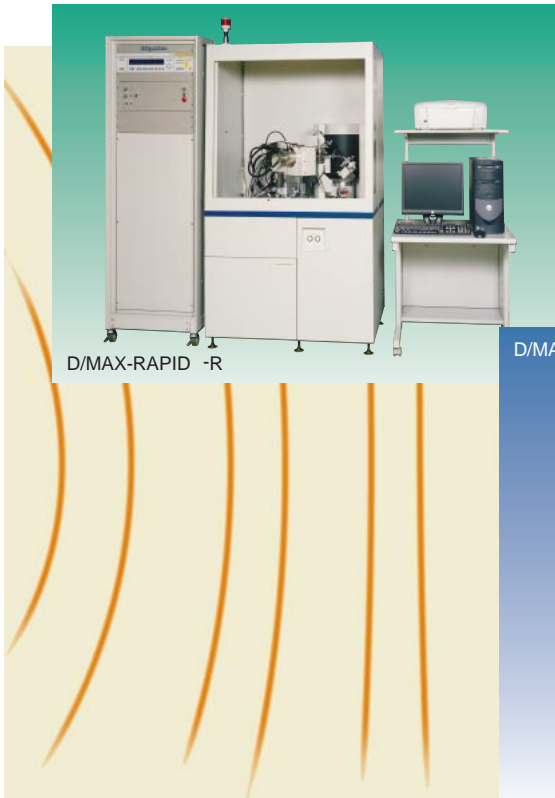


D/MAX-RAPID II

Rigaku/Curved IP X-ray Diffractometer System



D/MAX-RAPID -R

D/MAX-RAPID -S



The D/MAX-RAPID can perform rapid measurement of a two-dimensional X-ray diffraction image over a broad range. It is configured as a semicylindrical imaging plate (IP) arranged around a 2-axis (θ , ω) with fixed axis goniometer. This unique design makes the D/MAX-RAPID a new standard in X-ray diffraction systems for a wide range of diffraction experiments. The system can handle a large variety of samples ranging from a micro-areas on a larger sample, an exceedingly small amount of sample, a fiber, a film or any sample less than 120mm in diameter.

Rapid measurement of 2-D X-ray diffraction images over a broad range

A two-dimensional diffraction pattern of 210° horizontally (in terms of 2θ) and 90° vertically (at the origin) can be collected in a single image. The system can be configured for Laue-spot images or monochromatic Debye-ring images either in transmission or diffraction modes. Specifically, it is possible to collect data for percent crystallinity, phase identification, and crystallite size with one image.

2- θ - ω conversion of 2-D X-ray diffraction images

Qualitative analysis in general and quantitative analysis of crystallinity, etc. can be made immediately following data collection using standard X-ray analysis packages

- ω conversion of 2-D X-ray diffraction images: Pole Figures

The Debye ring contains information about grain orientation. Preferred orientation can be obtained from variations in intensity about the Debye

rings. The D/MAX-RAPID allows collection of multiple lines and azimuthal angles simultaneously for pole figures.

Powder patterns obtainable with minimal sample movement

The number of grains contained in a micro-area is very small. Therefore with point or line detectors sample oscillation using two or more axes is required for powder pattern measurement. With the D/MAX-RAPID, the 2-D detecting plane (IP) plays the role of one such axis. This makes it possible to obtain a powder pattern simply by sample in-plane rotation (ω -axis). This feature is effective for qualitative analysis of a tiny crystal (transmission method) as well as of a micro area (reflection method) on a sample. Two-axis oscillation may also be selected for special purposes such as texture measurements.

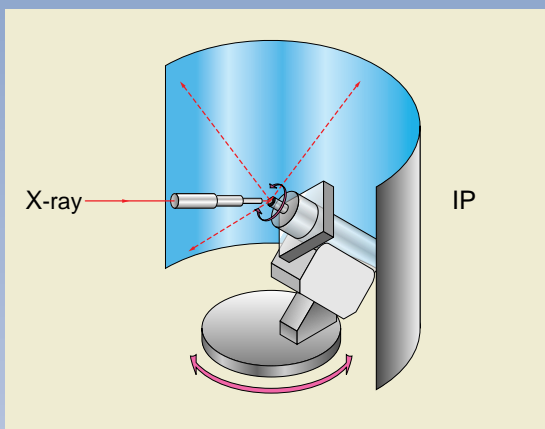
Selection of sample mount and measurement method according to the sample type

Various sample mounts (transmission method, reflection method) and sample stages are available to cope with powders, very small amounts of samples, films, fibers, block and plate samples, etc. Various sample shapes can be handled including curved surfaces.

