



Rigaku Innovative Technologies Europe **(RITE)**

Presented by:
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Introducing Rigaku

Since its inception in Japan in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. In fact, Rigaku means physical science in Japanese, the core of instrumentation.

Rigaku Facts:

- *Over 1600 employees worldwide*
- *Consolidated worldwide sales 270M€*
- *Presence in 57 countries*
- *Explicitly focused on X-ray technologies*
- *Our expertise allows us to provide complete X-ray analysis solutions – we make everything from X-ray sources, to optics and detectors.*



Rigaku Global Operations



Rigaku product line



XRD



XRF



SMX



SAXS



Sources



Stress Analysers



Optics



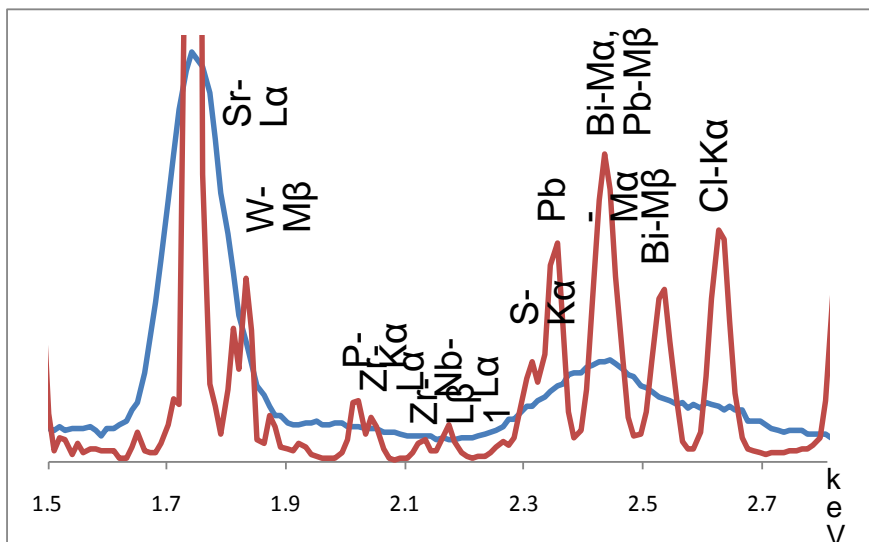
Detectors



Raman

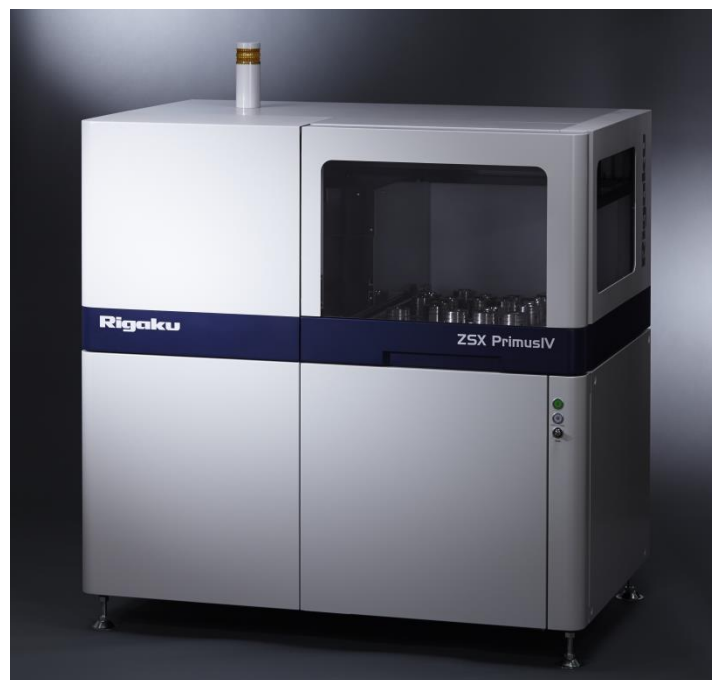
Supermini200

- From O2 – U92
- ppm detection limits
- Benchtop WD-XRF
- He type available
- 12 Sample positions
- Approx. 80kEuro
- Standardless application
- Micro- and UltraCarry available
- ppb detection limits
- 200W Pd tube



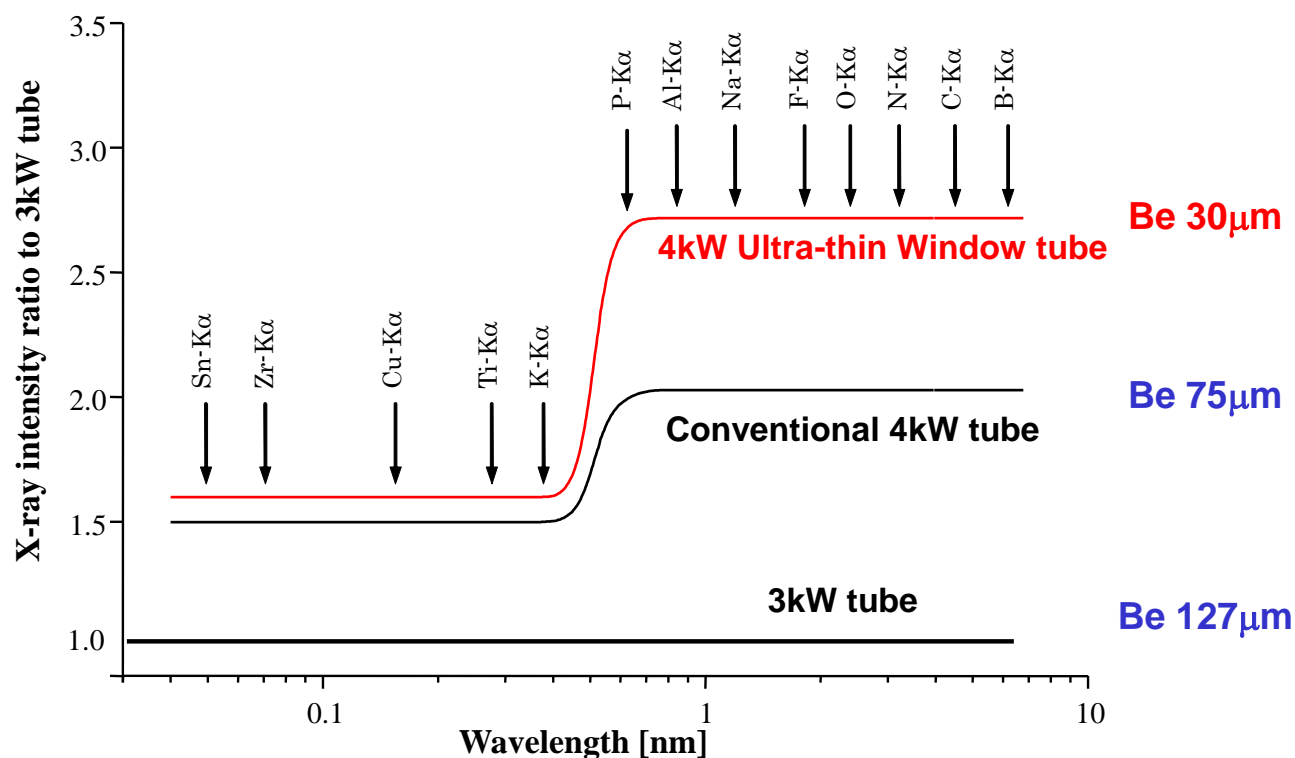
Primus 4

- From Be4 – U95
- Sub-ppm detection
- 3kW or 4kW Rh X-ray tube
- Tube above and below configuration
- APC (5 Pa – 2% B)
- 30 μm Be window
- Auto wire cleaning
- Mapping
- 12 analytical crystals
- Curved synthetic crystals
- 48 sample positions
- Up to 96 samples



