Contribution ID: **310** Type: **Poster**

Reference-free GIXRF-XRR based characterization of nanolayers and nanostructures

Monday, 17 September 2018 17:45 (15 minutes)

In most cases, bulk-type reference-materials do not provide optimal calibration schemes for the analysis of nanomaterials as e.g. surface and interface contributions may differ from bulk. Also, spatial inhomogeneities may exist at the nanoscale or the response of the analytical method may not be linear when going from bulk to the nanoscale. Thus, the availability of suited nanoscale reference materials is drastically lower than the current demand. The reference-free X-ray fluorescence (XRF) technique of PTB can address this disparity as it enables an SI traceable quantitative characterization of nanomaterials without the need for reference or calibration standards. This opens a route for the XRF based qualification of calibration samples.
As a first example, we use physical vapor deposition techniques for the development of layer-like reference samples with very low mass depositions. Different reference samples were fabricated for application in XRF and total-reflection XRF analysis. They were quantitatively characterized using synchrotron radiation employing PTB´s reference-free XRF approach.
In a second example, we work on the development of nanostructures as calibration samples. Several lithographic 2D and 3D nanostructures have been fabricated at PTB using e-beam lithography and were characterized using the reference-free grazing incidence XRF methodology of PTB. Here, an advanced and novel calculation scheme for the intensity distributions within the X-ray standing wave field (XSW) is required. In addition to the traceable quantification of elemental mass depositions, this allows for a determination of in-depth elemental distributions and the dimensional properties of the nanostructures.

Primary authors: HÖNICKE, Philipp (Physikalisch-Technische Bundeanstalt); Dr SOLTWISCH, Victor (Physikalisch-Technische Bundesanstalt (PTB)); Dr KAYSER, Yves (Physikalische-Technische Bundesanstalt); Dr BECKHOFF, Burkhard (Physikalisch-Technische Bundesanstalt); Mr SCHOLZE, Frank (Physikalisch-Technische Bundesanstalt); WEIMANN, Thomas (Physikalisch-Technische Bundesanstalt); KRÄMER, Markus (AXO DRESDEN GmbH)

Presenter: Dr KAYSER, Yves (Physikalische-Technische Bundesanstalt)

Session Classification: Poster session 1

Track Classification: P6 Nanomaterials and nanostructures