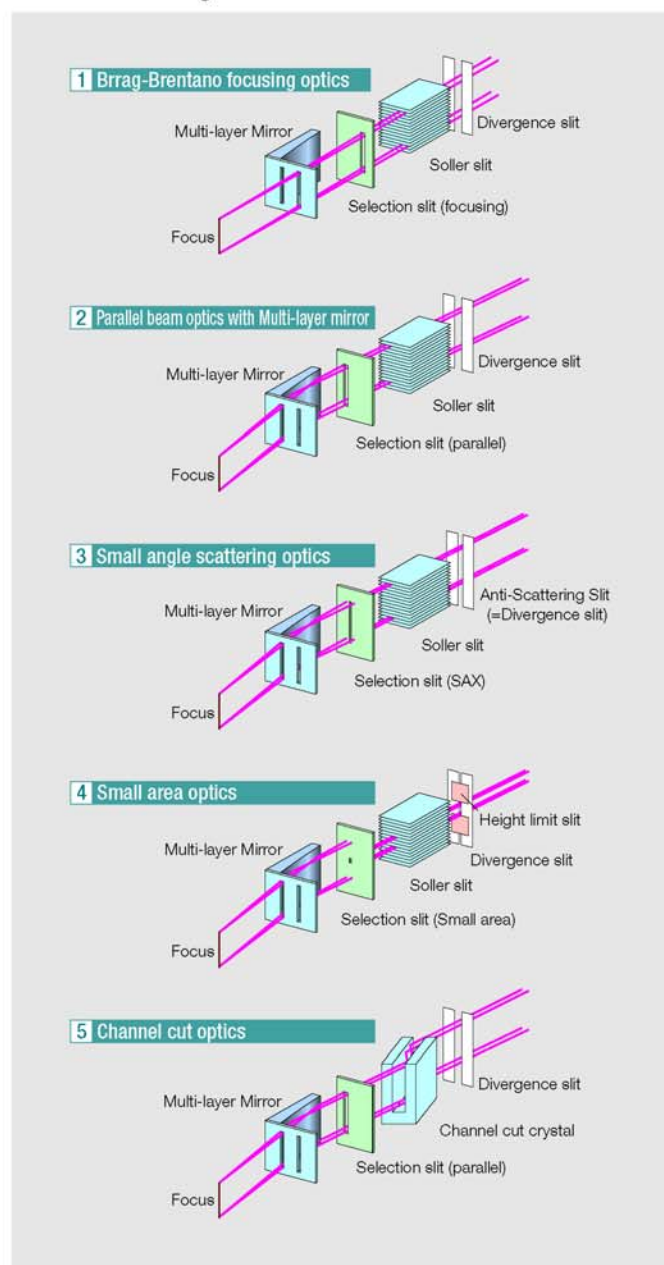


## Cross Beam Optics (CBO)

Cross Beam Optics is the epoch-making concept for easy selectable following formation.



## Specifications

(Basic specifications for Bragg-Brentano focussing optics. When optional unit is combined, some specifications will be changed.)

X-ray Generator	Maximum rated output	18kW
	Rated tube voltage	20 ~ 60kV
	Rated tube current	10 ~ 300mA
	Control method	Inverter control (High frequency power supply)
	Stability	Within $\pm 0.005\%$
Goniometer	Target	Rotating anode Cu (Others:Optional)
	Focus size	$0.5 \times 10\text{mm}^2$ (Others:Optional)
	Tube shield	One electromagnetic shutter as standard Line/Point focus changeover is possible
	Radiation enclosure	Full safety shielding with fail-safe open/close mechanism (Less than $2.0\mu\text{Sv/h}$ leakage at outer surface of radiation enclosure)
	Scanning mode	$\theta_s/\theta_d$ coupled or $\theta_s$ , $\theta_d$ independent
Detector/ Counting Electronics	Goniometer radius	285mm (When goniometer is set for Bragg-Brentano focussing method)
	$2\theta$ measuring range (may differ depending on combination)	$\theta_s/\theta_d$ coupled: $-3 \sim +154(2\theta)$ $\theta_s$ independent: $-1.5 \sim +77^\circ$ $\theta_d$ independent: $-95 \sim +120^\circ$
	Minimum step angle	$1/10000^\circ$
	Automatic variable slit	DS: 0.01 ~ 7.00mm SS, RS: 0.01 ~ 20.00mm (with interchangeable soller slit and height limit slit)
	Slewing speed	$150^\circ/\text{min}$ ( $\theta_s$ , $\theta_d$ independent)
	Fixed speed auto feed	$\theta_s/\theta_d$ coupled: $0.02 \sim 100^\circ(2\theta)$ $\theta_s$ , $\theta_d$ independent: $0.01 \sim 50^\circ$
	Step feed width	$\theta_s/\theta_d$ coupled: $0.0002 \sim 12^\circ(2\theta)$ $\theta_s$ , $\theta_d$ independent: $0.0001 \sim 6^\circ$
	Automatic alignment	Fully automated alignment for goniometer up to PHA
	Monochromator	Dedicated to Cu (other monochromator type are option)
	Counting linearity	700,000cps or higher (counting loss corrections are made with standard sample)
Computer	Scintillation counter	Scintillator: NaI, photomultiplier with preamplifier
	HW/PHA	0 ~ 1500V(with external control function) /baseline and window external control function
	Scaler/Timer	32-bit scaler 2 channels/32-bit timer 1 channel as standard
Computer	PC (Windows)	

