

Optimal sample preparation for TXRF analysis depending on the sample solutions

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Total reflection X-ray fluorescence (TXRF) analysis is well known as a useful technique for determining trace elements in sample solutions. Aliquot of sample solution is, usually, dropped onto the sample carrier and dried. And then, the elements in the sample solution are determined by measuring the prepared dried residue. Since the shape of dry residue depends on the quantitation value, it is required to control the dry residue. Generally, hydrophobic sample carriers are used to prepare small-size dry residue. However, when sample solution containing the high matrix is measured by TXRF analysis using the hydrophilic substrate, absorption of XRF in dry residue can not be ignored. Therefore, we have suggested a resist parallel-cross pattern substrate for preparing the thin film-like residue [1]. In this study, sample carrier with carbon layer and an ultra-hydrophilic substrate prepared by micro plasma jet technique were developed.

The substrate with carbon layer was prepared by using a vacuum evaporation technique. A carbon rod with 3 mm in diameter was used as evaporation source, and the thickness of prepared carbon layer was approximately 75 nm. Ultra-hydrophilic substrates were prepared by applying a laboratory built atmospheric-pressure helium micro plasma jet onto the center of the quartz glass side for 1 min [2]. Sample solution containing various elements was dropped onto each prepared substrate and dried. The dried residue was measured with TXRF instruments (NANOHUNTER-II, Rigaku). Since the contact angle of the droplet on each substrate was low, it was possible to prepare the spread dried residue.

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- [2] F. Duriyasart, M. Ohtani, J.-S. Oh, A. Hatta and K. Kobiro, A New Approach to Surface Activation of Porous Nanomaterials Using Non-thermal Helium Atmospheric Pressure Plasma Jet Treatment, *Chem. Commun.*, **53** (2017) 6704-6707.