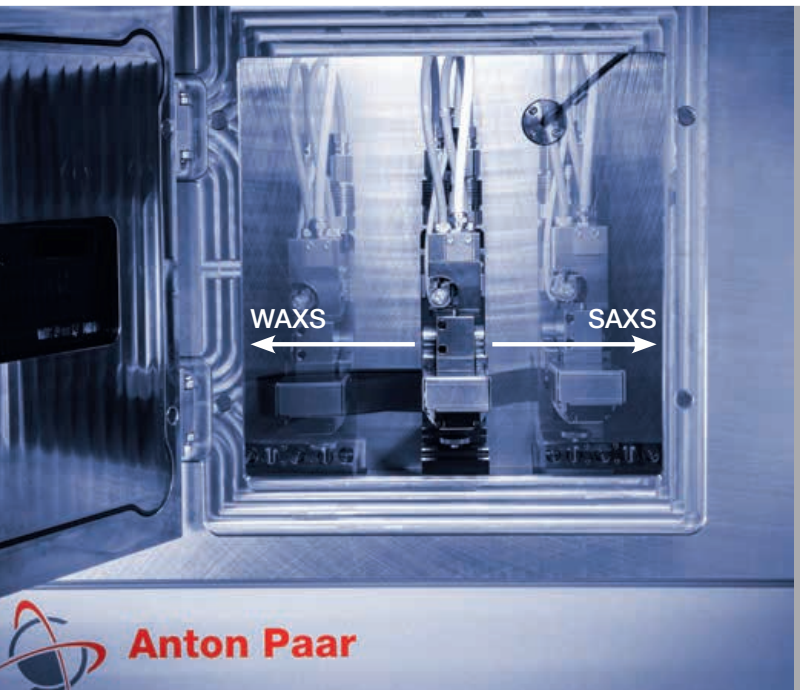
The optional MetalJet source offers the highest X-ray flux available for laboratory SAXS systems.

The combination of powerful X-ray sources with scatterless beam collimation ensures a high signal-to-noise ratio and perfect data quality.

Your sample is the focus

Benefit from SAXSpoint's precise and automatic TrueFocus alignment of all X-ray components and sample stages. This allows you to concentrate on the measurement of your sample in order to obtain the best possible results with SAXSpoint.





SAXS and WAXS studies in one go

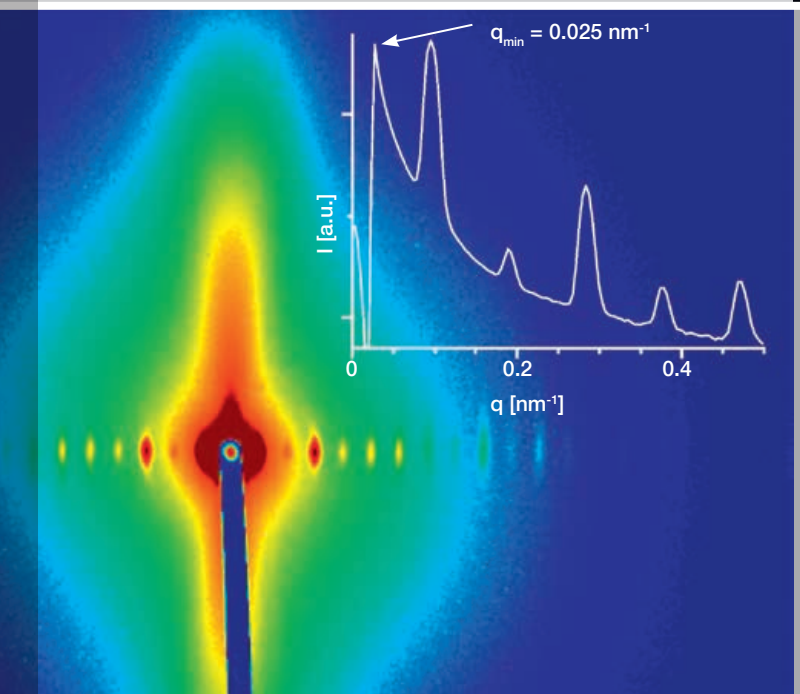
The well-proven TrueSWAXS feature allows you to run SAXS and WAXS measurements of your sample simultaneously. Don't worry about time-consuming re-alignment or changing the detector position, simply obtain SAXS and WAXS results automatically.

Providing comprehensive solutions

GISAXS stage, tensile stage, humidity stage, temperature stages, gas reaction cell, pressure cell, … whatever your application may require, SAXSpoint has a large measurement chamber with the proper sample stage for perfectly characterizing your nanostructured samples under ambient and non-ambient conditions.