\* For 10% input power variation

\* The numeric values of performance indicated in this brochure are based on the test results at Rigaku. Rigaku does not warrant that the identical values can always be obtained regardless of different operational environments.  
\* Windows is a trademark of Microsoft Corporation in the U.S. and other countries.  
\* JADE: A trademark of MDI  
\* Other company names and product names are trademarks or registered trademarks of the respective companies.

Specifications subject to change without notice.

Rigaku

Rigaku Corporation Tokyo Branch

4-14-4, Sendagaya, Shibuya-ku, Tokyo 151-0051, Japan  
Phone: 81-3-3479-0618 Fax: 81-3-3479-6112 e-mail: rinttyo@rigaku.co.jp

Soliste

株式会社ソリステ  
Soliste Corporation

Soliste Corporation

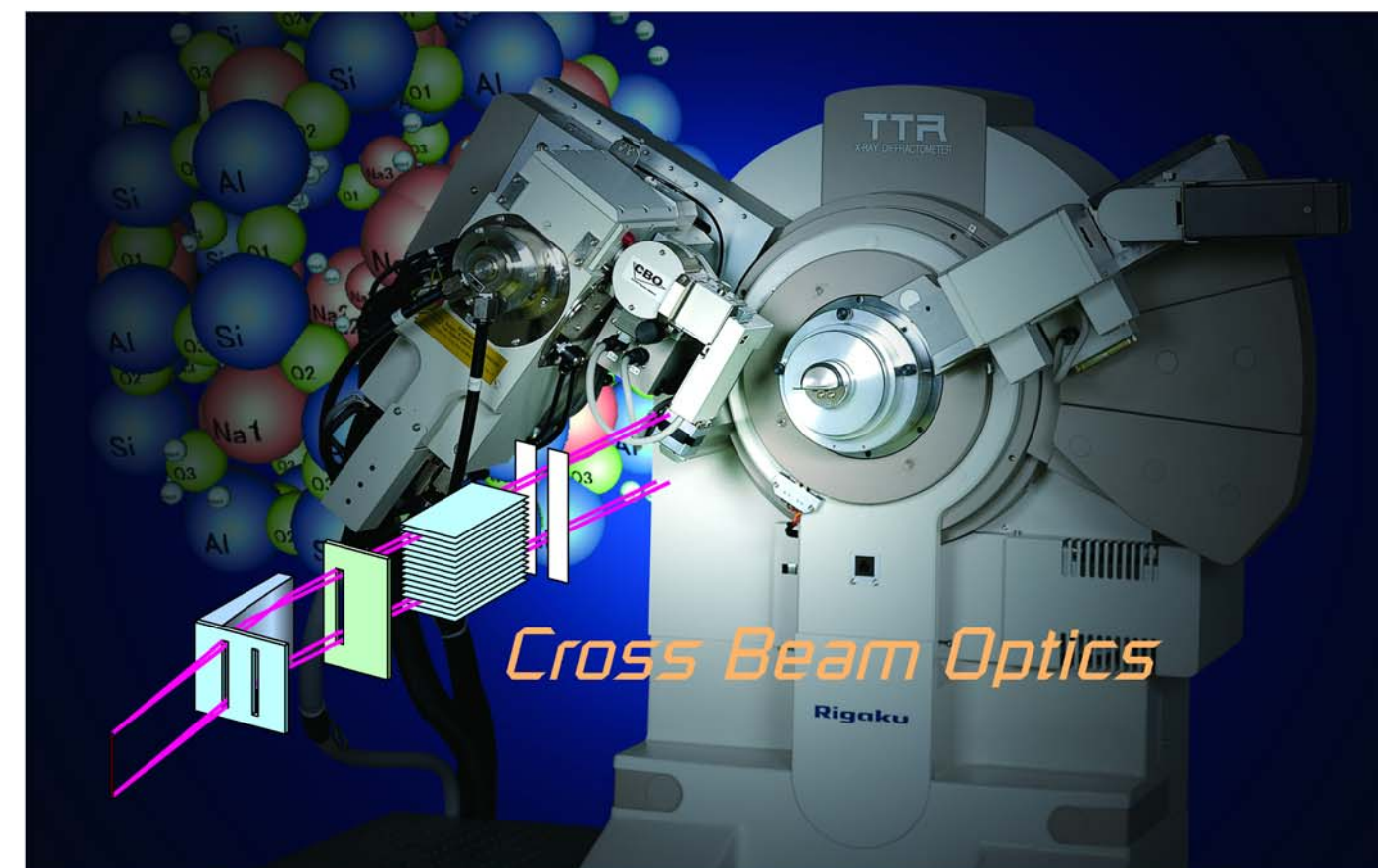
represents an equipment of Rigaku Corporation in Russia and CIS countries