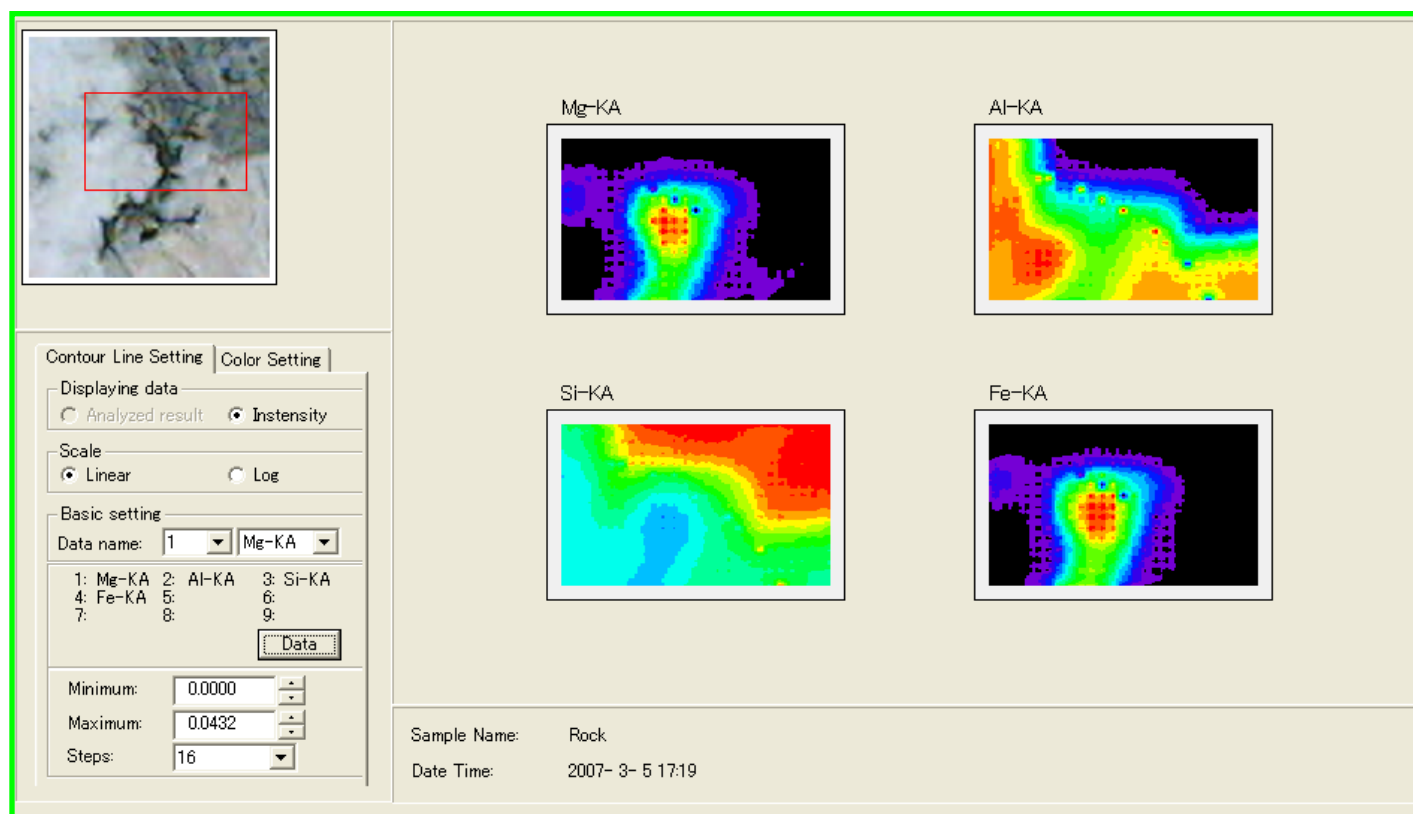
Thin Window X-ray Tube

Highest Sensitivity Analysis of Light Elements
using High Power X-ray Tube with Ultra Thin Window (Be 30 μ m)