Experimental set-up

Collimator replacement defines the area to be examined without sample oscillation. With an optional automated oscillation stage, both x and/or y can be oscillated in order to increase sampling areas for large grained materials or for quantitative analysis. A color CCD camera allows easy set up for both large or extremely small amounts of sample. Data collection can be started immediately with an easy to use menu system.

Diffraction system for the N



X-rays monochromatized with an incident beam monochromator are emitted in a horizontal direction. (Monochromator can be removed for Laue applications.) Collimator selection determines analysis area.

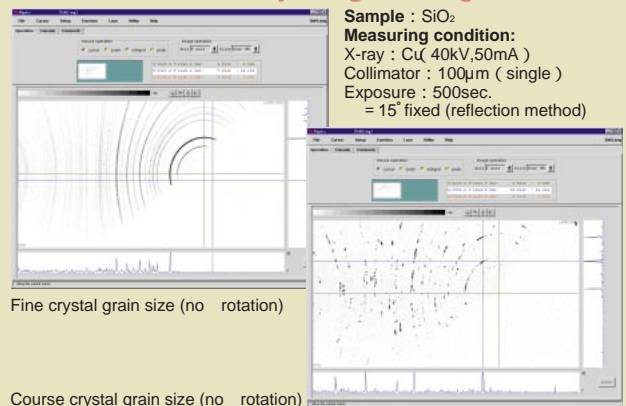
The goniometer consists of two axes: a vertical ω -axis and a θ -axis with θ fixed at 45° .

An IP is placed on the inner surface of a cylinder that surrounds the ω -axis at the center, allowing the observation of a 2-D diffraction image over a broad range.

The 45° fixed θ axis and the large imaging plate, which covers wide angles in both 2θ and ϕ (azimuth), can even collect powder patterns from a lone grain in a single image.

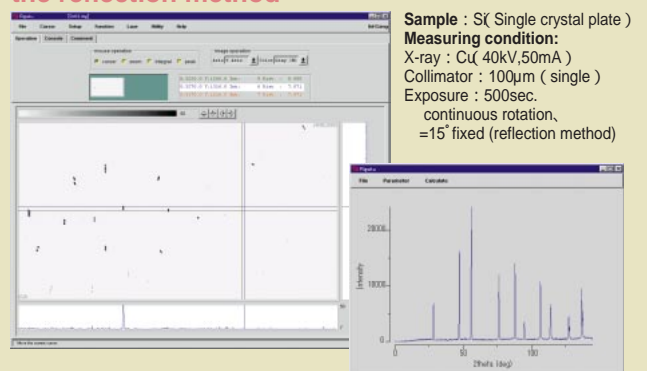
Measurement Example:

Difference in the Debye ring due to grain sizes



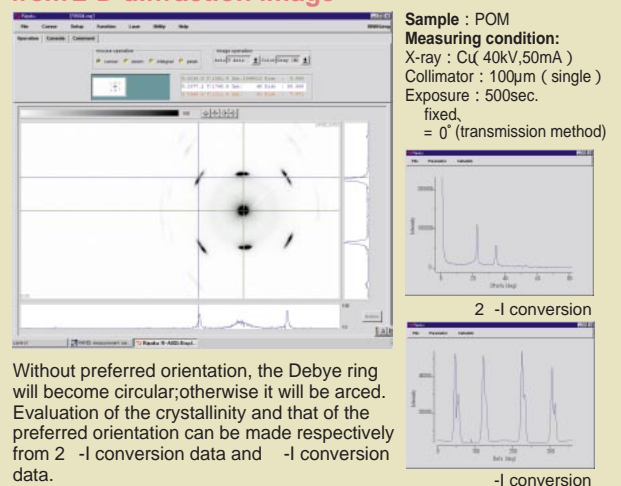
The 2-D detector allows the observation of not only the 2θ information but also the intensity distribution information in the Debye ring direction (ϕ) at the same time. Measurement of this variation over multiple images provides information for pole figures and texture analysis.

