A modern Multi-excitation for TXRF and Its Application to Environmental Samples

M. Beauchaine, A. Gross and H. Stosnach

Bruker AXS Inc., 5465 E. Cheryl Pkwy. Madison, WI 53711
Michael.beauchaine@bruker.com

During the last years modern Total Reflection X-ray Fluorescence (TXRF) bench top spectrometers could achieve attention for ultra trace element analysis in certain analytical laboratories in the world. However, the installed TXRF base shows limitations if compared with atomic spectroscopy methods. Due to insufficient sample excitation either the number of elements is limited or the detection limits do not satisfy typical requirements and standards for trace elemental analysis of environmental samples. This paper demonstrates the performance of a flexible multi-excitation TXRF configuration and its application to environmental samples.

The spectrometer was equipped with a Mo X-ray tube and a multilayer monochromator (17.4 keV). The second excitation was realized with a W tube (W-Brems, 35 keV). The use of a W tube also allows the integration of a third excitation for the low energy range (W-L, 8.4 keV). For fluorescence detection a new large area XFlash SDD equipped with a nitrogen purge for removal of the ambient Ar was installed.

Samples were prepared on quartz glass carriers and handled by a robotic autosampler. This sampling system also allows the use of other reflective carriers like wafers, microscopy slides etc.

The spectrometer performance was tested with different drinking and waste water standards, containing certain element impurities.

This paper shows that in wastewaters all elements of interest were detected and precisely quantified. In drinking water most elements could be detected and quantified with an acceptable precision. Therefore, a multi-excitation TXRF device can quantify a much broader element range of environmental samples and will be more competitive against present atomic spectroscopy methods.