12 Krasnopresnenskaya nab., Moscow, Russia, 123610, WTC, M-2, 15th Floor, Office 1548  
Tel.: +7 495-967-0959, Fax: +7 495-967-0960, e-mail: info@soliste.ru, URL: http://www.soliste.ru



# TTRAX III

## Theta/Theta Rotating Anode XRD System



The TTRAX III is a Rigaku's flagship model newly made out through substantial improvement of the existing TTRAX system reputed in the marketplace. In addition to all the functions and features of its predecessor Ultima III, the new model is characterized by 18kW maximum output.

The TTRAX III is a versatile X-ray diffractometer equipped with crossbeam optics, an incident optical system unique to Rigaku. This analytical tool, as a single unit, can handle a wide variety of analyses ranging from routine powder sample analysis to thin film material evaluation analysis by in-plane measurement.

The TTRAX III features a flexible system design so that an optimum system configuration can be realized according to the user's specific purpose of analysis. In other words, it is a build-up type multifunctional system which can single-handedly carry out plural analysis hitherto assigned to plural analyzers. Thus it features space saving and low running cost.

● **A build-up design to cope with varied needs:**

Functional expansion can be made with specific optical system units and attachments that are optionally available.

● **Ever more advanced Cross Beam Optics :**

— theta-theta small angle scattering measurement, the first of its kind in the world  
— Small angle scattering measurement in a high peak-to-background ratio is now practical with monochromatic high-brilliance incident beams using a multilayer film mirror. Precision-adjustment is automated to allow handy operation.

● **Theta-theta thin film measurement also can be made:**

Changeover between channel cut optics and In-Plane optics can be made easily. Sample positioning at time of thin film measurement is automated as well.

● **A high-precision, high-rigidity theta-theta goniometer:**

Since the sample is horizontally placed, there is no need to care about its installed state during measurement. Because of no sample holding, the sample is free from possible contamination or distortion due to fixing materials. Moreover, the focusing method measurement has become practicable with a diffracted beam monochromator at time of using the thin film optics provided with an In-Plane arm.

● **Applications and attachments in abundance:**

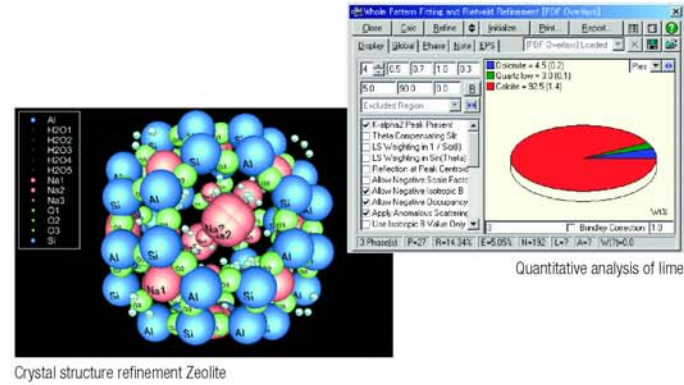
All of these add up to the realization of In-Plane measurement to enable state-of-the-art thin film material evaluation, reflectivity measurement and particle size/hole size measurement. Plentiful D/MAX series detectors and other attachments are thus available for joint use to vary the sample environment, for instance, besides other functional upgrading.

