

TXRF FOR SEMICONDUCTOR APPLICATIONS

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Two types of TXRF method are used in semiconductor applications — straight-TXRF and VPD-TXRF. Of the two methods, we believe that straight-TXRF is more useful in many respects, such as its nondestructive quality and mapping capability. This presentation discusses some topics concerning the reliability of straight-TXRF analysis.

(1) Standard sample

The fluorescent X-ray intensity of TXRF inherently depends on the depth profile of the analyte. Therefore, a series of standard samples that have consistent depth profiles of analyte elements are required for reliable determinations. From this viewpoint, we proposed a method called “Immersion in Alkaline Hydrogen Peroxide Solution (IAP)” to prepare standard samples, and demonstrated its usefulness. [1, 2, 3]

(2) Purity of spectra

For TXRF trace analysis, purifying the background spectra is actually more critical than intensifying the primary X-rays. To improve the purity of the spectra, we successively introduced new technologies such as an x - y stage, a dual-crystal spectrometer, and Au-L β excitation. Such approaches, together with our carefully detailed experiments, enabled clear distinction of a 10^9 atoms cm^{-2} level of transition metal peaks from the baseline. [4]

(3) Sweeping-TXRF

We propose a new TXRF application called “Sweeping-TXRF” for whole-surface analysis. In this method, the entire surface is “swept” under semi-controlled glancing angles. The large sample size cancels out any errors in glancing angles, so that the method provides an accurate average concentration in a short measurement time. This topic is also discussed in detail at another session of this conference.

References

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[2]Y. Mori and K. Shimano: *Anal. Sci.*, 12, 141 (1996).

[3]Y. Mori and K. Uemura: *Anal. Sci.*, 16, 987 (2000).

[4]T. Yamada, M. Matsuo, H. Kohno, and Y. Mori: submitted for publication in *Spectrochim. Acta Part B*.