

Direct determination of Tm in ultra-pure europium oxide by ICP-QQQ

JUANE SONG¹; XIANG-CHENG ZENG²; SEBASTIEN SANNAC³

¹[Agilent Technologies Co. Ltd (China), No. 3. Wangjing Bei Road, Beijing 100102, China. Juane_song@agilent.com]

²[Agilent Technologies Co. Ltd (China), No. 3. Wangjing Bei Road, Beijing 100102, China. Xiang-cheng_zeng@agilent.com]

³Agilent Technologies France, 3 avenue du Canada, 91978, Les Ulis, France.

As ultra-pure material, the impurities in europium oxide raw materials must be carefully controlled. ICP-MS is the most commonly used technique for the measurement of trace REEs due to its high sensitivity and simple REE spectra. However, the measurement of Tm in Eu_2O_3 is a challenge using conventional quadrupole ICP-MS, because the solo isotope of $^{169}\text{Tm}^+$ is overlapped from $^{153}\text{Eu}^{16}\text{O}^+$. Several sample-pre-treatment techniques, such as flow injection on-line solid phase extraction, and ion exchange chromatography, have been developed to separate the trace REEs from the Eu matrix prior to ICP-MS detection. However, these approaches are cumbersome and time-consuming procedures. Compared with conventional quadrupole ICP-MS, triple quadrupole ICP-QQQ with MS/MS operation offers the capability to analyse Eu_2O_3 directly with accurately measure Tm^+ at low concentrations. The background equivalent concentration(BEC) of Tm in 500 ppm Eu_2O_3 is 2.1ppt determined with 8900 ICP-QQQ using NH_3 on-mass mode, while the BEC is 64.8ppb with ICP-SQ using no gas mode. The BEC was reduced by four orders of magnitude using ICP-QQQ, demonstrating the capability for direct analysis of ppt or sub-ppt level impurities of Eu_2O_3 .