● **JADE, the world standard XRD data analysis software:**

In addition to powerful search/match based on profiles, various application analysis software programs can be utilized for up to the Rietveld analysis. The recent release version has further enhanced the JADE analytical capabilities.

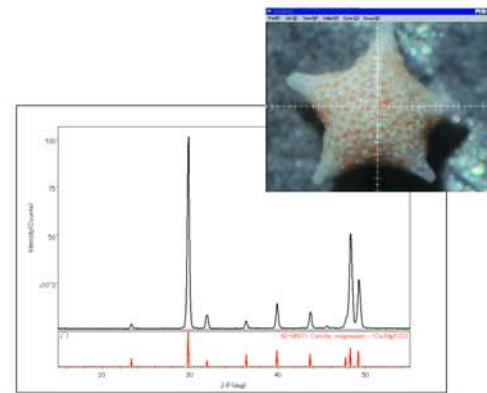
# Powder, liquid and up to thin film and nano material analysis

It displays high performance in measurement of such samples whose sample plane is difficult to secure, *in-situ* measurement, high-resolution and non-preferred orientation measurement of organic samples, high-resolution measurement of thin films, liquid and fused substance measurement, and so on.



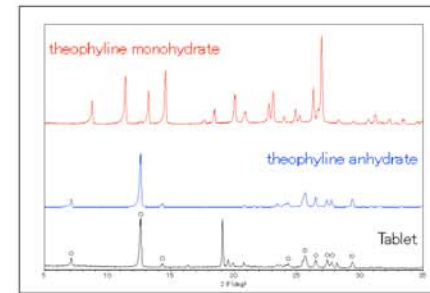
## Structural Analysis by Powder X-ray Diffraction

TTRAX III gives XRD data with high accuracy and resolution, which permits quantitative analysis, crystal structure refinement and electron density analysis by Rietvelt analysis.



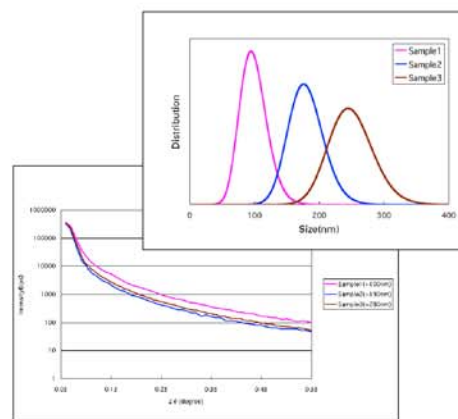
## Small area measurement

The measurement of several mm<sup>2</sup> area is possible with a small area slit.



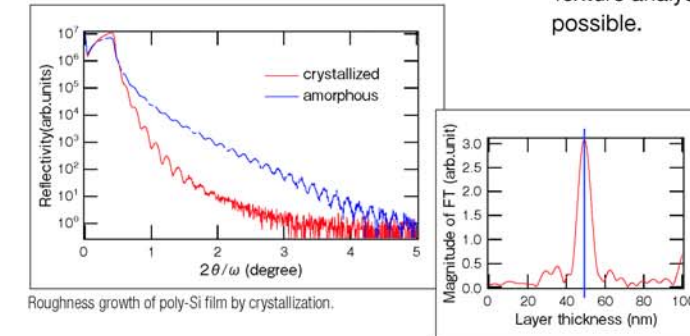
## High sensitivity and Accuracy

The Multi-layer Parallel Beam Method permits non-destructive identification of polymorphs in a pharmaceutical tablet.



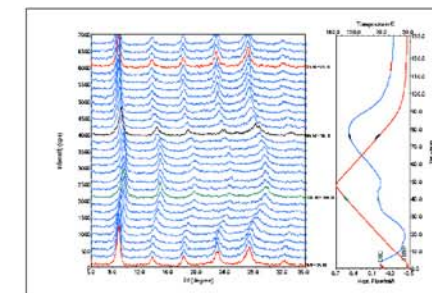
## Size and Distribution of nano-particle and pore

The Small Angle X-ray Scattering measurement permits the rapid and non-destructive measurement of size and its distribution of nano-scale particles and pores.