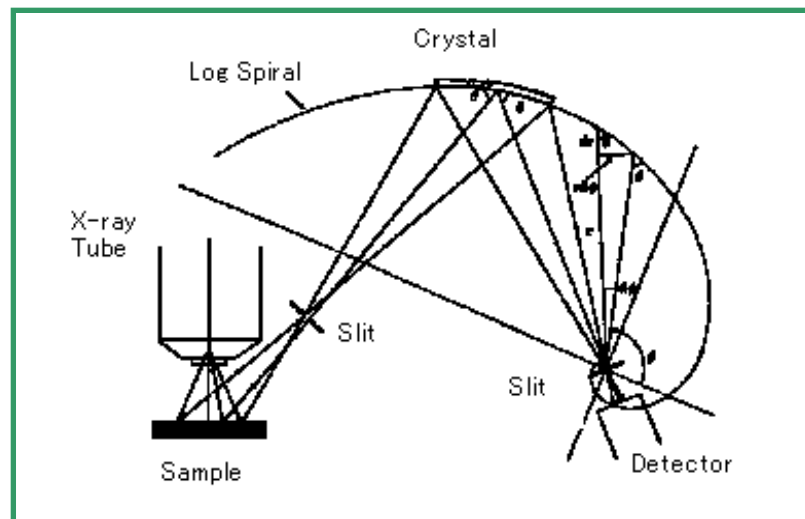
Mapping Analysis of Granite

Multi-element 2-dimentional mapping image



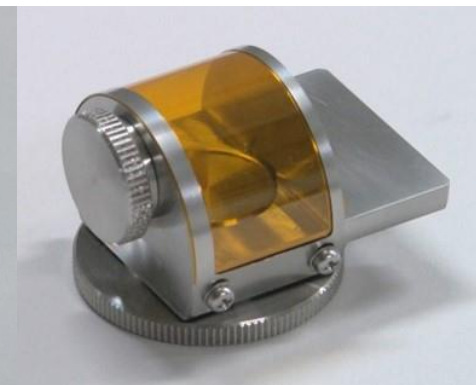
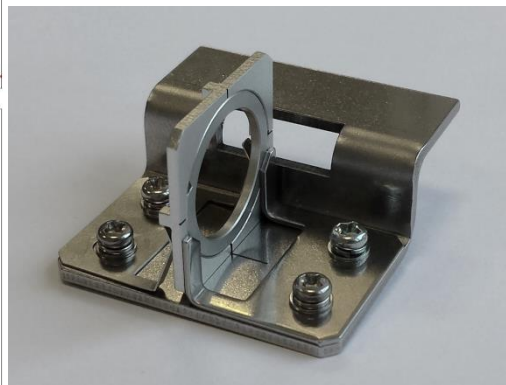
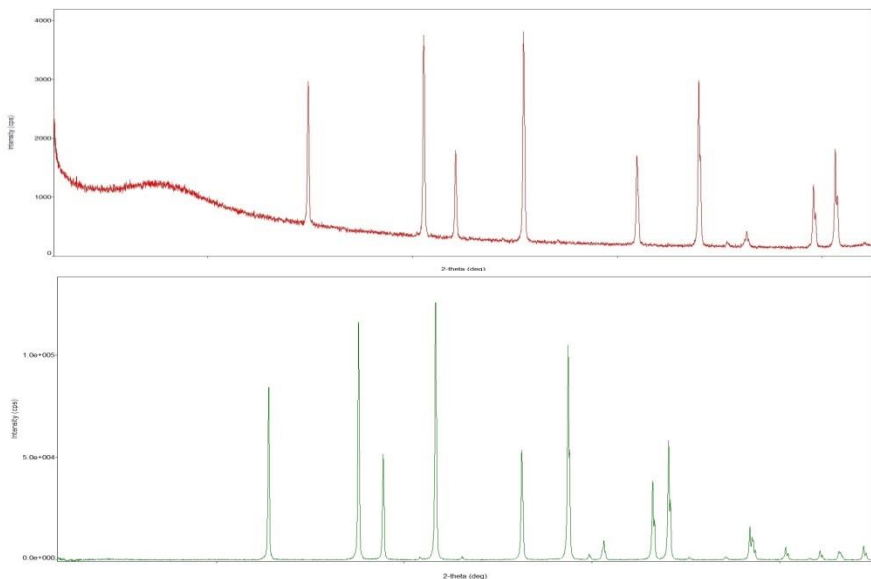
Simultix14

- From Be4 – U95
- Sub-ppm detection
- 3kW or 4kW Rh X-ray tube
- Tube above and below configuration
- APC (5 Pa – 2% B)
- 30 μm Be window
- Auto wire cleaning
- 30 channels (40 channels optional)
- Curved synthetic crystals
- 8 sample positions
- Up to 48 samples
- Log spiral crystals (Rigaku patent)
- BG measurement (Rigaku patent)
- Different pumping speed
- Different vacuum level

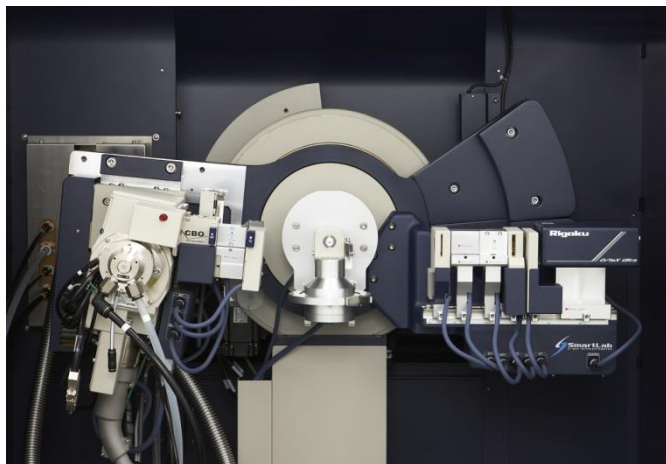


MiniFlex600

Benchtop XRD system
600W tube, water cooled
Movable knife edge and receiving slits
Up to 8 samples
1D and 2D detector
BTS 150°C and 500°C
Transmission measurement
Air tight sample holder
Low BG sample holder

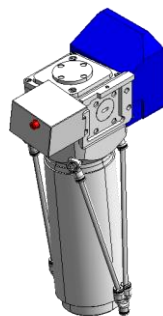


SmartLab

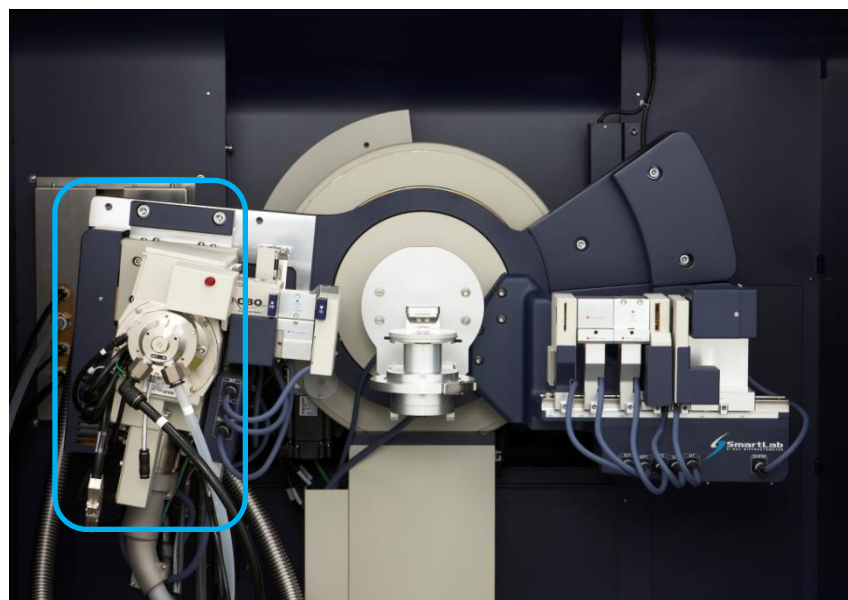
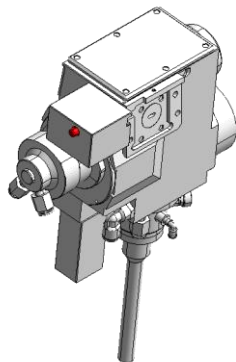


