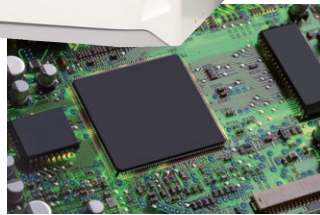
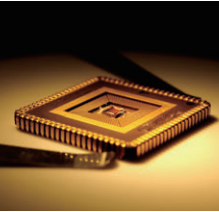


XGT-9000 Series

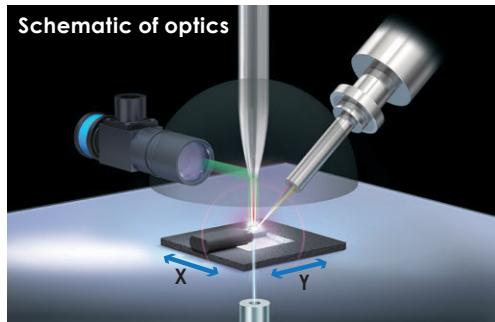
μXRF Analytical Microscope

Look Below The Surface

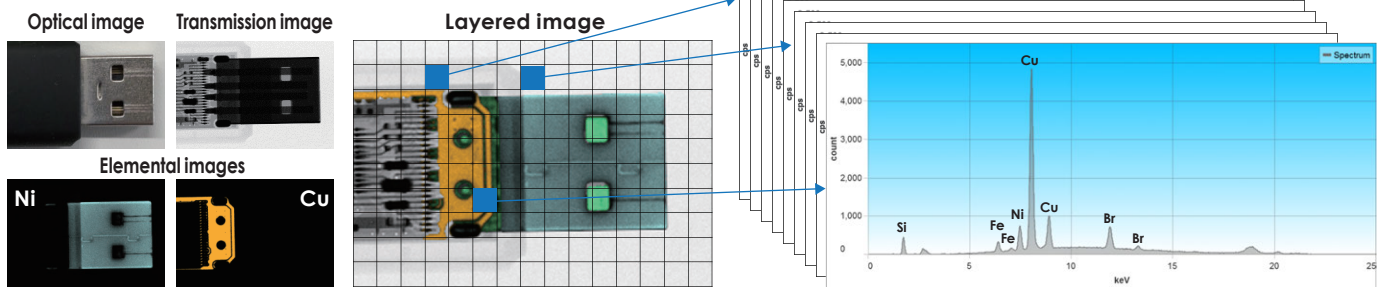


What is the XGT-9000 Series?

The XGT-9000 Series is an X-ray Fluorescence Analytical Microscope, which provides non-destructive elemental analysis of materials.



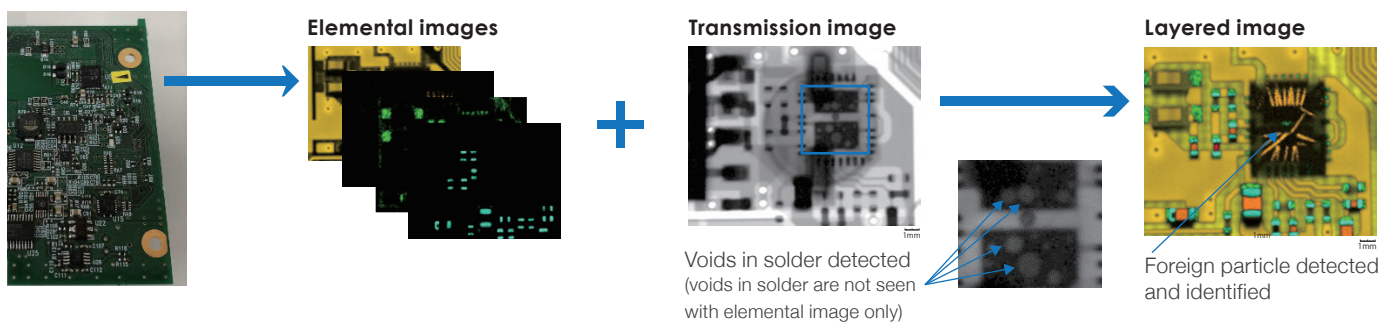
- 1 Incident X-ray beam is guided towards the sample placed on the mortorized stage.
- 2 X-ray fluorescence spectrum and transmission X-ray intensity are recorded at each point.
- 3 Information available: Qualitative & quantitative elemental analysis/Mapping/Hyperspectral imaging.