2-D diffraction image of a single crystal plate by the reflection method



Ten diffraction lines are observed by in-plane rotation only. The D/MAX-RAPID collects very intense single crystal reflections, which are sparse, to very weak diffuse scattering without distortion.

Example of 2θ - ω conversion and θ - ω conversion from 2-D diffraction image



Without preferred orientation, the Debye ring will become circular; otherwise it will be arced. Evaluation of the crystallinity and that of the preferred orientation can be made respectively from 2θ - ω conversion data and θ - ω conversion data.

New Century

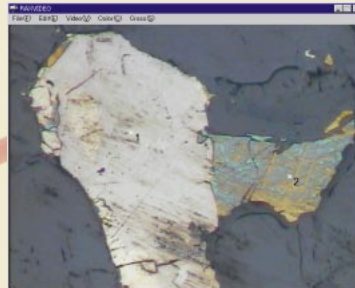
Measurement Flow:

Example of measurement utilizing X-Y stage (optional)

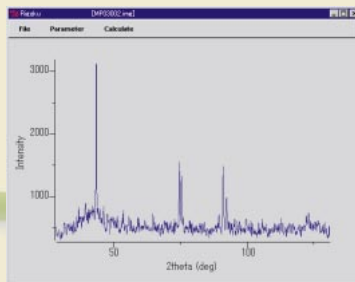
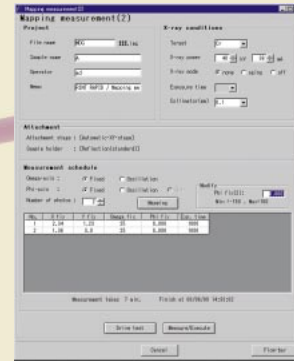
Mount a sample on the Goniometer.



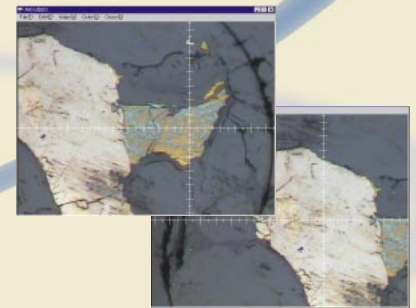
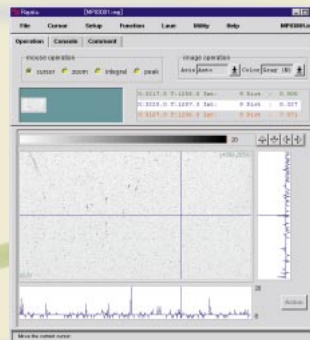
Specify the point to be measured.



Enter the measuring condition and start measurement.



Start 2- θ conversion and λ - λ conversion. Then proceed to qualitative processing, etc.



Move to the next point to be measured. (Exposure IP reading)

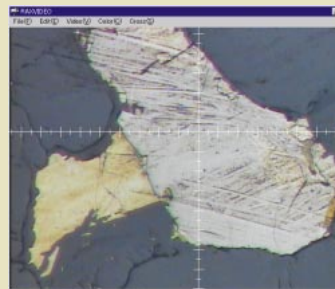
Measured 2-D image is displayed after exposure on IP is done.

Data Analysis:

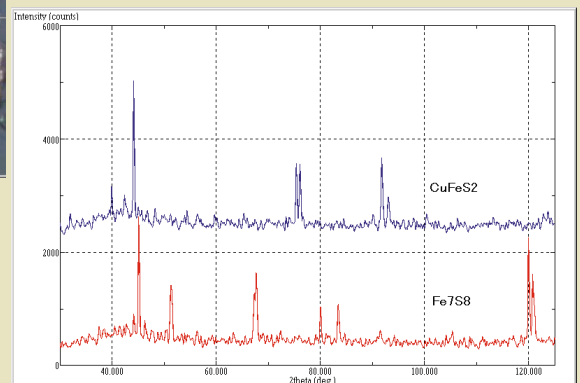
Measuring condition:

X-ray : C α (40kV, 50mA)
Collimator : 100 μ m dia.(single)
Exposure : 500sec

Shown right is data on different colored portions of a deposit on substrate by using a 100 μ m dia. collimator. An unknown material can be identified by retrieval of ICDD data (optional) with JADE qualitative software (optional). It was found out that the analysis area A (yellowish part) and the analysis area B (whitish part) are respectively composed of CuFeS₂ and Fe₇S₈.