X-ray sources

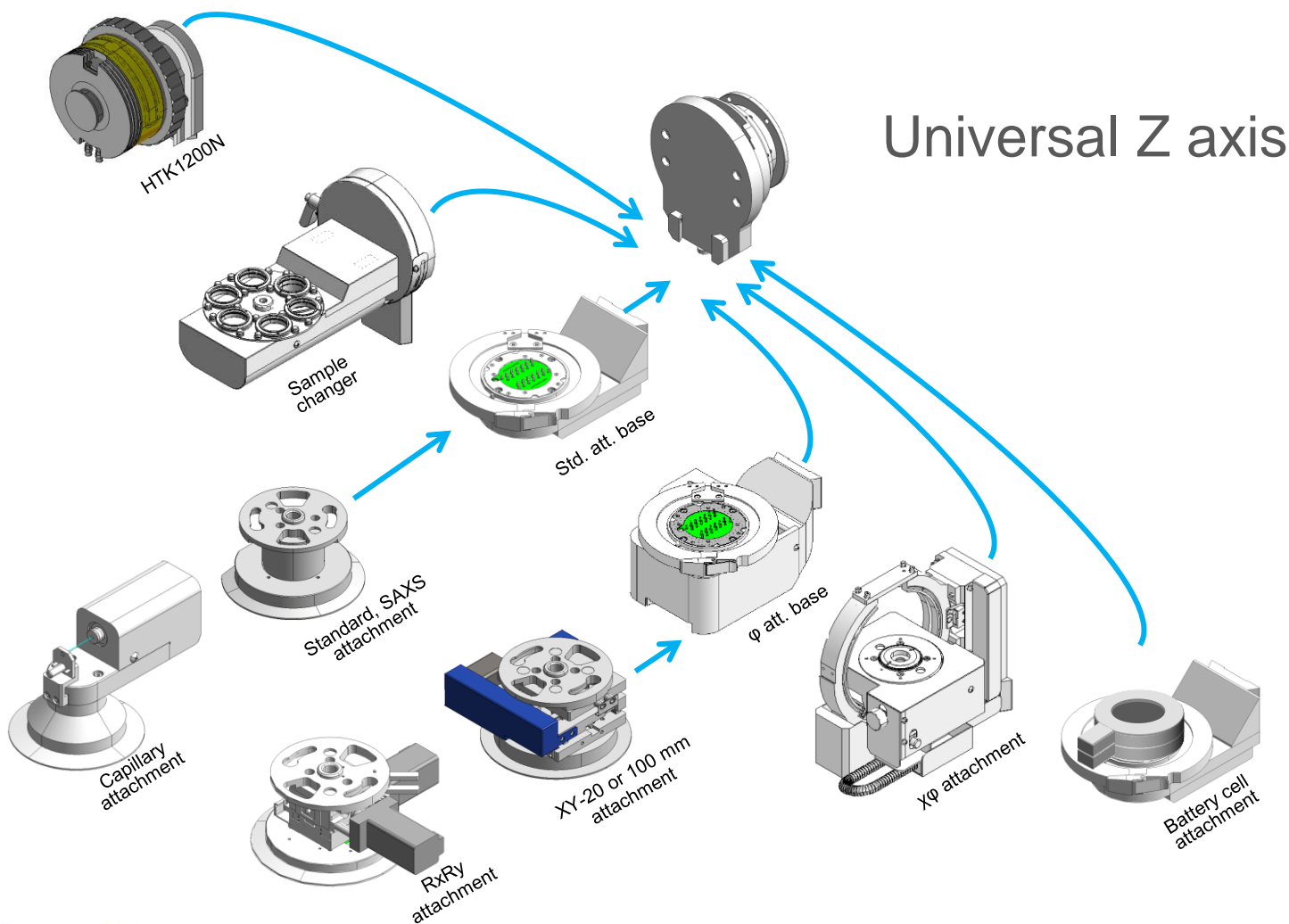
3kW sealed tube



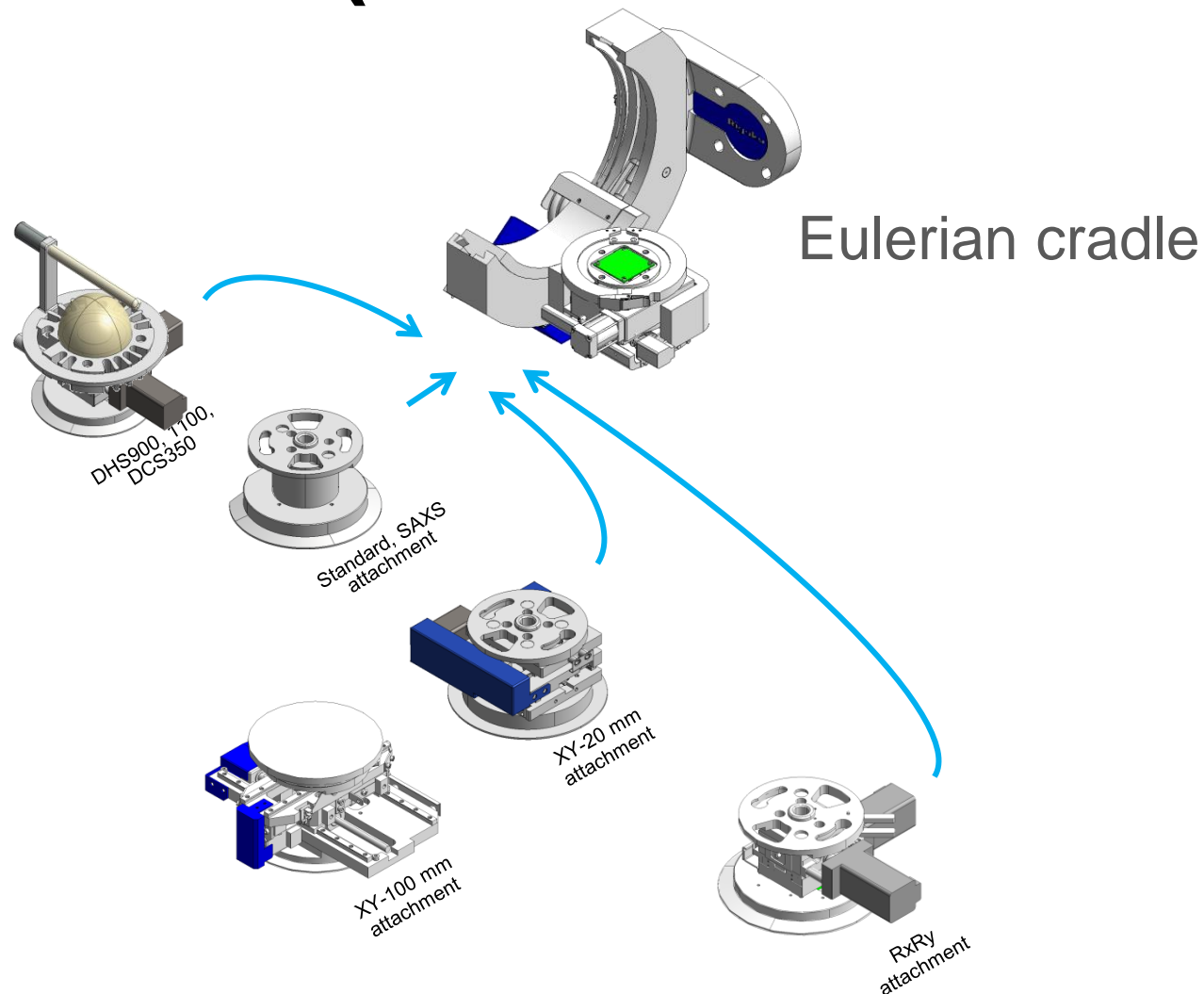
9kW rotating anode



Attachments (for standard base)



Attachments (for Eulerian cradle)

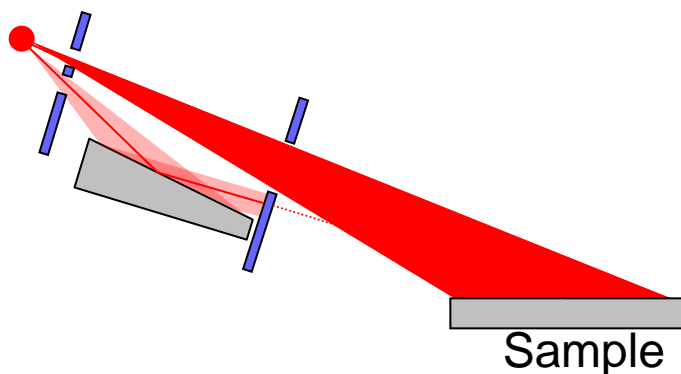


Cross Beam Optics

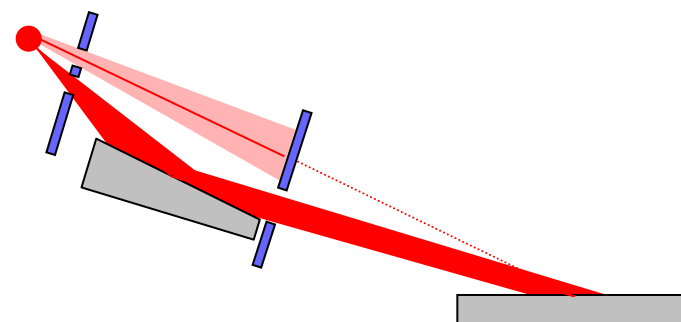
Rigaku Patented Technology US Patent # 6807251

BB and PB geometries are simultaneously mounted, aligned, and selectable.

