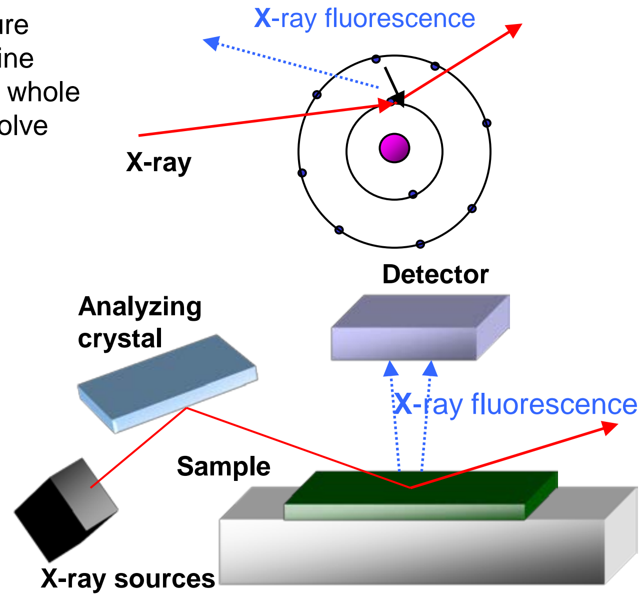
TXRF(Total Reflection X-ray Fluorescence)

TXRF is the mainstay for the semiconductor industry to measure metallic contamination of silicon wafers. TXRF is used for routine process equipment quality monitoring. New advances such as whole wafer mapping have moved TXRF into a diagnostic mode to solve contamination problems and find "root cause".



TXRF (Principle)

Total Reflection X-ray Fluorescence (TXRF) utilizes extremely low-angle x-ray excitation of a polished sample surface. The incident angle of the x-ray beam (typically 0.05°) is below the critical angle for the substrate and limits excitation to the outer most surface layers of the sample. The fluorescence photons emitted from the surface atoms are characteristic of the elements present.

Strength

- Elements Detected: S – U
- Detection limit: 1E9 to 1E12 at/cm2
- Quantitative
- Non-destructive
- Low cost
- Short turn-around time（3 to 6 days)

Technical Specifications

- Instrument: TREX 630T
- X-ray sources： W, Ag, Cr
- Sampling depth: 3 to 10 nm
- Probe Size: ~10 mm diam.

Detection Limit

Element	D.L	Source	DL	Source
Na			2E+12	Cr
Mg			5E+11	Cr
Al			2E+11	Cr
P			6E+10	Cr
S			4E+10	Cr
S	1E+11	W		
Cl	8E+10	W	3E+10	Cr
Ar	5E+10	W	2E+10	Cr
K	4E+10	W	1E+10	Cr
Ca	3E+10	W	8E+09	Cr
Sc	2E+10	W	6E+09	Cr
Ti	1E+10	W	4E+09	Cr
V	1E+10	W		
Cr	8E+09	W		
Mn	6E+09	W		
Fe	5E+09	W		
Co	4E+09	W		
Ni	3E+09	W		
Cu	3E+09	W		
Zn	2E+09	W		
Br	6E+10	W	2E+10	Ag
Pd	4E+10	W		
Pt			2E+10	Ag
La	8E+09	W		
Ce	7E+09	W		

(Unit：atoms/cm^2)

TXRF is a powerful technique to analyze wafer surface contamination with high sensitivity!