Unique features

Simultaneous imaging of fluorescent X-rays and transmission X-rays

The combination of elemental images and transmission images allows one to detect hidden defects.



Clear and flexible optical image

The XGT-9000 Series has high quality cameras with adjustable focus and advanced illumination modes. They provide a clear view of the targeted areas of interest on a sample. The right picture shows a small bearing with corrosion inside. A clear image can be obtained for both the surface of the bearing and the corroded zone inside.



Key features

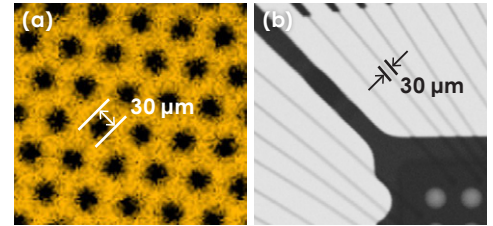
The XGT-9000 Series offers unique features that enable all kinds of materials to be analyzed with the highest performance and best flexibility.

Multi-probes including most advanced 15 μm ultra-high intensity

Using multiple probes is crucial to enable fast surface scanning with no compromise in characterizing small features with high spatial resolution.

<Multiple probes for the XGT-9000 Series to select>

- 10 μm probe
- 50 μm probe
- 100 μm probe
- 400 μm probe
- 1.2 mm probe
- 15 μm ultra-high intensity probe
- 100 μm ultra-high intensity probe

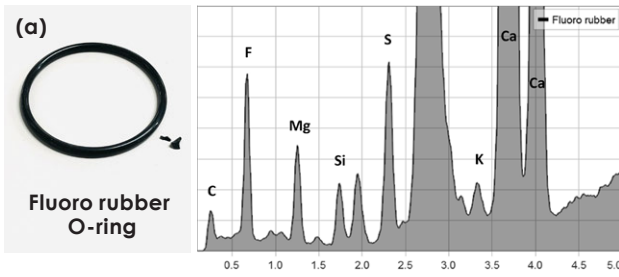


(a) Cu image on Copper mesh with 30 μm holes
(b) Transmission X-ray image of wire patterns inside a IC chip

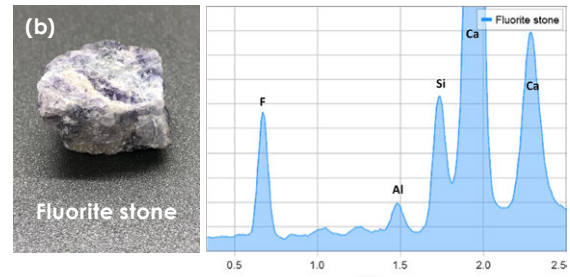
The new 15 μm ultra-high intensity probe is able to achieve ultra-fast imaging with small spot size without compromise in the X-ray beam intensity

Wide detectable element range: from carbon to americium

The XGT-9000 Series can be equipped with a light elements detector (optional) that allows the measurement down to carbon. With this detector, the XGT-9000 Series offers more possibilities for analysis of polymers and biological samples, or for applications in geoscience, mineralogy, archeology, and ceramics.



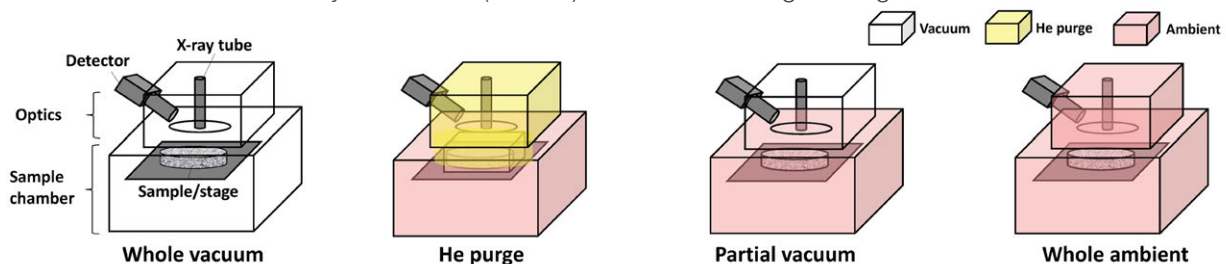
(a) Fluoro rubber



(b) Fluorite stone

Multiple measurement environments for your analysis

4 measurement environments can be selected depending on the application and the nature of the investigated sample. The whole vacuum offers the best sensitivity for light elements, however vacuum conditions may cause damage to hydrous, biological samples or fragile archeological specimens. The cost saving He purge module (optional) enables analysis of such samples without compromising the sensitivity down to carbon. Finally the partial vacuum mode is effective for analysis from Na (sodium) without increasing running costs.

