

Installation Requirements

Model	TXRF 3760	TXRF 3800e
Power supply	3 phase, AC 200 V, 50/60 Hz, 100 A	3 phase, AC 200 V, 50/60 Hz, 50 A
Earth grounding	Grounding resistance 30 Ω or less (Dedicated line)	Grounding resistance 30 Ω or less (Dedicated line)
Cooling Water (Tap water) for X-ray source	25 L/min, 0.2 ~ 0.5 MPa, 18 ~ 25 °C	6 L/min, 0.2 ~ 0.5 MPa, 18 ~ 25 °C
Cooling Water (Tap water) for dry pump	According to pump specifications	According to pump specification
N ₂ gas (high purity)	20 L/min, 0.03 ~ 0.05 MPa, <30 °C	20 L/min, 0.03 ~ 0.05 MPa, <30 °C
N ₂ gas for dry pump	According to pump specifications	According to pump specifications
Compressed air (CDA)	20 L/min, 0.5 ~ 0.6 MPa, <30 °C	20 L/min, 0.5 ~ 0.6 MPa, <30 °C
Online analysis program (option)	SECS/GEM	SECS/GEM
Others	Compressed air exhaust, Dry pump exhaust	Compressed air exhaust, Dry pump exhaust
Environment	Room temperature 18 ~ 27 °C, Humidity <75 %RH	Room temperature 20 ~ 25 °C, Humidity <75 %RH

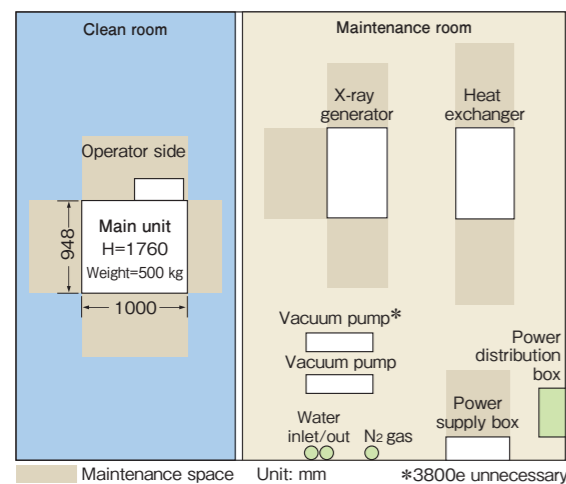
(Note) Pressure at gauge



TXRF SERIES 3760/3800e

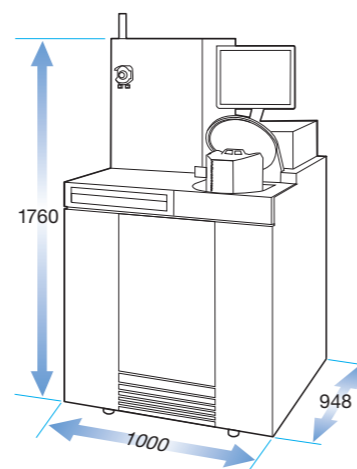
Total Reflection X-ray Fluorescence Spectrometer

Example of Installation



Compact Design with a Footprint of Less Than 1 m²

The footprint to accommodate the transfer robot chamber, XYθ stage, and personal computer is just 1000 (W) x 948 (D) [mm]. Maintenance areas are required only in the front and the rear of the tool. Clean room space is efficiently utilized.



Compliance with safety standards



SEMI S2/S8

Compliance with communication standards

SECS/GEM

ISO 9001/ISO 14001 approved

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High-reliability

— Wafer Surface Contamination Analysis

Total Reflection X-ray Fluorescence (TXRF) is an indispensable tool for materials and device development for semiconductor manufacturing.

Remarkable reliability is achieved thanks to newly developed X-ray optics, a new stage mechanism, and a new concept in compact rotating-anode X-ray sources. Also, a new, low-COO TXRF model offers reduced initial and operating costs.



High-sensitivity Model Total Reflection X-ray Fluorescence Spectrometer

TXRF 3760

- For 200 mm and smaller wafers.
- With high-power, rotating-anode X-ray source.
- Compact footprint: 1000 (W) x 948 (D) [mm].