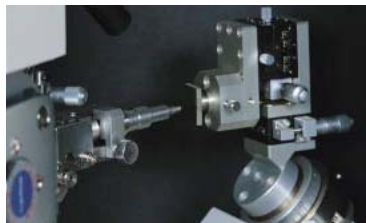
Analysis area A : Yellowish part
Analysis area B : Whitish part
(at crosshair center)
1 graduation : Approx. 30 μ m



Attachments (optional)



Automatic X-Y stage



Vertical XYZ stage (for stress)



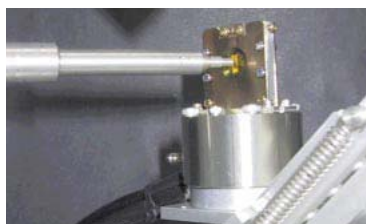
Sample stage for fiber and film



Zero background sample stage for small amount sample



High temperature attachment for reflection method(350°C)

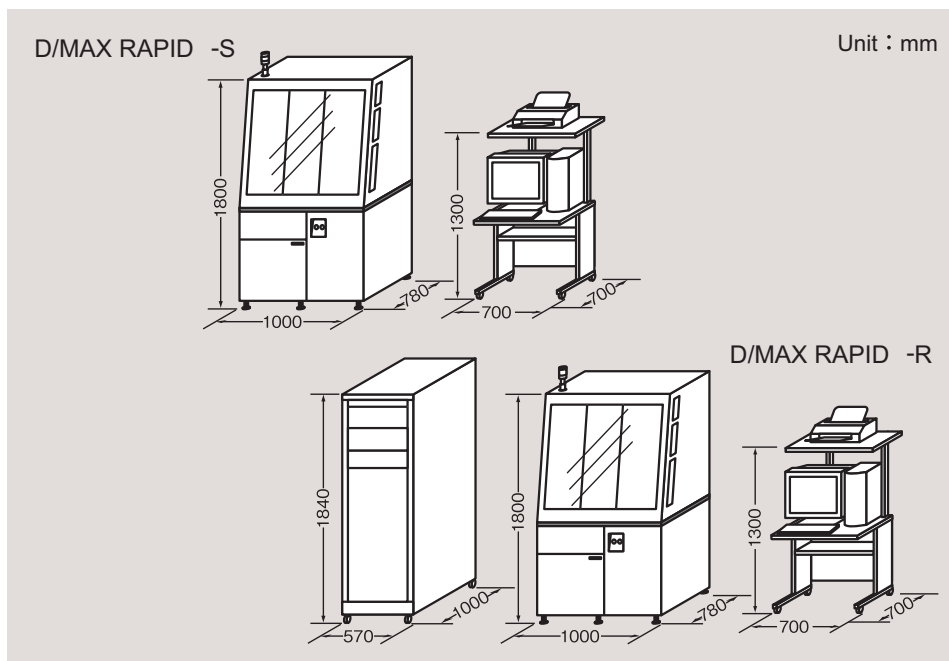


High temperature attachment for transmission method(400°C)

Specifications

Model	D/MAX RAPID -S	D/MAX RAPID -R
X-ray generator	3kW	18kW
Target	Select from among Cu, Cr, Fe, Co, Mo	
X-ray optics	Flat graphite monochromator	
Collimator	800,300,100, 50, 30 μ m dia.(10 μ m dia. : optional)	
Goniometer driving range	ϕ -axis : 360°, ω -axis : -15~+150°	
Sample adjusting range	X-,Y-axis : \pm 5mm, Z-axis : 10mm (a 30mm thick sample can be handled)	
Sample alignment	On CCD camera (approx. 30~240 times on CRT)	
Camera length	127.4mm	
Scanning range	-47~+163°	
IP size	470 \times 256mm	
Pixel size	100 \times 100 μ m	
Read-out time	52sec	
Erase time	20sec	
Read-out sensitivity	1.0 photon/pixel	
Computer	PC (Windows)	

Installation Requirements



● Power supply

X-ray generator (3kW) (18kW)	3-phase 200V, 23A [30A]*
	3-phase 200V, 70A [100A]*
	3-phase 200V, 7A [20A]*
Computer	Single phase 100V, 7A [15A]*
Water circulating pump	See manufactures specifications.

* Required circuit breaker capacity

* 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 is 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 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



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