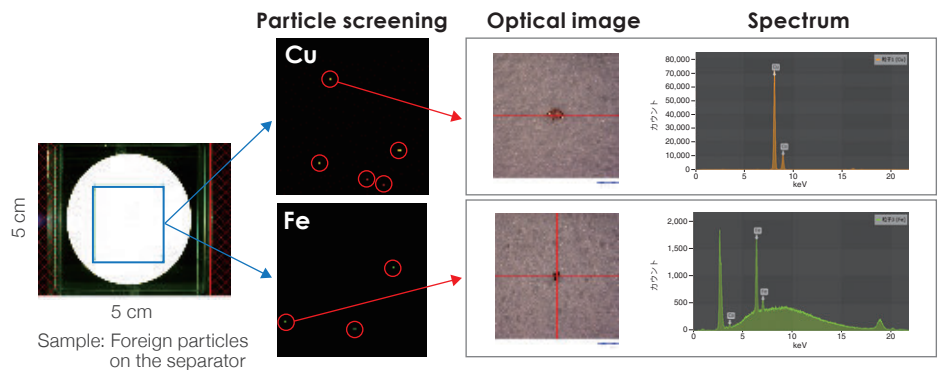


The XGT-9000 Series: A wide range of applications

Battery: Foreign particle analysis on separator film

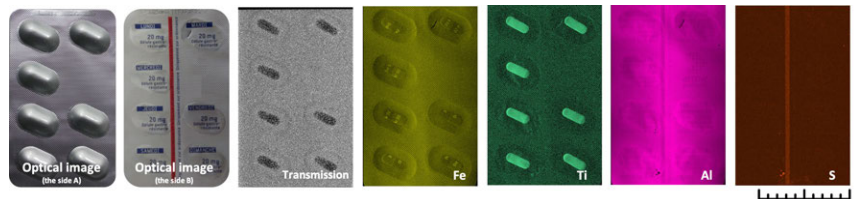
The XGT-9000 Series can detect and determine the composition of foreign particles, and therefore track the source of contamination.

The particle detection function (see page 6) within the XGT-9000 Series makes it possible to count the number of particles, characterize particle sizes, and get the coordinate position of particles to re-analyze them in detail.



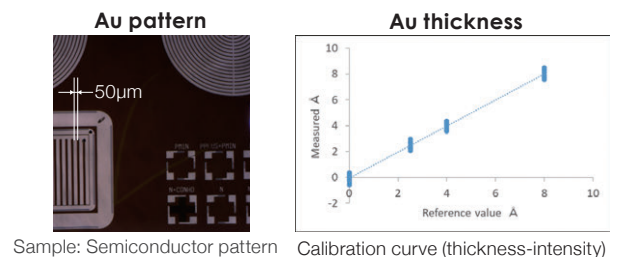
Pharmaceutical: Quality control, Foreign matter analysis

Quality control is a key aspect in the pharmaceutical industry. Drugs must be safe and with active formulations whose performance is consistent and predictable. With the partial vacuum mode, a full blister pack can be imaged.



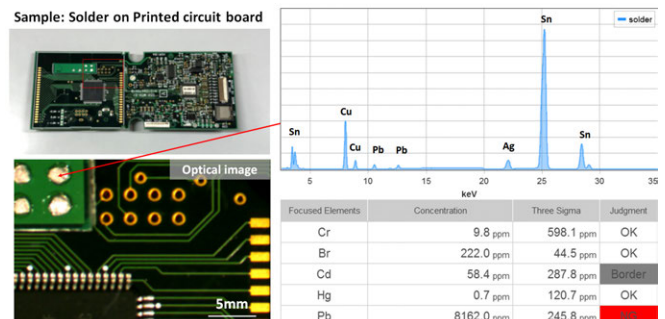
Semiconductor: Coating thickness measurement

The combination of micro-probe and thickness calculation function makes the XGT-9000 Series useful for semiconductor applications such as thickness measurement of narrow patterns on a wafer and coating on a small electronics. Example on the right shows thickness measurements of Au patterns on a Si wafer using calibration curve method.