Latest detection technology

SAXSpoint brings synchroton technology to the lab by integrating the new EIGER R series detectors featuring the latest hybrid photon-counting (HPC) technology from Dectris. This ensures high resolution and the best data quality.



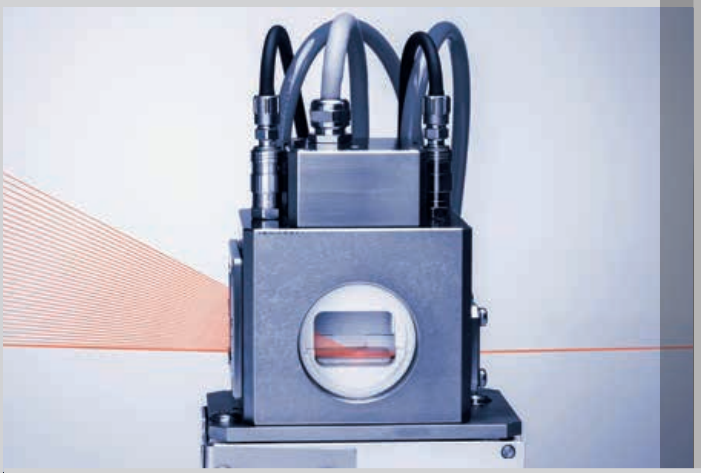
Resolving nanostructures

SAXSpoint features an outstanding angular resolution in point collimation with the smallest system size.
The innovative and compact design of SAXSpoint ensures short measurement times and excellent SAXS/WAXS/GISAXS data.

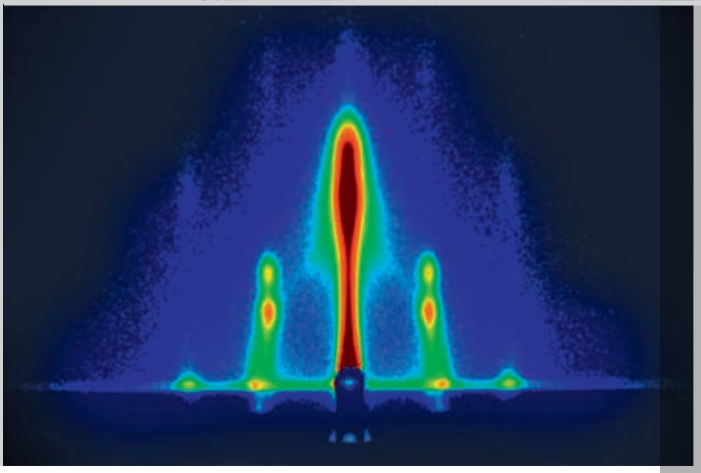
2D SAXS pattern of
collagen (chicken tendon)

Smart sample environments – Tailored to your applications

SURFACE



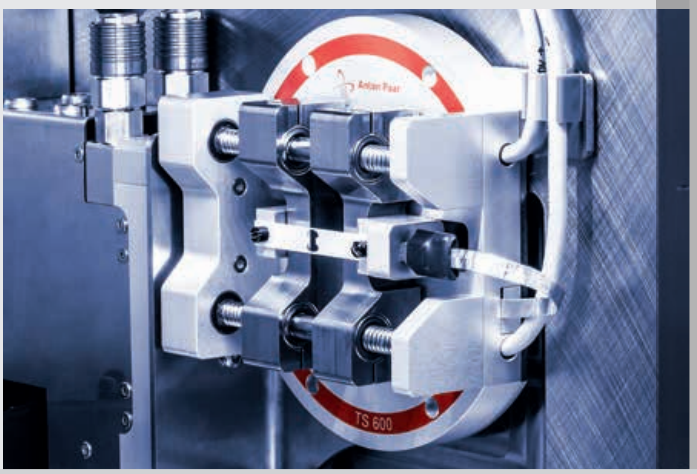
GISAXS Stage
Investigate nanostructured surfaces and thin-film samples using grazing-incidence (GI) SAXS - at elevated temperatures and under controlled atmosphere.