X-ray source



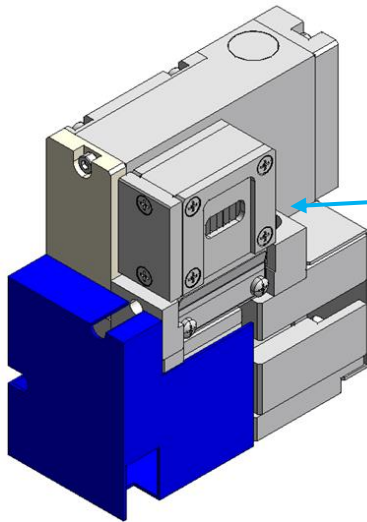
Bragg-Brentano focusing geometry (BB)



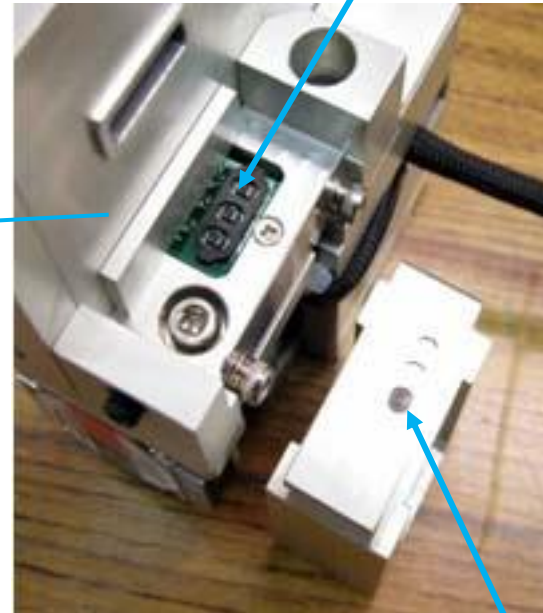
Parallel beam geometry (PB)