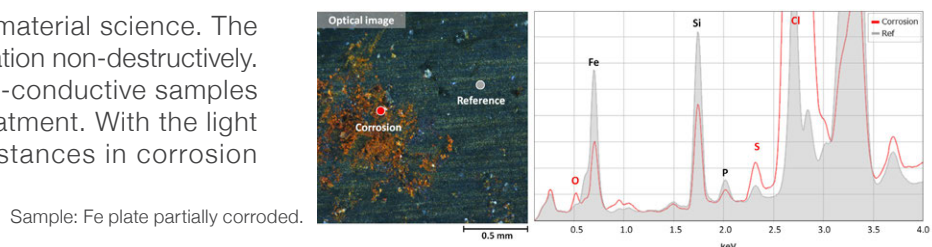
Electronics: Failure analysis, RoHS testing

Simultaneous imaging of transmission X-rays and fluorescent X-rays is effective to find defects inside electronic components (see page 2). The XGT-9000 Series is also an effective screening tool for RoHS testing. It can perform elemental mapping to find suspicious components on a complex sample, and analyze them to obtain the concentration of the elements regulated through RoHS. The XGT-9000 Series software can display compliance with the RoHS thresholds with a clear pass/fail result.



Material Science: Surface analysis of corrosion/contamination

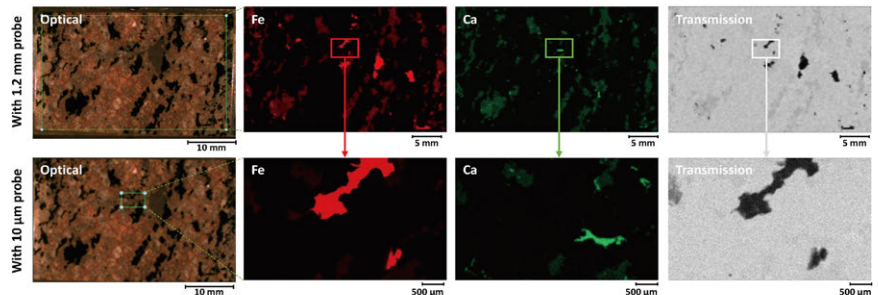
Elemental distribution is crucial for material science. The XGT-9000 Series provides this information non-destructively. Unlike SEM-EDS, it can analyze non-conductive samples without carbon or metal coating treatment. With the light elements detector, it is used for instances in corrosion studies.



Geoscience/Mineralogy: Elemental composition identification

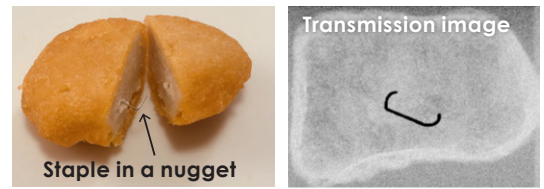
The XGT-9000 Series can be equipped with various probes and spot sizes providing comprehensive and detailed understanding of geological and mineral samples. Chemical phase distribution can be obtained with Labspec Link function (see page 7)

Sample: Thin section of a stone



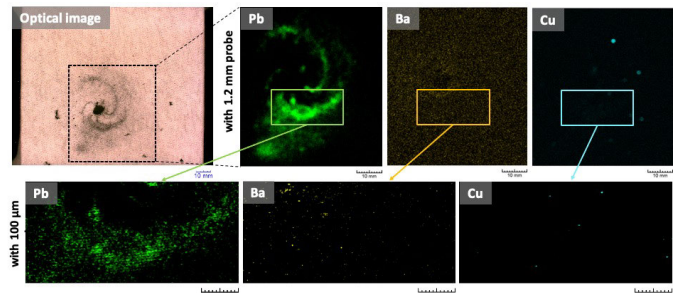
Food: Foreign matter analysis

Morphological, elemental & X-ray transmission inspection with the XGT-9000 Series helps food companies to identify the type of foreign substances and the root cause of such contamination in the food products. It is crucial to know if the issue happened during the production process or occurred later at the consumer site.



