Rigaku Introduces the NANOPIX Small Angle and Wide Angle X-ray Scattering(SAXS/WAXS) System

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Rigaku announces the NANOPIX, its latest small angle and wide angle X-ray scattering (SAXS/WAXS) measurement system

February 1, 2016 – Tokyo, Japan. Rigaku Corporation today announces the launch of the NANOPIX SAXS/WAXS measurement system, a new X-ray scattering instrument designed for nanostructure analyses. The NANOPIX SAXS/WAXS measurement system can be used for both small angle scattering (SAXS) and wide angle scattering (WAXS) measurements, which makes it possible to evaluate multiscale structures from sub-nanometer to nano-order (0.1 nm to 100 nm). The NANOXPIX SAXS/WAXS measurement system achieves the highest level of small angle resolution (Q_{min} to 0.02 nm^{-1}) for a laboratory SAXS instrument.

Small angle X-ray scattering (SAXS) is a technique used to study nanoscale structures of atoms or molecules and their variation by measuring the diffuse scattering from unequal electron density areas. SAXS experiments are performed in a wide range of fields from R&D to quality control.

The NANOPIX SAXS/WAXS measurement system is applicable to the study of a variety of materials including solids, liquids, liquid-crystals, or gels with ordered and disordered structures, and diverse applications including nanoparticle size distribution analyses, three-dimensional protein molecule structure analyses, identification of molecular assembly or disassembly and research of advanced materials, such as carbon fiber-reinforced plastics (CFRP).

Rigaku NANOPIX SAXS/WAXS measurement system

The NANOPIX SAXS/WAXS measurement system is configured with a high-brilliance, high-power point focus X-ray source, the OptiSAXS high-performance multilayer mirror, the ClearPinhole high-performance, low scattering pinhole slits, and the HyPix-3000 high-performance 2D semiconductor detector that enables the detection of diffraction and scattering even from anisotropic materials. Optionally, the HyPix-6000 detector is also available for wide angle measurements, offering an expanded detection area by combining two detection modules.

As one of the key features, the sample-to-detector distance is changeable depending on the structure size ranging from atomic structure (microstructures: 0.2 - 1 nm) to molecular structure (macrostructures: 1 - 100 nm).

In addition, the NANOPIX SAXS/WAXS measurement system enables measurements under various temperature or humidity conditions, experiments with simultaneous DSC (differential scanning calorimetry) measurements, as well as measurements in combination with special attachments or other external devices. Control of the measurement environment is essential for the research of structure-property relationships of functional materials.

The NANOPIX SAXS/WAXS measurement system will start shipping in April 2016.

Main Features

・High small angle resolution

Equipped with the MicroMax-007 HFMR microfocus high-brilliance X-ray generator (1,200 W), the OptiSAXS long-focus multilayer mirror optics and the ClearPinhole high-performance, low-scattering pinhole slits, the NANOPIX SAXS/WAXS measurement system achieves the highest level of small angle resolution (Q_{min} to 0.02 nm^{-1}) in a laboratory SAXS instrument. Additionally, the X-ray generator and the multilayer mirror optics are integrated into one beam module to deliver high stability and reproducibility.

・Intelligent system control software

The NANOPIX SAXS/WAXS measurement system is fully motorized and controlled by software. The control software features a sensing function that enables the automatic recognition of sample attachments.

・High-performance 2D semiconductor detector

The NANOPIX SAXS/WAXS measurement system incorporates the HyPix-3000 hybrid pixel array detector with a spatial resolution of 100 µm, 775 x 385 pixels, and an active area of 77.5 mm x 38.5 mm. This detector can obtain information on diffraction and scattering even from

anisotropic materials. Optionally, the HyPix-6000 detector containing two modules to achieve an extended active area is also available to cover the even wider angle ranges.

・Changeable distance between sample and X-ray detector

In the NANOPIX SAXS/WAXS measurement system, several short vacuum paths are connected between the sample and the detector that can be easily inserted/removed using a vacuum path sliding function when the sample-to-detector distance needs to be changed. This vacuum path sliding function makes it possible to slide unnecessary vacuum paths for retraction instead of moving them up or down in order to adjust the sample-detector distance. This function improves operability and facilitates measurements under the most suitable conditions.

・Support of various sample environments

To simplify measurements under various environments, locking-type kinematic bases are used on the sample stage. Advanced material research requires information on material structures to be exposed to various temperature or humidity conditions, mechanical deformation, and other environmental conditions. Corresponding to such needs, the NANOPIX SAXS/WAXS measurement system is available with a variety of optional attachments and also has enough free space around the sample to enable the easy installation of devices for controlling the sample environment.

About Rigaku

Since its inception in Japan in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. Rigaku and its subsidiaries form a global group focused on general-purpose analytical instrumentation and the life sciences. With hundreds of major innovations to their credit, Rigaku companies are world leaders in X-ray spectrometry, diffraction, and optics, as well as small molecule and protein crystallography and semiconductor metrology. Today, Rigaku employs over 1,100 people in the manufacturing and support of its analytical equipment, which is used in more than 70 countries around the world supporting research, development, and quality assurance activities. Throughout the world, Rigaku continuously promotes partnerships, dialog, and innovation within the global scientific and industrial communities. Information about Rigaku is available at www.rigaku.com.

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