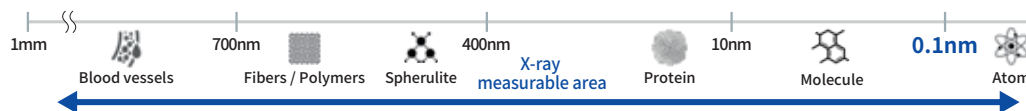
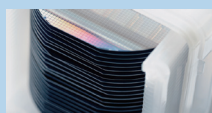


Semiconductor

From Lab to Fab, AI is powering a new era of innovation and semiconductors are leading the charge. Rigaku delivers the metrology tools engineers and scientists need to push boundaries, master new materials, and meet the demands of modern manufacturing. We're not just keeping pace with innovation, we're driving it.



Category	Technology	Scale	Product name / Series name	Function / Role
 Ingot	X-ray Diffraction	—	FSAS III	Rapid analysis of crystal orientation of wafers and ingots for various substrates.
 Substrate	X-ray Topography Total X-ray Fluorescence	0.1-100nm	XRTmicron Series TXRF Series	Expansive suite of tools and applications for in-fab and near-fab support of semiconductor manufacturing processes. X-ray topography imaging system is used for non-destructive dislocation imaging. Total-reflection X-ray fluorescence (TXRF) spectrometers are widely used to measure surface contamination on substrates.
 Wafer: Thin Films and Devices	X-ray Diffraction X-ray Reflectivity X-ray Fluorescence Small-angle X-ray Scattering	0.1-100nm	XTRAIA XD Series XTRAIA MF Series XTRAIA CD Series WaferX 310 ONYX Series TFXRD Series Smartlab	Broad capability to analyze thickness, composition, and crystalline quality of metal, dielectric, and semiconductor thin films used in leading edge semiconductor manufacturing. X-ray reflectivity (XRR) enables accurate thickness measurements for ultrathin films, including films opaque to traditional optical measurements. X-ray fluorescence(XRF) allows accurate measurement of film composition on blanket films and patterned wafers, with configurations and sources customizable to specific elements of interest. High resolution X-ray diffraction (HRXRD) provides specialized metrology for epitaxial films, with robust measurement of thickness, composition, and strain for thin films and multilayers. Grazing Incidence Small-Angle X-ray Scattering (GI-SAXS) provides advanced morphological characterization for complex structures in cutting-edge logic and memory devices. Transmission Small-Angle X-ray Scattering (T-SAXS) offers detailed, non-destructive evaluation of high aspect ratio holes and trenches found in vertical memory devices.
 Wafer: Mask	X-ray Diffraction X-ray Fluorescence Small-angle X-ray Scattering Total X-ray Fluorescence	1-100nm	XTRAIA XD-3000R XTRAIA MF-3000R TXRF Fab310R XTRAIA CD Series	Adapts robust, established film characterization techniques for advanced photomask metrology. X-ray reflectivity (XRR) provide robust analysis and quality control for multilayer reflectors underpinning EUV masks. Total X-ray reflectance fluorescence (TXRF) enables non-destructive analysis of trace contaminants on masks and mask blanks.
 Wafer: Interconnects	X-ray Diffraction X-ray Reflectivity X-ray Fluorescence	10-1000nm	XTRAIA XD Series XTRAIA MF Series WaferX 310 ONYX Series TFXRD Series Smartlab	Versatile characterization of thickness, composition, and grain size for interconnect metals, including liners and seed layers. Suitable for routine tool monitoring and inline process control. Applications extend to complex, modern interconnect schemes such as through-silicon via and buried power rail architectures.
 Packaging	X-ray Fluorescence X-ray Imaging (CT)	~100nm-100µm ~100nm-100µm	ONYX Series WaferX 310 XTRAIA MF Series New tool under development	Hybrid X-ray fluorescence/optical microscopy platform enables characterization of bump shape, thickness, and composition with micron-scale spatial resolution. Extendable to high accuracy /precise measurements of scale microbumps, hybrid bonding integration schemes. We are developing an inline inspection system that utilizes X-ray imaging technology to automatically detect defects in micro bumps and through-silicon vias (TSVs) used in advanced packaging.