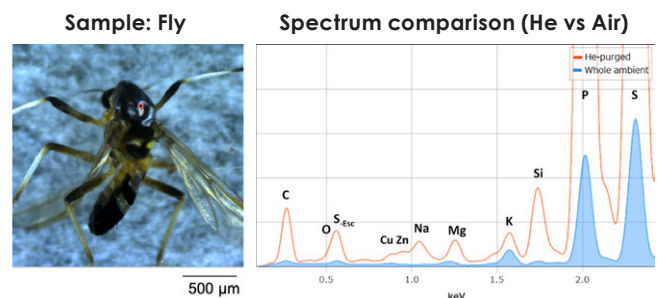
Forensic: Trace evidence identification, Fake product identification

The XGT-9000 Series can be used for identification of trace evidences such as collected gunshot residues, glass fragments, and fibers with sizes even down to tens of micron. It can also be used for fake product identification. The right figure shows comprehensive and detailed elemental map images of gunshot residue on a cloth with two different probes under partial vacuum condition.



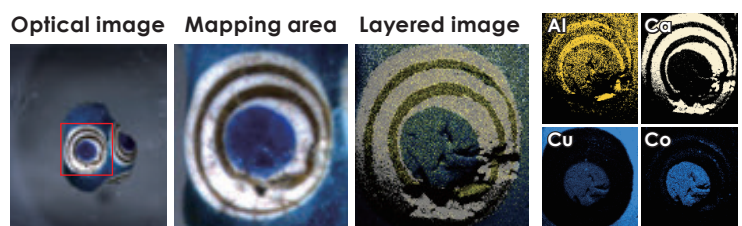
Biology: Metabolism investigation

Elemental distribution is important to understand metabolism in biological samples. Biological samples contain water or gas and therefore cannot be measured in a full vacuum environment because they will be significantly affected or damaged. The unique partial vacuum mode or He-purge mode with the XGT-9000 Series enables analysis of biological samples without compromising sensitivity to the light elements.



Archaeology: Origin investigation

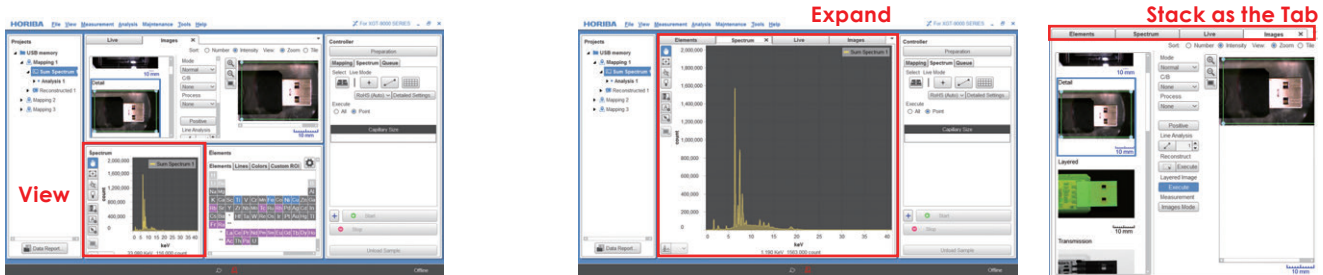
Elemental analysis of archeological samples helps to determine when and where they were made. The XGT-9000, a non-destructive elemental analytical instrument, is suitable for valuable archeological samples. Elemental composition of a dragonfly eye bead (shown right) revealed that it originated in Egypt/Middle East during the 2nd century B.C. The XGT-9000 SL, a super large chamber model is able to fit large paintings without compromising performance and X-ray safety.



XGT-9000 Series Software Suite

Simple and rich GUI/Customizable windows/Advanced functions

The user interface offers a flexible way to measure multiple samples or areas in unattended mode (queue function), display the analytical results, present the data, and edit reports. Advanced treatments include image processing, particle finder, colocalization measurement and multivariate analysis (refer to "Combination of XRF and Raman Spectroscopies").

