# DETERMINATION OF THE OXIDATION STATE OF IRON-CONTAMINATIONS ON SILICON WAFER SURFACES WITH K-EDGE TXRF XANES

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SR-TXRF is a microanalytical technique which offers sensitivities as high as 8000 cps/ng and detection limits in the fg range for transition metals with a multilayer monochromator and a bending magnet beamline. If a crystal monochromator is used as monochromator the technique can be coupled to X-ray absorption measurements to gain chemical information on specific elements of interest. With this modified set-up there is a flux reduction of about two orders of magnitude, but it is still sufficient for the analysis at ppb level. This approach allows the extension of the X-Ray Absorption spectroscopy to traces in samples where only small amounts are available.

It is well known, that the surface contamination levels of Si wafers are very low and SR-TXRF with its low detection limits offers a non-destructive way to detect them. To trace possible sources of contamination not only information about spatial resolution of the contaminant but also chemical information like the oxidation state is of relevance. Especially for iron contaminations the chemical state of the element is of interest for semiconductor industry.

Wafer samples from IBM laboratories, showing surface contaminations in the E12atoms/cm² range for Fe have been investigated concerning their oxidation state.

SR-TXRF XANES measurements were accomplished at the bending magnet beamline L of HASYLAB, Hamburg, using a Si(111) double crystal monochromator and a Silicon Drift Detector (SDD).