

Spectral Correction for Transmission X-ray Tubes for Use in the Quantification Software

ATI-QUANT

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ATI-QUANT is a software package developed at TU Wien, Atominstitut[1,2]. ATI-QUANT uses fundamental parameters for quantification in XRF. Considerable efforts were made to describe the spectral distribution of the transmission X-ray tube AMPTEK MINI-X with Rh anode versus the previously used side-window tube with thick Rh target. The following research objectives were addressed: to analyze possible reasons for the incorrect calculation of elemental concentrations measured with the rhodium-anode transmission tube; to find a corrective function to better reflect the spectral distribution of the transmission tube; to test the corrected spectrum by means of reference standard materials; to extend the experimental setup in such a way as to correctly quantify light elements; and to compare two software packages for data evaluation (AXIL-IAEA and PyMCA).

By modifying the experimental setup and by calculation of the spectral distribution, the range of quantifiable elements was successfully extended to include light elements (down to Al). This was achieved by flushing the excitation and detection paths with He gas under slight overpressure. The corrected transmission-tube spectrum provides excellent quantitative results, achieving an even better performance than the well-established side-window spectrometer. Results and applications will be shown.

[1] B.Grossmayer, Softwarepaket zur quantitativen Röntgenfluoreszenzanalyse mittels fundamentaler Parameter unter Verwendung von Röntgenoptiken, Diploma Thesis, TU Wien, 2009

[2] P. Necker, Quantitative X-ray fluorescence analysis of samples with various matrices using a universal data evaluation software, Diploma Thesis, TU Wien, 2017