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Characterization of MC-MICAP-MS for Zinc Isotope Abundance Ratio Measurements

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Zinc isotope abundance ratios are used as tracers in biological, environmental, and geological processes. The ability to precisely measure zinc isotopes is crucial in impactfully serving these applications. However, measurements of zinc isotope abundance ratios made with conventional multiple collector inductively coupled plasma mass spectrometers (MC-ICP-MS) suffer from Ar-based polyatomic interferences. This limits measurement precision. Specifically, zinc isotope measurements made with traditional MC-ICP-MS are hindered by spectral interferences and matrix effects from argides such as $NaAr^+$, $MgAr^+$ and $AlAr^+$. Precision measurements of copper, the dominant element used for zinc normalization, are also limited by polyatomic spectral interferences formed from Ar-based plasmas, such as $NaAr^+$. The newly introduced MC-MICAP-MS[1] replaces the traditional ICP ion source with a N-based microwave inductively coupled atmospheric plasma (MICAP) ion source, eliminating Ar-based interference formation within the ion source. Here, I will explore the power of MC-MICAP-MS as an alternative for precise zinc isotope abundance ratio measurements through comparison of its spectral interference and matrix element tolerance with that of conventional MC-ICP-MS. Matrix elements of interest presented here include Na, Mg, Al, and K.

Due to the difference in plasma between MC-ICP-MS and MC-MICAP-MS, it is crucial to investigate if there are fractionation difference between the two instruments. This poster will present a robust investigation into the fractionation behaviour of MC-MICAP-MS through a case study of zinc isotope fractionation. The suitability of three fractionation correction strategies for zinc fractionation in MC-MICAP-MS will be explored: standard-sample bracketing, combined standard-sample bracketing using copper for internal normalization, and the linear regression approach.

1.Retzmann, A., Menon, A., Wieser, M.E., Introducing MC-MICAP-MS: using a N_2-based plasma ion source for Sr isotope abundance ratio measurements. *J. Anal. At. Spectrom.* 40.