

Improving surface sensitive XRF using ink-jet printing and information from the angle dependent signal

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Total Reflection X-ray Fluorescence (TXRF) is a small footprint, resource efficient micro-analytical tool for trace elemental determination. However, depending on the matrix TXRF is also challenging in several ways: the preparation of a representative aliquot maybe difficult for slurries, shading effects and matrix effects may occur and the applicability of an IS maybe hampered by interferences (fitting may be impaired as well) or inhomogeneities. It is therefore crucial to understand and if applicable mitigate the influence of the before mentioned phenomena.

We have used the small volume approach using pL droplets to study shading in TXRF previously [1,2]. Using this approach thin specimens in a favorable geometry are prepared with a well defined morphology; this way minimizing matrix effects and shading [3]. To be used as standard it is also necessary to determine the delivered elemental amounts. Here we will present on the performance of a commercial ink-jet printer cartridge to deliver defined volumes and elemental amounts. The microscopic specimens obtained have been successfully applied to determine relative sensitivities in TXRF and prepare references to study coded apertures in grazing incidence full field micro-XRF. The homogeneous lateral distribution of analyte and IS may be probed by micro-XRF, to obtain information on likeness of analyte and IS. To study the likeness of the in depth distribution (film-like or particle-like) angle scans can deliver valuable data. Here we present first results on angle scans using a prototype GIXRF set up and a commercial TXRF instrument.

[1] M. Menzel, O. Scharf, S. H. Nowak, M. Radtke, U. Reinholz, P. Hirschenhuber, G. Buzanich, A. Meyer, V. Lopez, K. G. McIntosh, C. Strel, G. Havrilla, U. E. A. Fittschen, [J. Anal. At. Spectrom. \(2015\) 30, 2184-2193.](#)

[2] U. E. A. Fittschen, M. Menzel, O. Scharf, M. Radtke, U. Reinholz, G. Buzanich, V. M. Lopez, K. McIntosh, C. Strel, G. J. Havrilla, [Spectrochim. Acta, Part B \(2014\) 99, 179–184.](#)

[3] M. Evertz, T. N. Kroger, M. Winter and S. Nowak, *Spectrochimica Acta Part B*, (2018) 149, 118-123.