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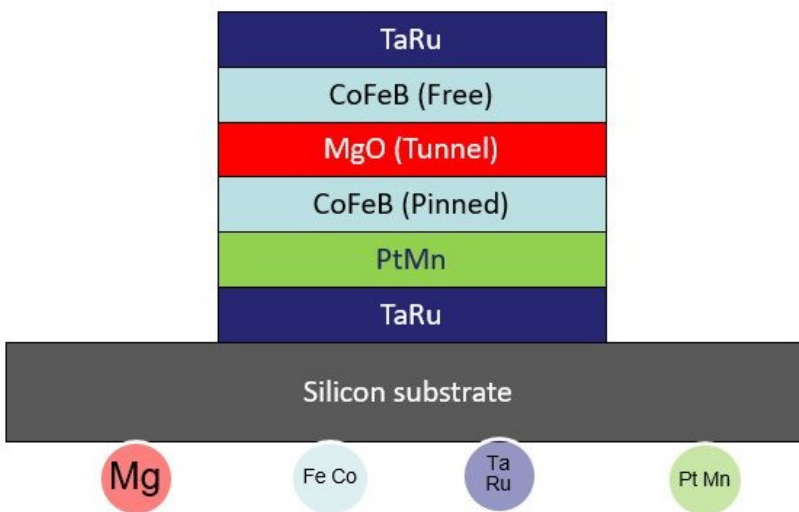
Semiconductor Metrology Application: Metrology for Substrate Back Side Contaminati

Contamination elements

MRAM elements: Lower limits of detection (LLD) [atoms/cm²]

	Mg	Al	Fe	Co	Mn	Ta	Ru	Pt
TXRF-V310	6e8	9e8	1e7	1e7	1e7	1e8	?	?
TXRF 310Fab	6e10	9e10	1e9	1e9	1.4e9	1.3e10	1e10	8e9

After etching of MTJ layer and cap layer, those elements cause contamination on the backside of the silicon substrate.

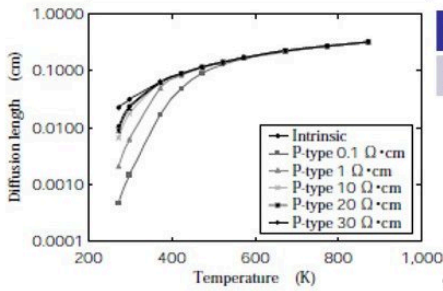


BAC-TXRF

Backside contamination must be measured to avoid cross-contamination of the product line.

BAC-TXRF is a suitable technique for the MRAM application.

Diffusion in Silicon Substrate

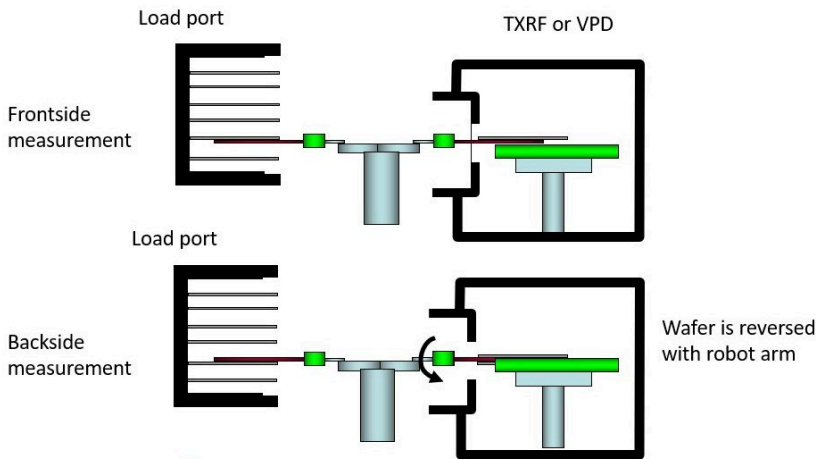


Metal	Diffusivity
Fe, Co, Ni, Cu	Large

Graph from Kobe Steel

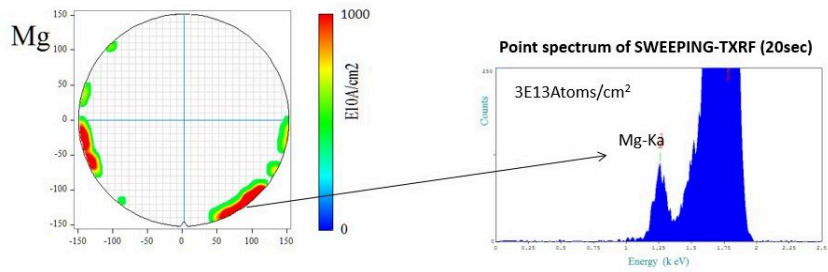
Diffusion length of Cu at various temperatures for 1 hr.