Optical component sensors

Photo sensors

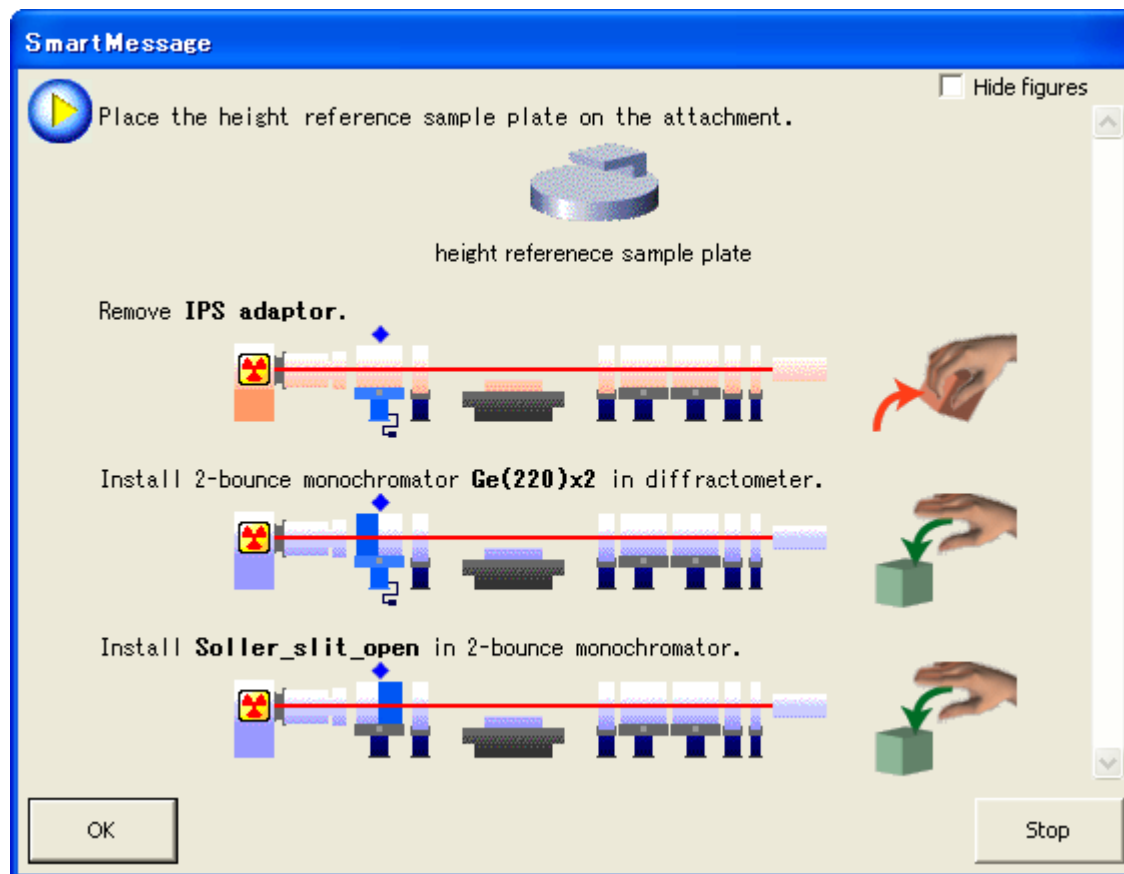


Ge(220)x2 + Soller slit



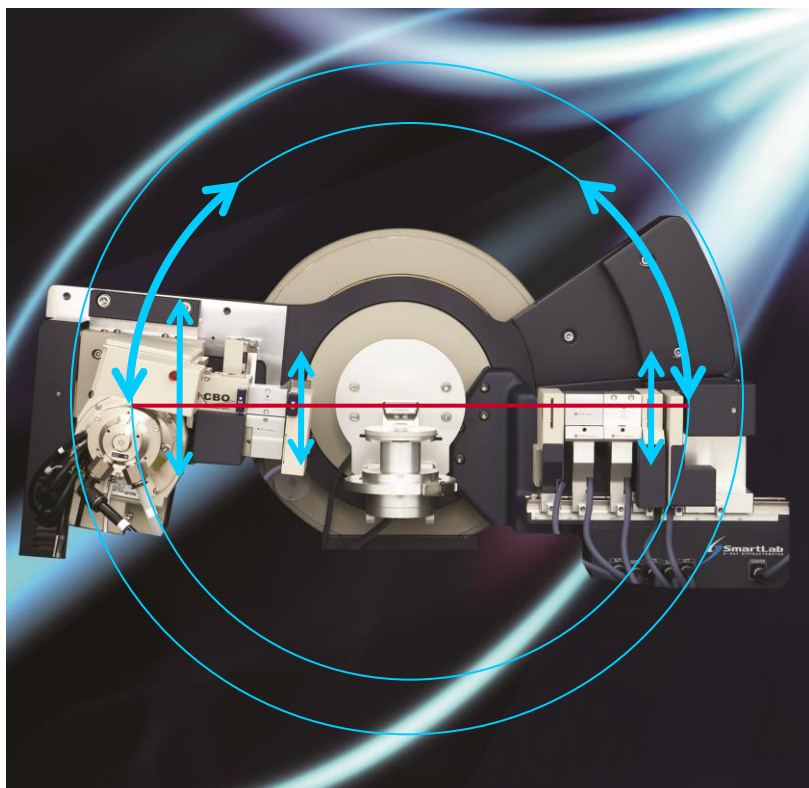
Marks

SmartMessage™ / optics



US Patent # 7711091 B2

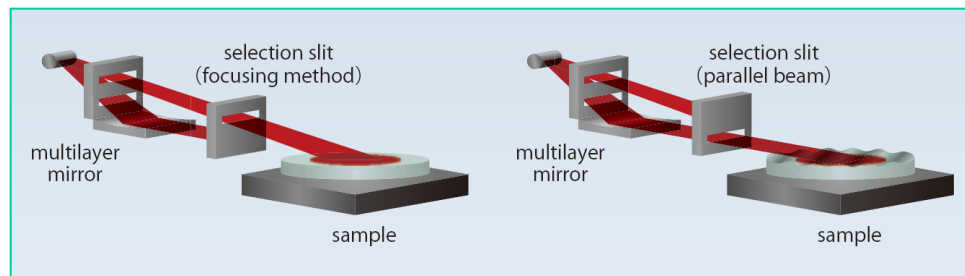
AutoAlign™



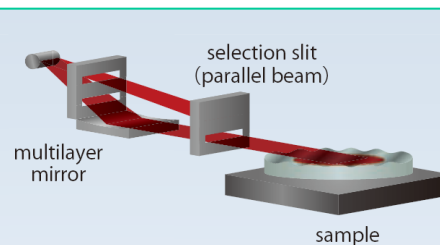
- Source height
- Incident beam direction
- Mirror angle
- Divergence slit height
- Sample height
- 2θ zero point
- Double slit alignment
- Detector setting

Powder analysis optics

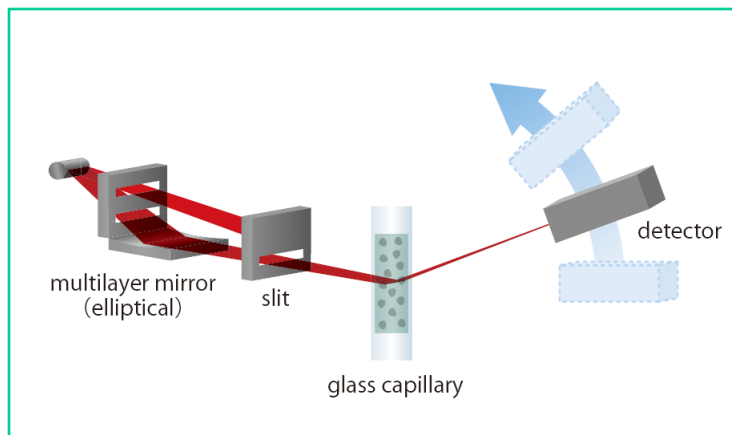
Brag-Brentano



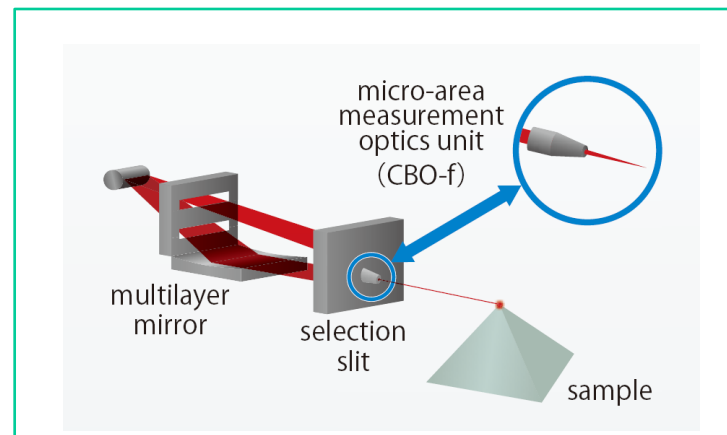
Parallel beam



CBO-E for transmission

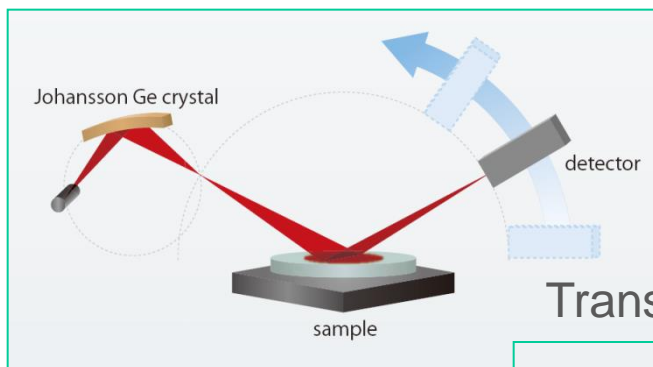


CBO-f for micro-diffraction

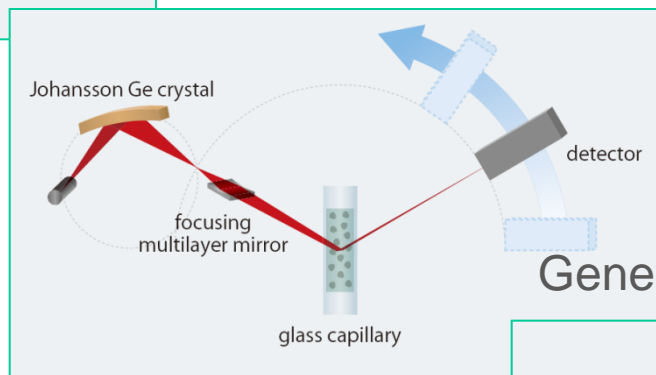


K α 1 HR powder analysis optics

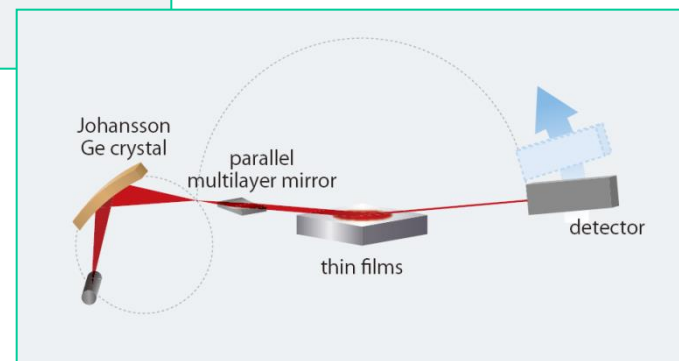
Reflection focusing



Transmission focusing



General purpose parallel



HyPix 3000 2D detector



USPs

Ultra-high dynamic range and high sensitivity

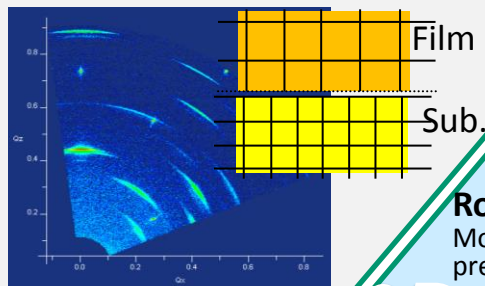
Seamless switching from 2D-TDI (Time Delay and Integration) mode to 2D snapshot mode to 1D-TDI mode to 0D mode with a single detector

XRF suppression by high and low energy discrimination

High spatial resolution, direct-detection pixel array detector

Wide Area Reciprocal Space Map

Epitaxial relation, domain structure,...

