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Determination of Ir and Ta in hafnium matrix samples using ICP-QQQ

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Hafnium (Hf) is rare in the Earth's crust, hafnium metal and chemical derivatives of hafnium can be used in aerospace, defense industry and semiconductors, etc. High-purity hafnium is listed as a key metal by many countries, especially high-purity hafnium with purity greater than 99.99%. So the accurate content of impurities in hafnium is a greater concern. ICP-QMS is often used to analyze impurity elements in high-purity metals, but there are greater difficulties in analyzing high-purity hafnium, because Hf and oxygen reaction is more active, such as $^{177}Hf^{16}O^{+}$ and $^{174}Hf^{16}OH^{+}$ will interfere with 191Ir and 193Ir, and ^{180}Hf and $^{179}HfH+$ trailing on the ^{181}Ta. ICP-QQQ has variety reaction gases to effectively and reliably eliminate multi-atomic interferences through controlled chemical reactions in the collision/reaction cell. ICP-QQQ also has ultra-high abundance sensitivity to solve the tailing problem. We made and tested a 500 ppm hafnium solution with high-purity hafnium, the concentrations of Ta using the mass shift mode of ICP-QQQ and Ir using the in on mass mode use oxygen as cell gas were 1 and 0.001 ppb. Respectively, which were nearly 10-fold or more lower than those of ICP-QMS, proving that the interference caused by the hafnium matrix on the impurity elements Ta and Ir can be effectively removed using ICP-QQQ. In addition, the spiked recoveries of the tests were in the range of 90-110%.