

SYNCHROTRON RADIATION TXRF: NEW RESULTS

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Synchrotron Radiation based TXRF is now being used routinely at the Stanford Synchrotron Radiation Laboratory to carry out industrially relevant measurements for industry. The current detection limits of 7×10^7 atoms/cm² for the transition elements have proven more than adequate for all the studies undertaken to date. As a result, developments have been focused on reliable quantification, maintaining sample cleanliness as well as increasing throughput. In addition, recent developments have brought the analysis of light elements into reach with detection limits of 3×10^9 atoms/cm².

In parallel with the routine analytical activities, several new developments are being pursued. In order to develop an understanding of the kinetics of metal deposition during cleaning processes, TXRF will be used to study the adsorption of metals such as copper and iron while the silicon wafer is inside of a solution. Preliminary experiments have shown that such experiments are feasible if the water layer over the wafer is kept sufficiently thin. A sample cell has been designed and initial results for copper solutions will be presented.

In a second project, a wavelength dispersive spectrometer (WDS) that employs a sagittally focusing graphite analyzer crystal was used in both the standard TXRF and grazing emission (GEXRF) geometries to explore the improvements that are possible with higher resolution detectors. In this spectrometer, the mosaic spread of the analyzer crystal creates a 1 keV wide band of dispersed x-rays at the focal plane, thus eliminating the need for wavelength scanning when only one element is being analyzed and a position sensitive detector is used. Although the detection limits were only in the 10^{10} atoms/cm² range due to the reduced solid angle of the WDS, it may be possible to use such a detector for the *in situ* experiments where the large scatter signal from the water would overwhelm a standard energy dispersive detector. Results comparing the TXRF and GEXRF geometries will be presented along with the achieved resolutions.