Low-COO Model Total Reflection X-ray Fluorescence Spectrometer

TXRF 3800e

- CO₂ exhaust reduced by 50% compared with Rigaku's previous model (TXRF 3750).

Results in an Instant

Higher throughput thanks to shorter measurement time achieved by high power and a vacuum transfer robot. Interruption of a job to measure an urgent sample is easily handled.

Easy Operation

Easy operation in routine analysis mode. Automatic analysis can be set in measurement recipes. Alignment and mapping are easily done.

Reduced Footprint

Compact footprint: 1000 (W) x 948 (D) [mm]. Excellent maintainability.

High-power X-ray Source

Rigaku's patented 3-crystal exchanging mechanism enables the entire element range (from light to heavy) to be covered by one tungsten (W) target X-ray source.

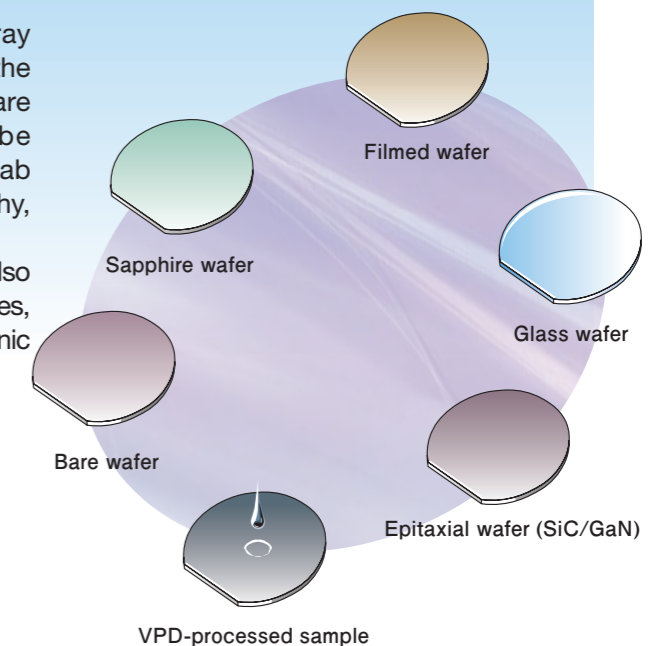
Liquid Nitrogen-free Detector System

Liquid nitrogen-free SDD (Silicon Drift Detector) offers high resolution and high count rate.

Applicable to a Variety of Wafers and Applications

The application of Total-reflection X-ray Fluorescence analysis is not limited to the analysis of metallic contamination on bare silicon wafers. TXRF analysis can be applied to gauge the cleanliness of all fab processes, including cleaning, lithography, etching, ashing, films, etc.

Beyond silicon devices, this technique is also applicable to the fields of SiC power devices, compound semiconductors, MEMS, organic electroluminescent materials, etc.



High-precision Analysis

Lower Limits of Detection (LLD) of TXRF ※1

Element	Na	Al	Fe	Ni	Cu
TXRF 3760	$2.5 \times 10^{11} \#2$	$2.5 \times 10^{11} \#2$	1.0×10^9	1.0×10^9	1.5×10^9
TXRF 3800e	—	—	1.5×10^9	1.5×10^9	2.3×10^9

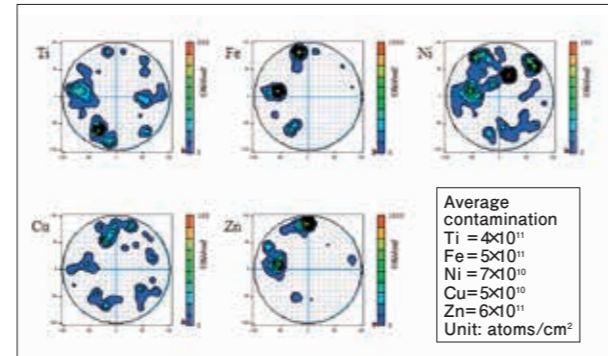
Measurement time: 1000 sec Unit: atoms/cm² ※1 Typical Value ※2 In case of film-type contamination

Sweeping-TXRF

- High-speed, full-wafer mapping.
- Contamination can be mapped at the 5×10^{10} atoms/cm² level in 15 min (200 mm wafer).