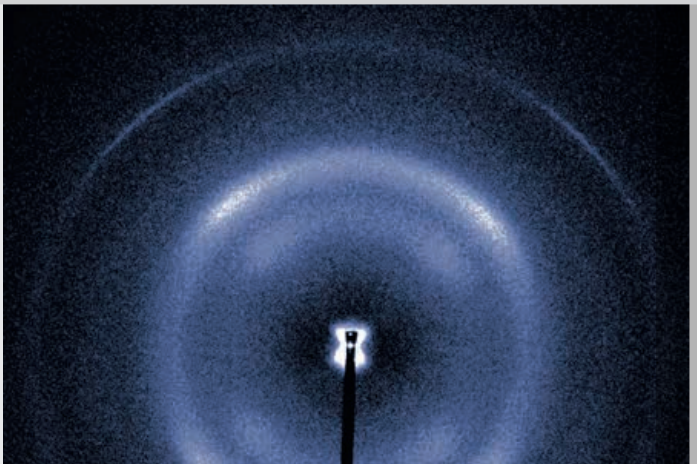
GISAXS pattern of a polymer thin-film on Si substrate

NON

STRESS/STRAIN



Tensile Stage
Perform SWAXS studies on nanostructured fiber and foil samples under well-defined mechanical load and controlled temperature.



SAXS pattern of a stretched coir fiber

SAMPLING

N-AMBIENT

TC Stages
Use the TC Stage sample stages for measurements of solids and liquids under precisely controlled temperatures over a wide range from -150 °C to 500 °C.

Humidity Stage
Study the influence of relative humidity (RH) and temperature on the nanostructure of your powder or film sample.

G/MAPPING

Vario Stage
Run automated measurements of multiple solid samples and capillaries using a single stage. Rely on high-precision sample positioning.

ASX Autosamplers
Run automated measurements of up to 192 liquid samples using standard well plates. Benefit from the cooling option for sensitive (biological) samples.

Typical SAXS/WAXS applications

➤ Polymers and fibers

Semi-crystalline polymers, block copolymers, polymer blends, fibers

➤ Nanostructured surfaces (GISAXS)

Layered thin-film samples, mesoporous thin films, nanoparticle superlattices

➤ Catalysts, porous materials

Mesoporous materials, catalysts for polymerization, gas purification, fuel cell materials

➤ Nanocomposites

Nano-filled polymer composites (carbon nanotubes, clay)

