Synchrotron Radiation Total Reflection X-Ray Fluorescence Analysis is an established analytical technique offering detection limits in the low fg range for ideal samples. Measurements have been carried out at Hasylab beamline-L after the upgrade of the beamline with new x-ray optics (multilayer monochromators, cut-off mirrors)\(^1\). Detection limits for Ni on a Si wafer of 6.6 fg have been extrapolated.

Synchrotron radiation is the ideal source for the analysis due to its well known properties. In particular, the linear polarization of the radiation in the orbit plane leads to a reduction of the detection limits, if a side-looking detector is applied. Still, there are two choices for the position of the reflector (sample carrier). The reflector can be positioned vertically maximizing the solid angle of detection, or can be placed horizontally maximizing the degree of linear polarization of the beam exciting the sample\(^2\).

The two geometrical configurations were experimentally tested analysing real samples with different matrices, a NIST standard water sample, an oil standard, and a steel sample. The samples with a stronger scattering matrix gave better results with the horizontal reflector whereas low scattering samples showed better detection limits on a vertical reflector.

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\(^1\) G. Falkenberg, O. Clauss, A. Swiderski, T. Tschentscher, X-Ray Spectrom. 30 (2001) 170-173