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High Mass Resolution Laser Ablation Al-Mg Measurements with Resolved Doubly-Charged ^{48}Ca Interference

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The Al-Mg isotopic system is particularly vital for deciphering processes occurring during the early Solar System [e.g. 1], including (1) the use of the short-lived ($t_{1/2}$ = 0.7 Ma) Al-Mg chronometer, and (2) measuring mass dependent Mg isotopic variations to elucidate processes like condensation and evaporation in the Solar Nebula. While *in-situ* measurements via Laser Ablation Multi Collector Inductively Coupled Plasma Mass Spectrometry (LA-MC-ICPMS) provide an excellent opportunity for coordinated chronology and stable isotope analyses at improved spatial resolutions, the method is also hindered by isobaric interferences ($^{48}Ti^{2+}$ and $^{48}Ca^{2+}$ on $^{24}Mg^{+}$, in addition to $^{52}Cr^{2+}$ and $^{12}C^{14}N^{+}$ on $^{26}Mg^{+}$). The $^{48}Ca^{2+}$ interference on $^{24}Mg^{+}$ is particularly troublesome for plagioclase and other high-Ca/low-Mg mineral phases that define the high Al/Mg data of isochrons used for early Solar System chronology.

We present the first *in-situ* Mg-Al isotopic measurements using the dual path Nu Instruments^{TM} SP1700 MC-ICPMS coupled to the Applied Spectra^{TM} iX-fs-Tandem LA-LIBS instrument. The instrumental setup offers the potential use of a collision/reaction cell (low energy path) for additional interference removal, though the focus here is its high mass resolution for the standard high-energy LA-MC-ICPMS operation. The laser ablation analyses are conducted in medium mass resolution, with the combination of source and collector slits producing an RP>9500 at 20% transmission, to eliminate isobaric interferences.

Several commonly used terrestrial standards (e.g., USGS basalts & San Carlos Olivine) were analyzed, as well as plagioclase separates from the ancient achondrite Asuka 881394. Using the high energy path and medium mass resolution of the SP1700 MC-ICPMS, we confirm the previously reported [2] ^{26}Mg excesses (>2.5 %) in plagioclase. The analyses demonstrate the current capability of the Nu SP1700 MC-ICPMS for resolving the $^{48}Ca^{2+}$ interference on $^{24}Mg+$ and producing accurate results for high-Ca/low-Mg phases via *in-situ* LA-MC-ICPMS.

[1] Simon & Young (2011) *Earth Planet Sc. Lett.* **304**, 468-482. [2] Wimpenny et al. (2018) *Geochim. Cosmochim. Acta* **244**, 478-501.