➤ Liquid crystals

LC displays, food and drug delivery systems, membranes

➤ Colloidal particle dispersions

Nanocrystals, pigments, quantum dots

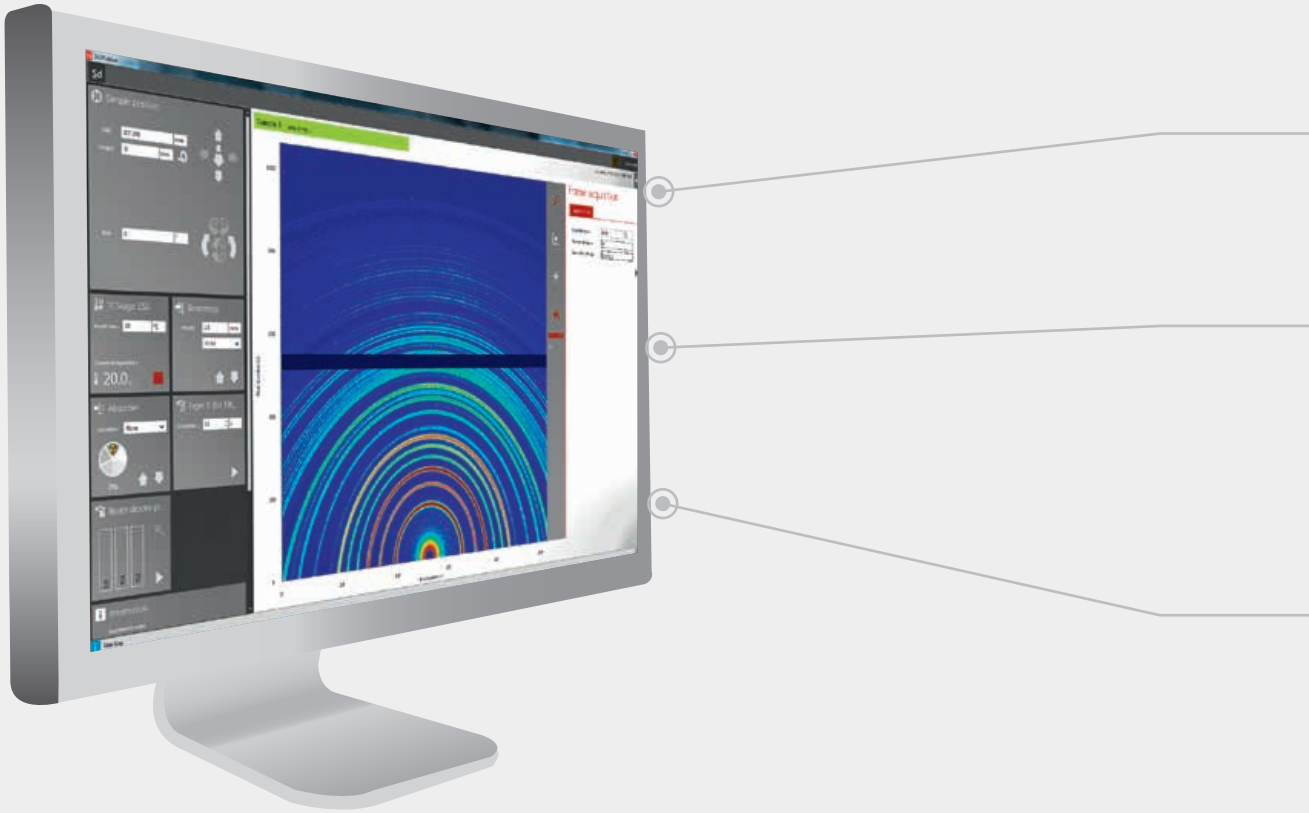
➤ Surfactants and emulsions

Detergents, food and drug carrier materials, personal care products

➤ Biological materials

Biomembranes, lipids, peptides, proteins in solution

Dedicated software – Ensuring the best results



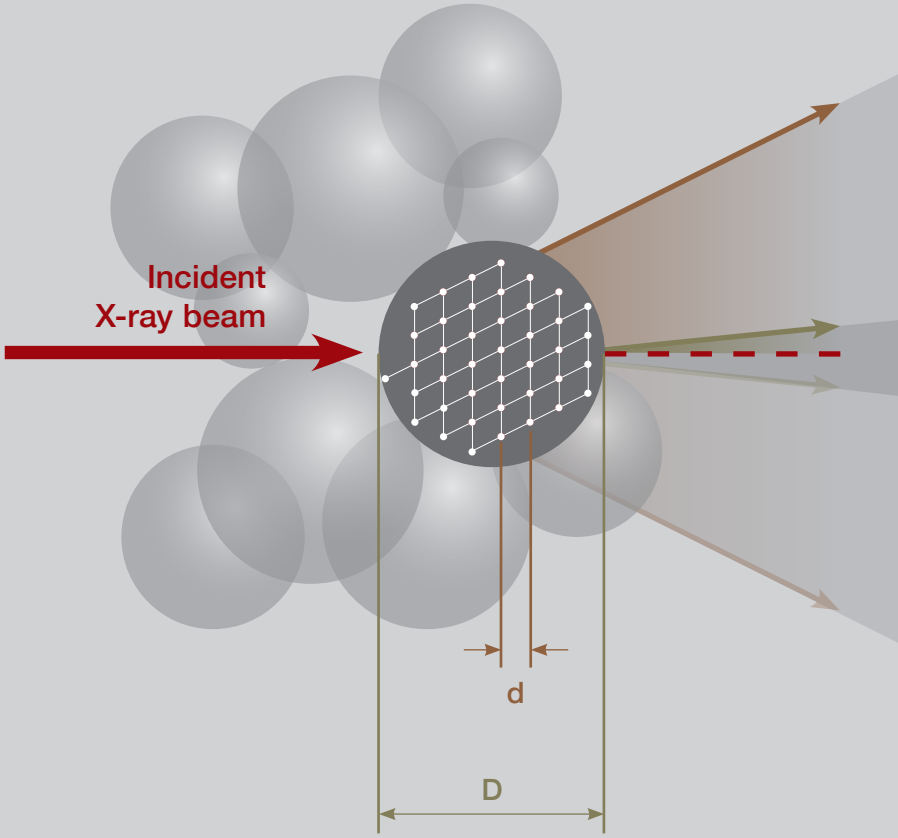
SAXS/WAXS method – Principles

What SAXS/WAXS is

SAXS/WAXS/GISAXS is a non-destructive method which provides structural information about materials from the sub-nanometer scale up to a few hundred nanometers. It determines:

- Particle size and size distribution
- Particle shape
- Inner structure
- Orientation
- Porosity/Surface
- Crystallinity

When X-rays hit a sample they are scattered and produce a scattering pattern characteristic of the sample's nanostructure.