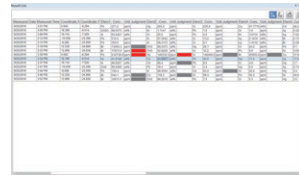


Standard GUI

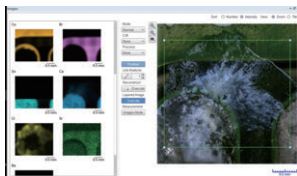
Edited GUI



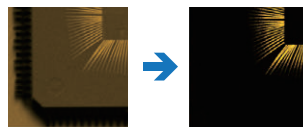
RoHS mode GUI



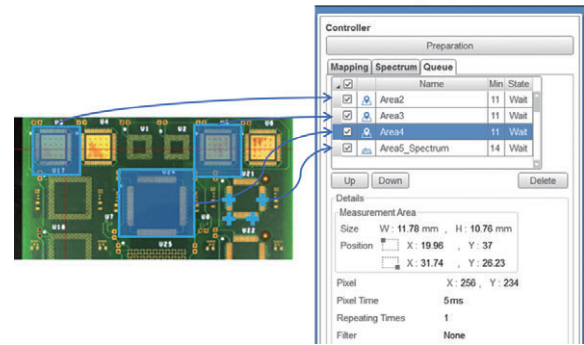
Result list view



Floating view



Raw image → Processed image
Image processing for mapping

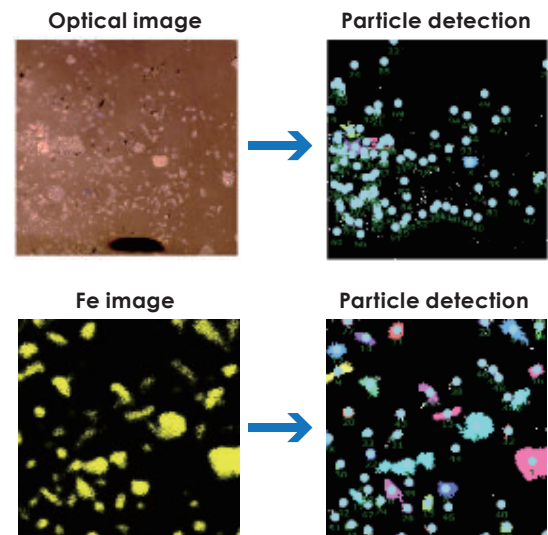
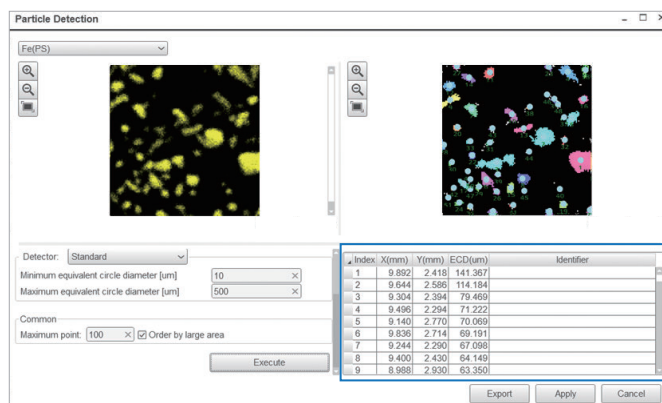


Queue function

Multiple measurements including mapping /multi points

Particle detection function

The particle detection function is available from all the 3 images in the XGT-9000 (Optical, Fluorescence X-ray and Transmission). The particle detection function automatically detects particles and marks their position for multi-point measurement, classification and analysis.



Coordinates of detected particles are automatically stored and transferred to the multi-point analysis mode

Do more with your HORIBA XRF

XGT-9000SL

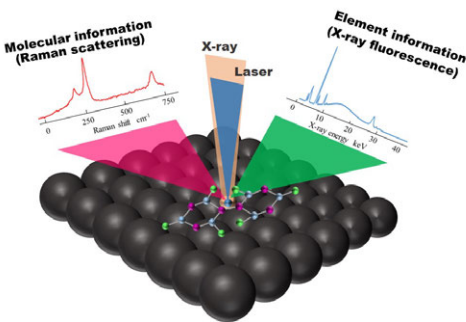
XGT-9000SL provides a non-destructive analysis of your valuable large samples such as a large printed circuit board, semiconductor wafer or archaeological samples.