About BAC-TXRF



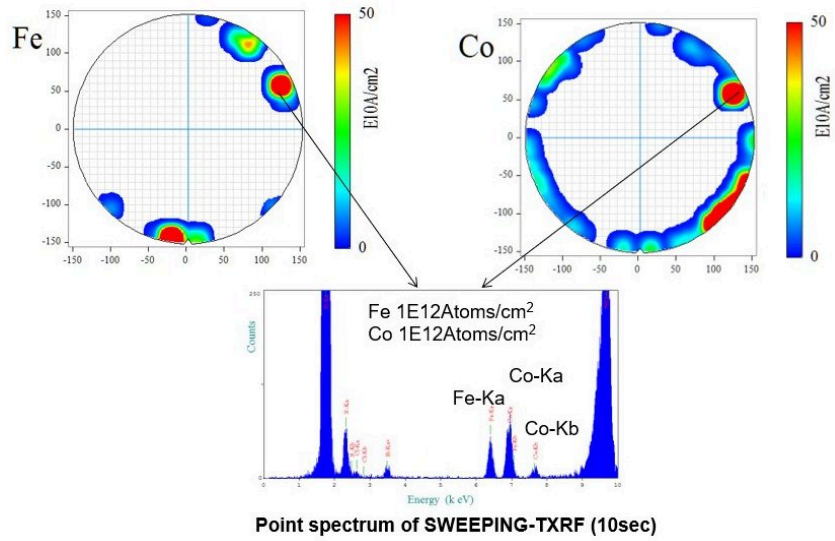
Frontside and backside handling with flipping robot arm

Contamination from the tunnel layer material (MgO)

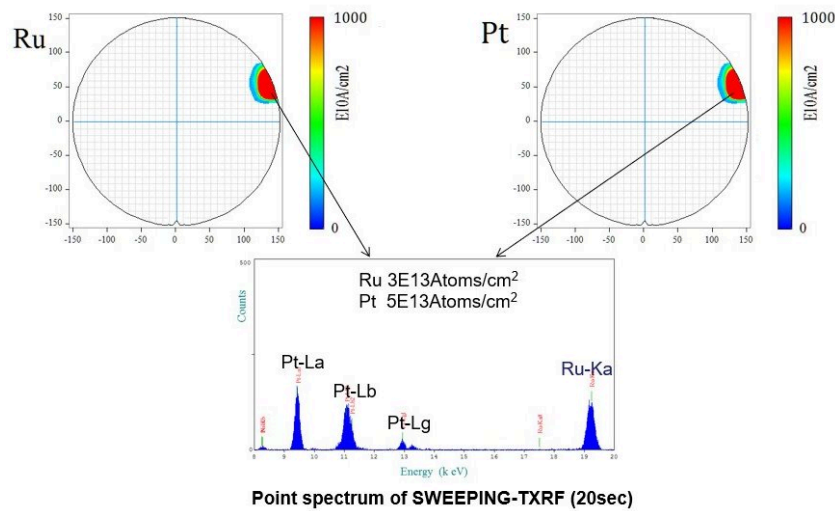


The W-M excitation source is suitable to measure light-element contamination, such as Na, Mg, and Al.

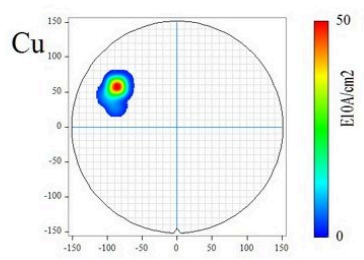
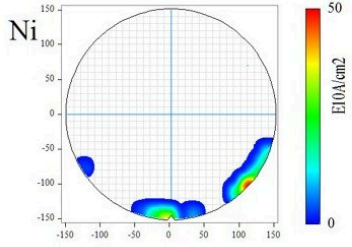
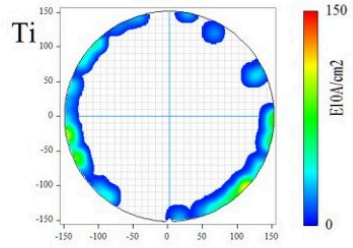
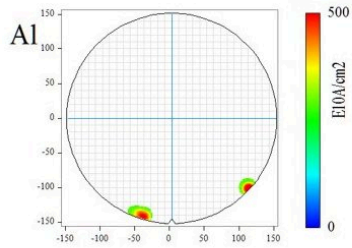
Contamination from the free and pinned layer material (CoFeB)



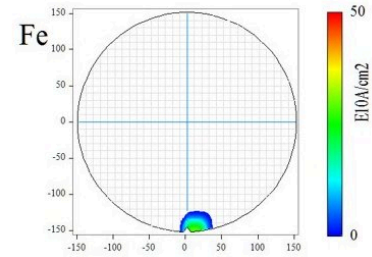
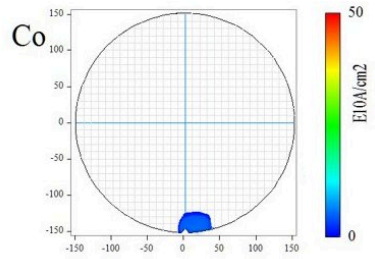
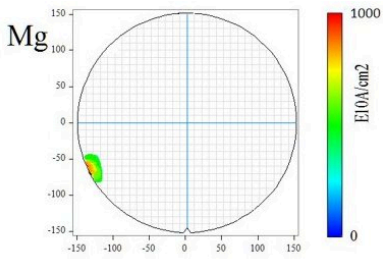
Contamination from the Pt and Ru layers



Other detected elements



Results after cleaning



Related products



TXRF 310Fab

TXRF spectrometer for wafer surface contamination for up to 300 mm wafers



XHEMIS TX-3000

TXRF spectrometer for wafer surface contamination for 300 mm wafers