※Sweeping-TXRF was jointly developed by Siltronic Japan and Rigaku.

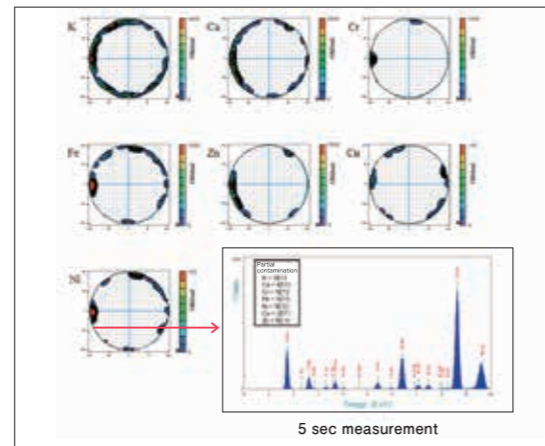
Example of Sweeping-TXRF at 5 sec/point measurement



ZEE-TXRF (Zero Edge Exclusion TXRF)

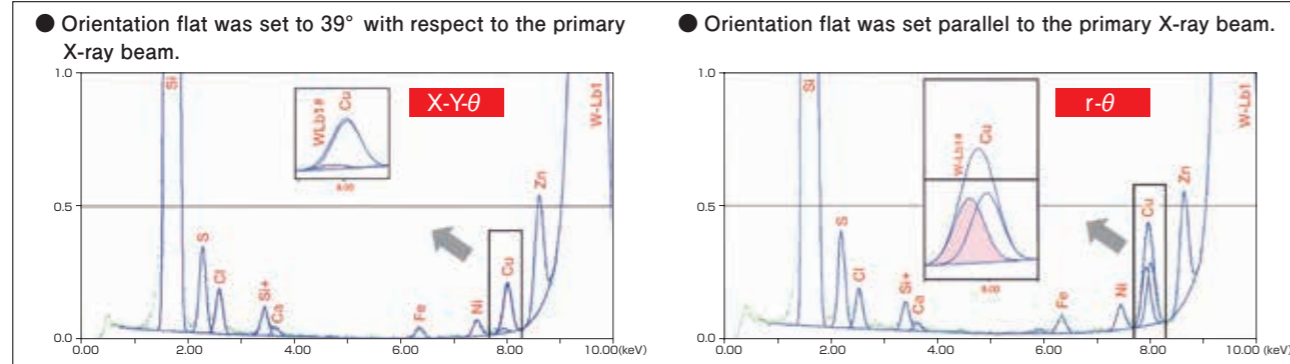
- High-sensitivity, non-destructive measurements can be made at the wafer edge with zero edge exclusion.
- Detect metal contamination out to the wafer edge.

Example of ZEE-TXRF measurement



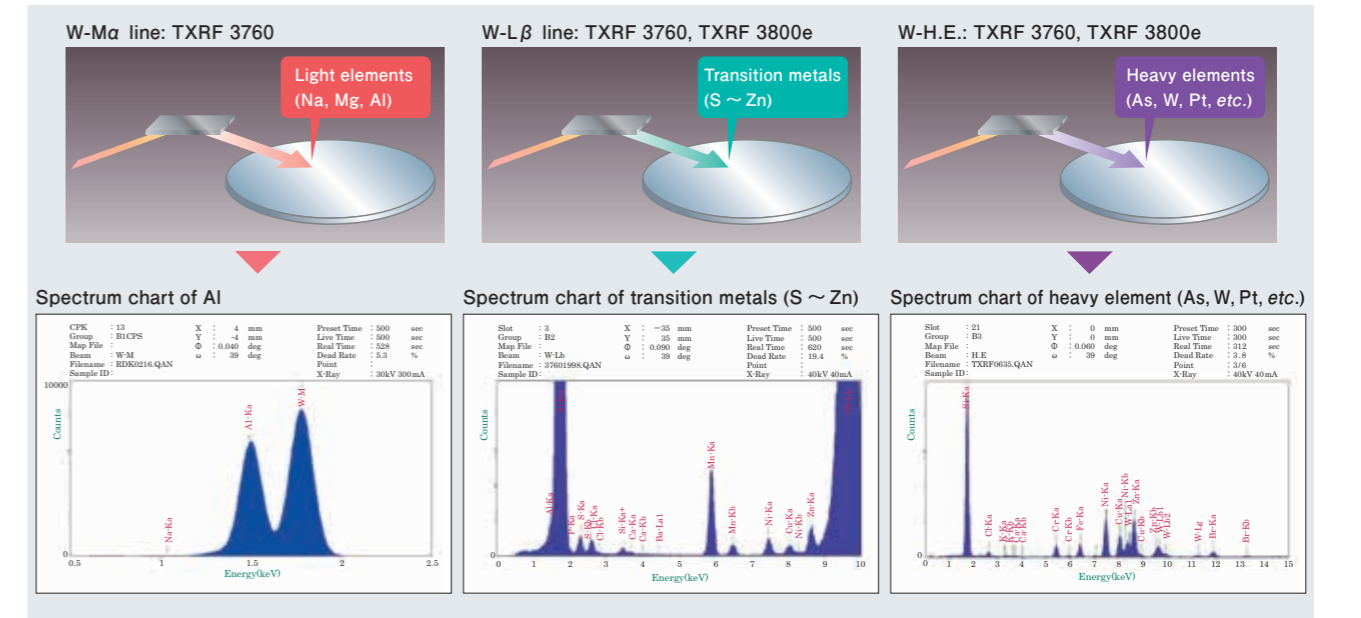
Diffraction Elimination for Improved Trace Element Analysis — New XYθ Sample Stage