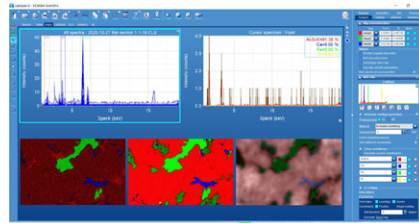
* The sample chamber of the XGT-9000SL complies with the radiation safety requirement. Measurement can be carried out under partial vacuum, He purge, or ambient conditions.

Combination of XRF and Raman Spectroscopies

- ◆ XRF and Raman spectroscopies are complementary techniques.
- ◆ XRF provides information about elemental composition of the material, whereas Raman offers molecular information.
- ◆ Co-localized measurements between the XGT-9000 and HORIBA Raman Spectroscopy provide more information about the sample.
- ◆ Transfer of the XGT-9000 data to the advanced LabSpec Suite software using LabSpec link.



Combination of XRF



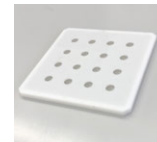
LabSpec link

Sample holders

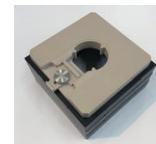
Various sample holders are provided to fit different shapes and types of samples. Fast and easy change between holders with HORIBA's modular stage design.



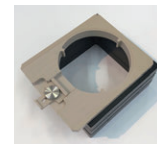
One touch sample holder



Sample tray (WR type)



Wafer holder (2 inch, 4 inch and others)



Transfer vessel: Measurement of samples isolated from air

HORIBA XRF family



MESA-50V3



MESA-50KV3



MESA-7220V2



SLFA-60



SLFA-6000 Series

Customization examples



Benchtop XRF

Sulfur / Chlorine-in-Oil analyzer

In / On-line analyzer

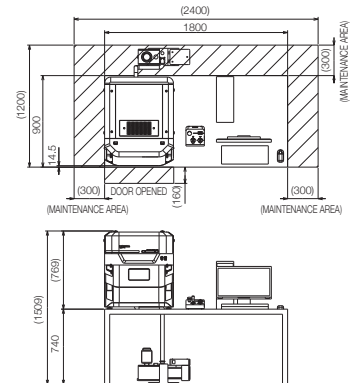
Real time analysis for coating thickness and composition

XGT-9000 Series Specification

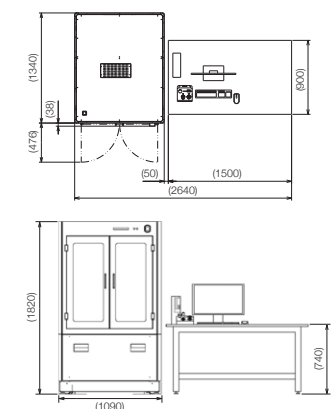
Model	XGT-9000	XGT-9000SL
Basic information		
Instrument	X-ray fluorescence analytical microscope	
Sample type	Solids, Liquids, Particles	
Detectable elements	C* – Am *with optional light elements detector (F – Am with standard detector)	
Available Chamber size	450 (W) x 500 (D) x 80 (H)	1030 (W) x 950 (D) x 500 (H)
Maximum sample size for mapping	300 (W) x 250 (D) x 80 (H)	500 (W) x 500 (D) x 500 (H)
Maximum mass of sample	1 kg	10 kg
Optical observation	Two high resolution cameras with objective lens	
Optical design	Vertical-Coaxial X-ray and Optical observation	
Sample illumination/observation	Top, Bottom, Side illuminations/Bright and Dark fields	
X-ray tube		
Power	50 W	
Voltage	Up to 50 kV	
Current	Up to 1 mA	
Target material	Rh	
X-ray optics		
Number of probes	Up to 4	
Primary X-ray filters for spectrum optimization	5 positions	
Detectors		
X-ray fluorescence detector	Silicon Drift Detector (SDD)	
Transmission detector	NaI (TI)	
Mapping analysis		
Maximum mapping area	100 mm x 100 mm	350 mm x 350 mm
Minimum step size	2 μm	4 μm
Operating mode		
Sample environment	Full vacuum/ Partial vacuum / Ambient condition / He purged condition (optional)	Partial vacuum / Ambient condition / He purged condition (optional)* *He purge condition is necessary to detect down to carbon with a light elements detector or down to fluorine with a standard detector.

Dimensions (Unit: mm)

XGT-9000



XGT-9000SL



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⚠ Please read the operation manual before using this product to assure safe and proper handling of the product.

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