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Iron in low resolution? Removing molecular interferences with the *Neoma MS/MS* MC-ICP-MS.

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Measuring the isotopic composition of iron, especially the isotope ratios $^{56}Fe/^{54}Fe$ and $^{57}Fe/^{54}Fe$, is a frequent and longstanding application for MC-ICP-MS instrumentation. The presence of common molecular interferences, including $^{40}Ar^{16}O^+$ and $^{40}Ar^{14}N^+$, has made high mass resolving power (≥6,000 *ΔM/M*) a requirement to measure Fe isotope ratios [1]. However, high mass resolving power cuts ion transmission, increasing the sample size required to achieve high isotope ratio precision.

The re-introduction of MC-ICP-MS containing collision/reactions cells has opened the possibility of measuring Fe isotope ratios in low resolution. Wang *et al.* used H_2 and He gas in a collision/reaction cell to eliminate argon-based interferences on Fe and measure high precision $^{56}Fe/^{54}Fe$ in low resolution [2]. The Thermo Scientific™ Neoma MS/MS™ MC-ICP-MS includes the patented combination of a MC-ICP-MS with collision/reaction cell and pre-cell mass filter [3,4]. The groundbreaking and novel pre-cell mass filter, for fidelity of mass bias, has been described in Craig *et al.* [5]. Here we report experiments measuring $^{56}Fe/^{54}Fe$ and $^{57}Fe/^{54}Fe$ in low resolution using O_2 in the collision reaction cell. Using the pre-cell mass filter to prevent $^{40}Ar^+$ and $^{40}Ar^1H^+$ from entering the collision/reaction cell was necessary to allow O_2 to break up the Ar-based molecular interferences without adversely affecting Fe transmission: at the same time as enhancing Fe sensitivity. As a result, both $^{56}Fe/^{54}Fe$ and $^{57}Fe/^{54}Fe$ could be successfully measured free of molecular interferences in low resolution. The resulting method was applied to a selection of Fe samples, with long-term stability of $\delta^{56}Fe_{IRMM\text{-}014}$ and $\delta^{57}Fe_{IRMM\text{-}014}$ better than ± 0.02 ‰ (1SD) and 0.03 ‰ (1SD) respectively.

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