The XYθ driving mechanism of the new sample stage further improves the analysis of trace contamination by eliminating escape peaks caused by diffraction peaks from a silicon substrate.



Wide Analyzable Element Range from Na to U with a 1-target, 3-beam Method

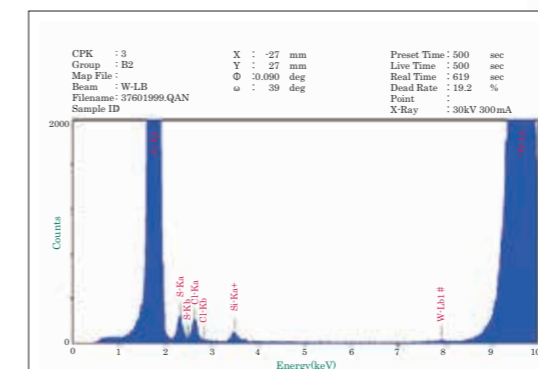
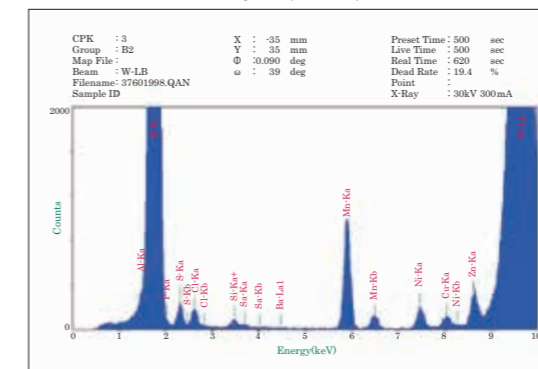
With a single X-ray source, ¹¹Na~⁹²U are analyzed thanks to Rigaku's unique 1-target, 3-crystal exchanging mechanism. The crystals are switched automatically through software, quickly and with high precision.



Feasibility of Off-line VPD — Droplet Search Function

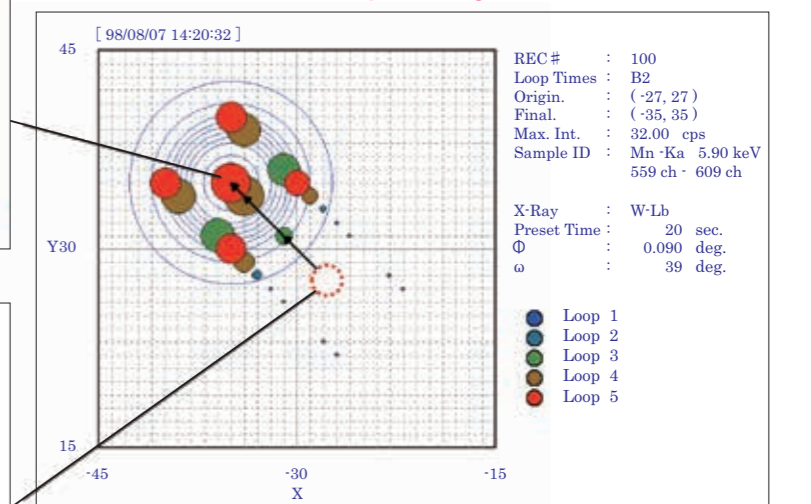
The repeatability of VPD and droplet analysis is improved by the droplet search function. This function can also run under PI Link function.