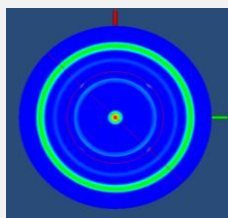


In-Plane XRD

Direct observation of in-plane crystal structure, orientation and lattice constant

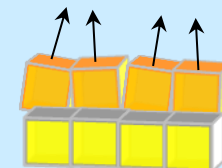
2D-Pole Figure

Texture, orientation distribution



Rocking Curve

Mosaicity analysis of sample having preferred orientation



2D

Wide Area

0D

Wide Dynamic Range

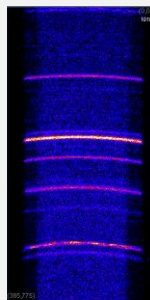
SmartLab + HyPix-3000 Multi-Dimensional Applications

SAXS and U-SAXS

Particle size and its distribution for nm/sub- μ m scale particles

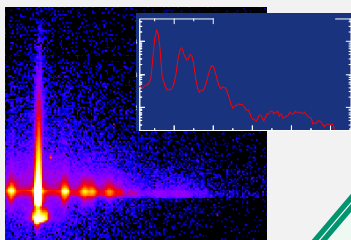
In-situ high temperature XRD

Phase transition, reaction, dehydration



GI-SAXS

Nano-structured surface analysis

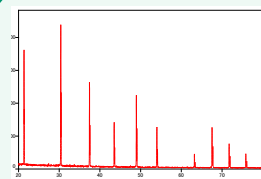


1D

High Speed

High Speed Powder XRD (Time Delay Integration)

High speed measurement of phase identification, quantitative analysis, crystallite quality

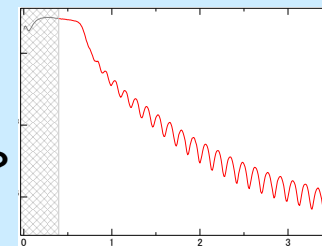
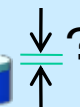


High-speed residual stress

High-speed residual stress analysis mainly for bulk sample

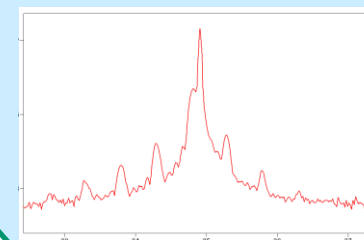
Reflectivity

Thickness, density, roughness of thin film



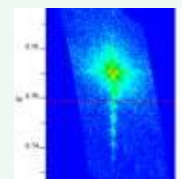
High-resolution Rocking Curve

Thickness, composition and lattice mismatch of epitaxial film



High-speed Reciprocal Space Map (high-resolution)

Lattice constant and strain analysis for epitaxial film

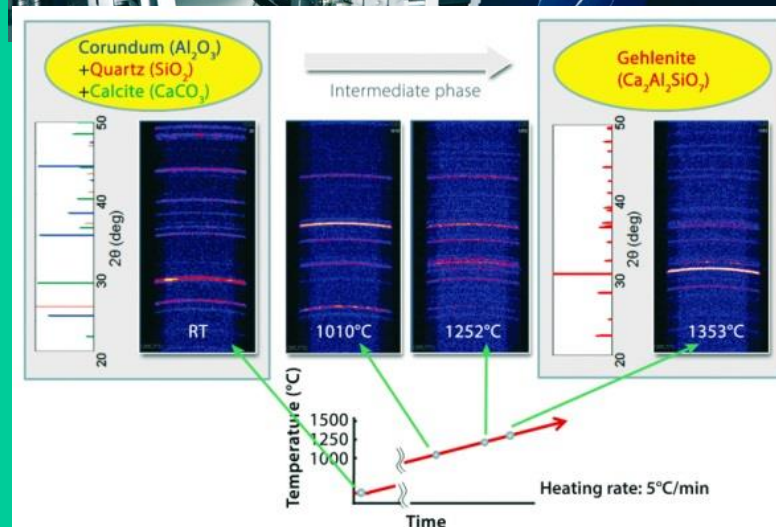
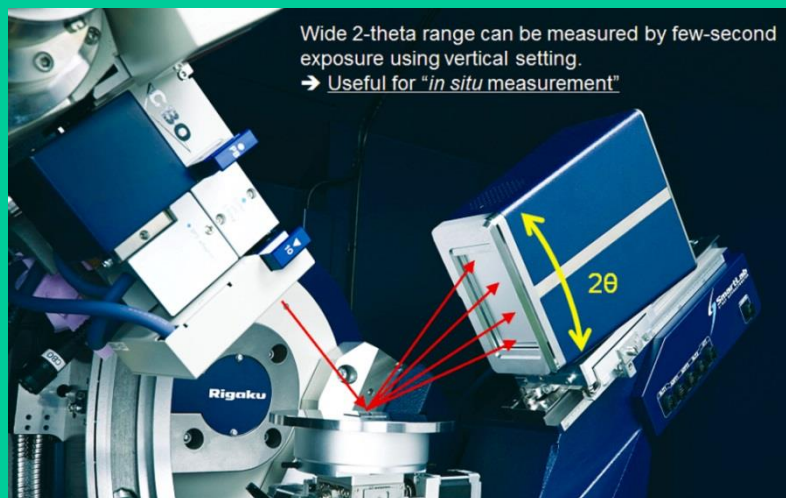
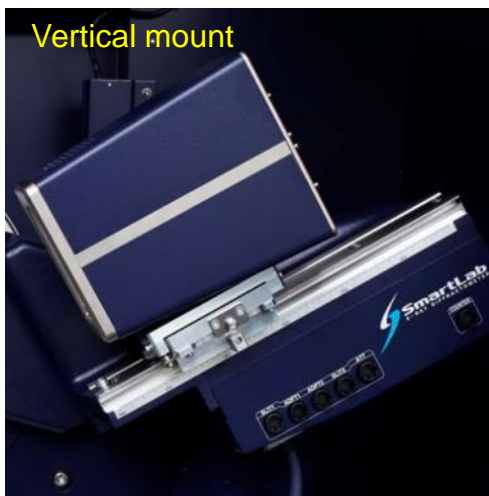


