TXRF analysis using carbon coated glass substrate in comparison with conventional sample preparation

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Total reflection XRF (TXRF) is well known technique for trace elemental analysis. A small volume droplet of the sample solution is dropped onto a flat substrate. After it is dried, the dried residue is analyzed by TXRF instrument. TXRF quantification is performed by standard addition technique. However, the size or shape of the dried residues still influence on the quantitative values. Previously, we reported the application of resist pattern substrate [1]. A structure of parallel crosses was produced by photo lithography on Si wafer. A 10 µl volume of the standard solution (including Ti, Cr, Ni, and Pb) was dropped onto the resist pattern substrate. The dried residue was obtained in a relatively large area of 3-4 mm in square. We consider that this sample preparation is a promising technique, however, its high cost and time consuming for preparing the resist patterns were problem.

Therefore, we proposed a simple technique for sample preparation. A carbon thin film was used instead of resist pattern. The carbon film was made of graphite rod on a glass substrate with a thickness of about 75 nm by a vacuum evaporation method. A small volume of various sample solutions was dropped onto the carbon coated glass substrate. The dried residues were characterized by using a confocal laser microscope, a micro XRF imaging, and a contact angle analyzer. The dried residue was measured by NANOHUNTER II, (Rigaku Co., Japan). Repeatability and RSD (relative standard deviation) values of quantitative results were analyzed and detailed results will be presented.

Reference

[1] K. Tsuji, N. Yomogita, Y. Konyuba, Sample Preparation for Total Reflection X-ray Fluorescence Analysis Using Resist Pattern Technique, *Spectrochim. Acta Part B*, **144** (2018) 68-74.