Actual Position of Droplet (-35.35)



Original Target position (-27.27)

Conceptual Image



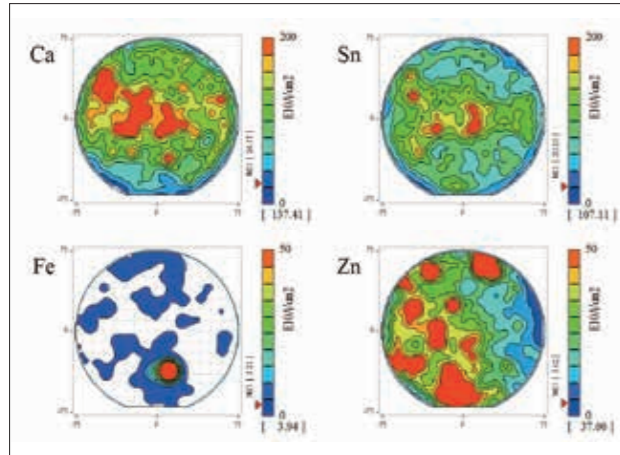
Examples of Measurement in Applications

Speed and Flexibility Guarantees Quality and Efficiency of Operation

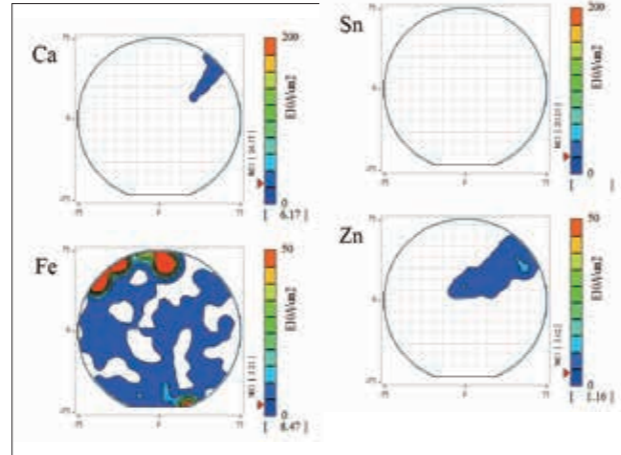
SiC Wafers

TXRF is a very powerful contamination monitoring tool for SiC wafers, for which chemical analysis is not effective. Process A and Process B were run with different cleaning protocols by SiC wafer suppliers. TXRF provides entire wafer contamination mapping information.