2-ways of Detector Mount

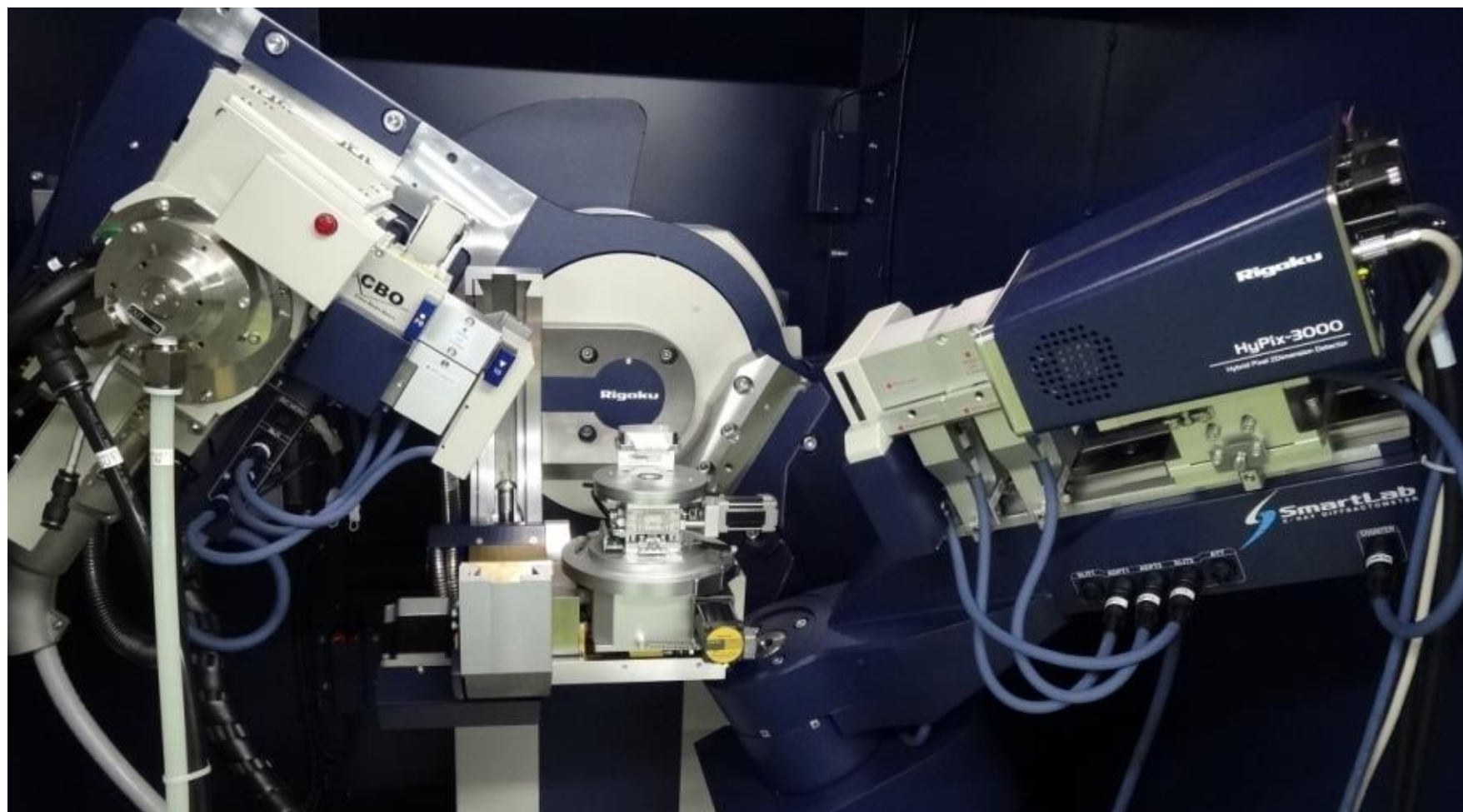
Horizontal mount
(normal setting)



Vertical mount

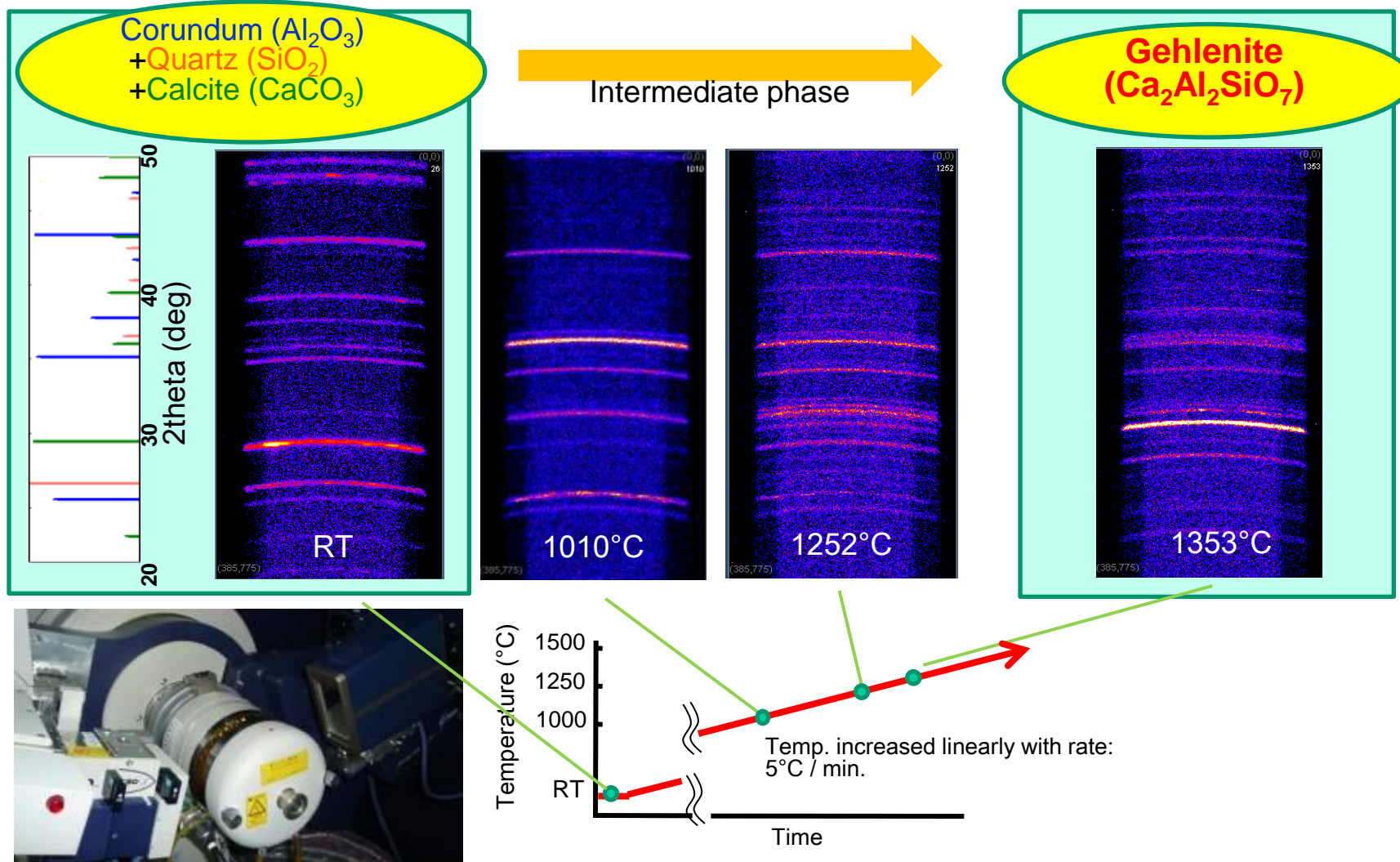


SmartLab with HyPix-3000



Application Example

In-situ XRPD



Domo arigato!



Rigaku Innovative Technologies Europe s.r.o.