# Identifying FUN inclusions with LA-MC-ICPMS Mg isotopic analysis

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A small group of CAIs exhibit some fractionated and unknown nuclear (FUN) isotopic effects, e.g., O, Mg, Si, Ca, and Ti, and are called FUN inclusions. These FUN CAIs are characterized by large mass-dependent fractionation effects in Mg, Si, and O, and a few ‰ of mass-independent isotopic anomalies in elements such as Ca, Ti, Cr, Sr, Ba, Nd, and Sm. Despite their discovery for more than 40 years, the origin and formation of the FUN CAIs remain poorly constrained, e.g., the large isotopic anomalies and relatively low abundance of $^{26}$Al, due largely to identical physical and textual appearance from normal CAI, and are thus difficult to identify potential FUN inclusions. In order to better identify and, subsequently, constrain the nature and origin of FUN CAIs, we have set up *in situ* LA-MC-ICPMS Mg isotopic analysis for CAI in thick meteorite slab, to quickly search for CAIs deficient in $^{26}$Mg, a common characteristic of FUN CAIs. Subsequently, CAIs with abnormal Mg isotopes will be extracted and prepared for NanoSIMS study, e.g., O, Mg, and/or Si, and for further solution-based MC-ICPMS study. Approximately ~1mm thick sections of Allende and DAG192 (CO3) were prepared and subjected to *in situ* laser ablation MC-ICPMS, a 193nm Analyte G2 excimer laser coupled with a Nu-Plasma II, Mg isotopic analysis at IES. The spot size was 50 μm with 50 sec ablation time. San Calos ol, opx, and cpx and two glass standards BCR-2G and BIR-1G were studied and the results were comparable to published data, while San Calos opx was used as the main standard during the experiments. Preliminary results showed that while the Mg isotopes for majority of the CAIs from both Allende and DAG192 exhibited normal to positive $^{26}$Mg, due to the decay of $^{26}$Al, two CAIs from Allende showed resolvable $^{26}$Mg deficits of -1 to -1.5‰, and 0 to -0.5‰, respectively. With a typical 2-sigma SD of 0.33‰ for our Mg isotopic analysis, the first CAI showed clearly resolvable $^{26}$Mg deficit from both sides of the thick sections, while questionable for the second CAI. Currently, we are in the process of extracting both CAIs from the thick slabs, and making preparations for SEM and NanoSIMS O isotopic analysis, and the results will be presented during the 2018 Goldschmidt Conference.