150 mm SiC Wafer - Process A



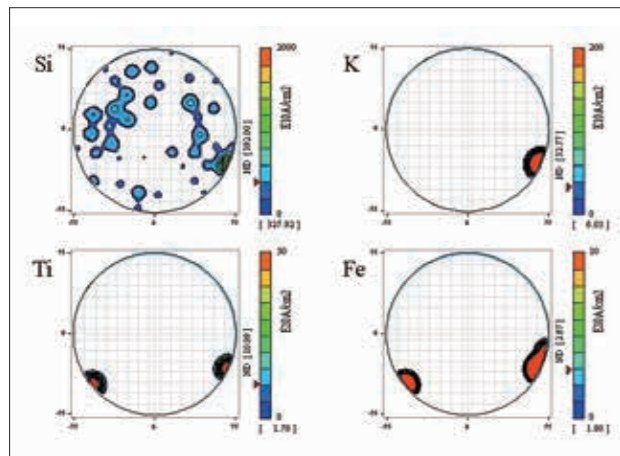
150 mm SiC Wafer - Process B



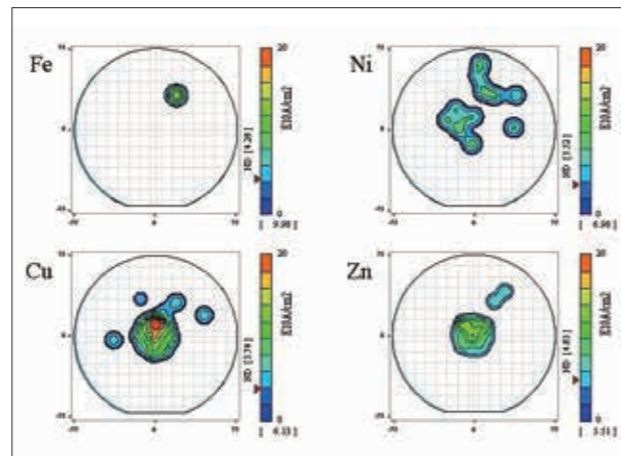
Other Compound Semiconductors — GaN, Sapphire

TXRF has also been widely applied in the compound semiconductor field, such as in GaAs, GaN and Sapphire wafer processes.

GaN

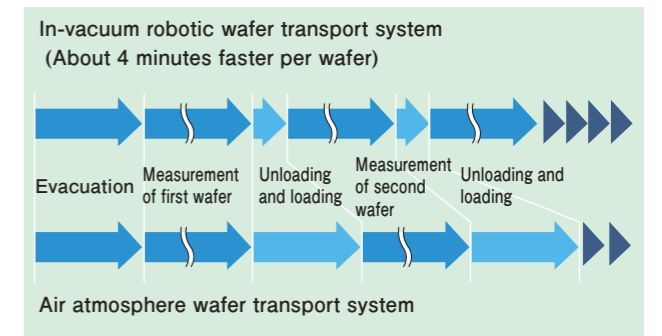


Sapphire



Higher Throughput — In-vacuum Robotic Wafer Transport System

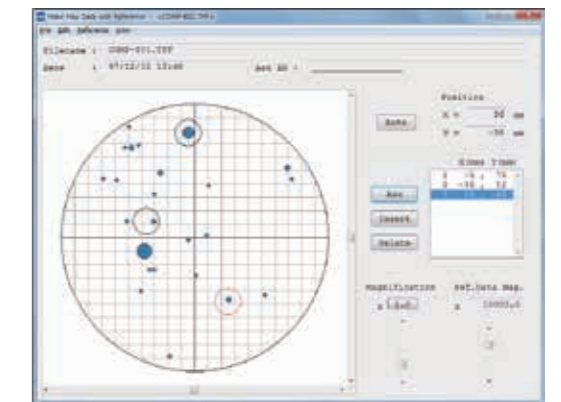
Higher throughput is achieved thanks to a vacuum chamber that accommodates a wafer cassette, eliminating lost time of evacuation for every wafer. Thanks to the combination of an independent cassette chamber and a vacuum transfer robot, interruption of a measurement to run an urgent wafer is quickly done. The wafer search function that moves the robot arm only to slots where wafers are detected also contributes to higher throughput.



Data Import from a Surface Defect Inspection Tool — PI-Link

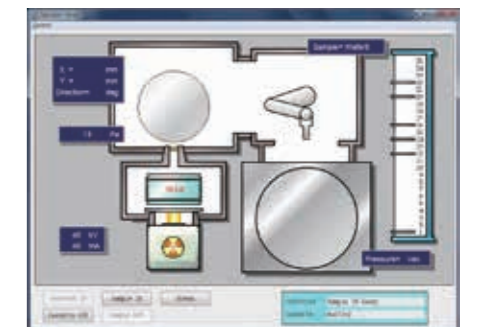
PI-Link enables data import from various suppliers' surface defect inspection tools to perform elemental analysis at defect points. Element information is obtained for particles and scratches that is unavailable from surface defect inspection.

Element information of particles



Operation Status Display

Graphical display of the system configuration enables the operator to see at a glance the tool status and condition, including sample movement, kV-mA of the X-ray source, sample being measured, etc.



Measurement Condition Setting

Up to 50 measurement conditions can be preset by simple operation. New recipes can be created while measurements are running, enhancing productivity. Measurement conditions for priority wafers can be set up with a single line of input.