Use the comprehensive and intuitive software packages of the SAXSpoint system for easily processing and evaluating your SAXS, WAXS and GISAXS data:

System control and data acquisition | SAXSdrive™

- SAXSdrive™ provides full control of the SAXSpoint system components and allows you to run automated SAXS/WAXS/GISAXS experiments.

Data processing and analysis | SAXSquant™

- Analyze 2D and 1D data using fully customizable templates and determine important parameters such as radius of gyration RG, particle size, specific volume and more.
- Process the generated data files in any data evaluation software, such as ATSAS, SASView, SASfit.

Advanced structure interpretation | PCG

- Retrieve structural information such as particle size, size distribution, shape and inner structure using IFT and deconvolution techniques.
- Interpret scattering data of interacting (i.e. concentrated or charged) particle systems.

WAXS: The signal at large angles (typically > 10°) gives information on the crystalline structure at the atomic level.
d < 1 nm

SAXS: The collected scattering signal at low angles provides information on large assemblies up to a few hundred nanometers.
D ~ 1 - 100 nm

Advantages

- **The SAXS/WAXS technique requires practically no sample preparation and therefore analyzes a material in its original state.**
- **SAXS/WAXS ideally complements other structural analysis methods that only provide local information such as electron microscopy.**
- **The obtained results are statistically relevant and representative of the entire samples.**

Pioneering laboratory SAXS instrumentation

- **1957**

  The first commercial SAXS analyzer was built by Anton Paar in Graz, Austria.

- **1981**

  KKK SAXS camera developed, over 800 instruments produced by Anton Paar and sold worldwide.

- **2003**

  Introduction of SAXSess, featuring X-ray beam mono-chromatization and 2D detection.

- **2012**

  Introduction of SAXSpace with unique SmartSAXS, TrueFocus and TrueSWAXS features.

- **2015**

  Introduction of the new and brilliant SAXSpoint system featuring outstanding resolution with compact system size.

Specifications

X-ray source	- Microfocus X-ray source (Cu, Mo) - Optional dual (Cu & Mo) microfocus X-ray source - High-performance Ga MetalJet source
X-ray optics and collimation	- Custom-designed optics (fully evacuated) - Automated scatterless beam collimation (fully evacuated)
Sample stages/ Autosamplers	- TCStage temperature-controlled stages - GISAXS stage with heating option - Tensile stage with heating/cooling option - Humidity stage - Autosamplers for multiple solid and liquid samples - Customized solutions available on request
Special features	- TrueFocus: self-alignment with X-ray beam - TrueSWAXS: continuous and simultaneous SWAXS studies up to 74° 2Θ - Stagemaster: YZ stage with auto-recognition of sample stages
Temperature range Atmosphere	- -150 °C … 500 °C, ± 0.1 °C - Vacuum, air, inert gas, humidity (reactive gases on request)
Sample holders	- Low-noise quartz capillary for liquids - Sample holders for solids - PasteCell for viscous and powder samples - RotorCell for sample spinning - High-pressure cells - µ-Cell for small sample volumes - FlowCell and TubeCell for automation
Accessible q-range	- 2D EIGER R series CMOS detector q_{min}: 0.025 nm^{-1} and q_{max}: 40.7 nm^{-1} (60 ° 2Θ) Δq = 0.005 nm^{-1} - 2D imaging plate detector q_{min}: 0.045 nm^{-1} and q_{max}: 49.0 nm^{-1} (74 ° 2Θ) Δq = 0.004 nm^{-1} - Ultra-low-q option available on request
Software	- SAXSdrive measurement and acquisition software - SAXSquant data processing and analysis software - Advanced data interpretation software (PCG)
Dimensions	Footprint 0.9 m x 1.8 m

Your SAXSpoint system in good hands

➤ Best quality

Be sure that all components of your SAXSpoint instrument are of the best possible quality. Anton Paar's long tradition, experience and skills in producing high-precision measurement instrumentation ensure that your SAXSpoint will produce high-quality SAXS/WAXS/GISAXS results.

➤ High system uptime

SAXSpoint is reliable and robust; count on a long working time without failure. On top of that Anton Paar's worldwide network of experienced application and service specialists provides swift support for the smooth operation of your SAXSpoint instrument.

➤ Profound SAXS/WAXS/GISAXS knowledge

We take care of your SAXSpoint system: Starting with installation and commissioning of the system, our SAXS/WAXS specialists provide a thorough onsite user training in order to help you to make the most of your SAXSpoint system.

Based on 60 years of SAXS experience we accompany you with dedicated application support made available by our skilled SAXS/WAXS/GISAXS application scientists.

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