## Interface roughness, Thickness and Density of Thin Films

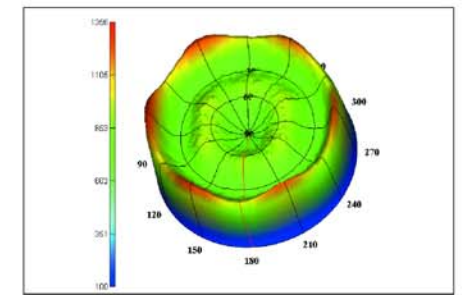
The reflectivity measurement makes possible the identification of thin film structure.



## In-Situ measurement

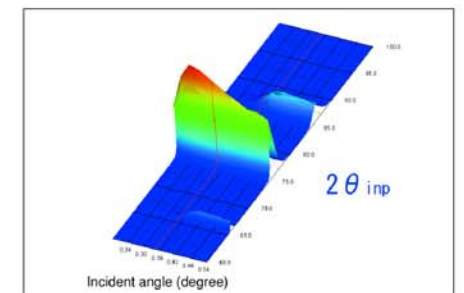
The simultaneous measurement of XRD and DSC is possible under various temperature and humidity conditions.

By courtesy of Prof. K. Fuda, Akita University



## Orientation

Texture analysis of various materials are possible.



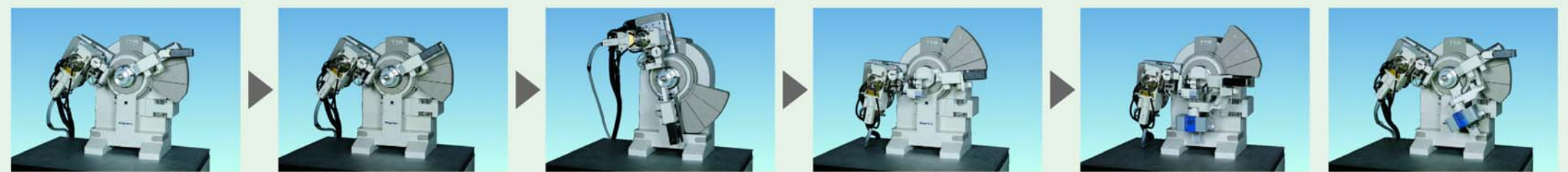
## In-Plane Texture of Ultra-Thin Film

TTRAX III enables more sensitive analysis in thickness direction of crystalline phase, crystallinity and orientation.

## Attachments(Optional)



## From standard focusing method to In-Plane analysis



### Equipped with Cross Beam Optics (CBO)

Either the focusing method using divergence direct beam from the X-ray tube or the parallel beam method using the high brilliance parallel X-ray beam formed by multilayer mirror is possible. Various optical systems that can easily be mounted or de-mounted to/from the goniometer are available so as to meet wide variety of application requirements.

### High Precision Parallel Beam Optics Mode

By combining the multilayer mirror and the long slit assembly, the data having high-precision, high resolution and high reproducibility can be obtained. It shows its excellent power especially in such measurements as the powder method structure analysis, *in-situ* measurement and the measurement of clay, mineral or organic samples.

### Small Angle X-ray Scattering Measurement Mode

Conventional 3-slit SAXS optics can be replaced by TTRAX III in this configuration. Excellent S/N ratio is realized by the multilayer mirror, which monochromatizes the incident X-rays. The inclination of the sample surface can be arbitrary selected as shown in the photos.

### Multi-purpose Thin Film Measurement Mode

High-intensity multilayer-mirror optics can be converted to a high-resolution optics suitable for reflectivity, rocking-curve or reciprocal-lattice-mapping measurements by adding a channel-cut crystal after it. Sample position is automatically adjusted by the dedicated software that controls the automated rotary attenuators and the four-axis stage for thin-film samples.

### In-Plane Measurement Mode

The new In-Plane attachment allows the equatorial grazing-incidence diffraction measurement, which provides the depth-resolved information on the lattice planes perpendicular to the sample surface without the influence of the substrate. Furthermore, perfect pole-figure map measurement for thin films, which were not available by the conventional method, can be obtained using our newly-developed method.

### (Conducting of the focusing method measurement with TTRAX goniometer equipped with the In-Plane axis.)

Cross beam optics (CBO) can be used without removing the In-Plane axis. Photo above shows the diffracted beam monochromator is mounted on Ultima goniometer. Various attachments can also be used with this mode.