^{26}Al-^{26}Mg SYSTEMATICS OF ALLENDE AOAs.

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Amoeboid Olivine Aggregates (AOAs) are irregularly shaped mm to cm sized refractory objects present in most carbonaceous chondrite groups. AOAs are believed to have formed in an ^{16}O-rich gaseous reservoir as aggregates of high temperature nebular condensates consisting of forsterite, Fe-Ni metal and a refractory Ca-Al-rich component, and have escaped extensive melting [1]. Recent work on the Ti isotope composition of early solar system solids, asteroids and planets [2] indicates that AOAs and CAIs have identical ^{50}Ti excesses, suggesting a genetic link between these two types of refractory materials. Thus, similarly to CAIs, AOAs can provide information regarding the earliest evolution of the solar protoplanetary disk. Moreover, available ^{26}Al-^{26}Mg data for AOAs obtained by in situ methods (SIMS) suggests that these solids formed with an initial ^{26}Al/^{27}Al value of ~5×10^{-5} [3], consistent with the canonical abundance of ^{26}Al in the early solar system.

Here, we report the preliminary results of a study aimed at characterizing the petrology and ^{26}Al-^{26}Mg systematics of a number of AOAs from the Allende CV chondrite, in order to better understand the duration of the AOA-forming event and its relationship to the CAI-forming event. AOAs were selected from polished slabs of the Allende meteorite and, following petrographic characterization, sampled by means of micro-drilling. Following Mg purification by ion exchange chromatography, the Mg isotope composition and Al/Mg ratios were determined by high-resolution multiple collection plasma source mass spectrometry. Novel analytical protocols allow for measurements of μ^{26}Mg* (per 10^6 deviation from terrestrial ^{26}Mg- /^{24}Mg) and Al/Mg ratios in silicate materials to higher precision than previously possible, namely with an external reproducibility and accuracy of 2.5 ppm and 0.2%, respectively.

Four AOAs with ^{27}Al/^{24}Mg ratios ranging from 0.115 to 0.874 define a line in μ^{26}Mg* vs. ^{27}Al/^{24}Mg space with a slope corresponding to an initial ^{26}Al/^{27}Al of $(5.0 \pm 0.3) \times 10^{-5}$, and an intercept of -6.5 ± 8.0 ppm. The uncertainty of the slope defined by the Allende AOAs sampled so far, corresponds to an age uncertainty of ~60,000 years, thereby supporting a short duration for the AOA-forming event. In contrast to recent high-precision ^{26}Al-^{26}Mg data for Efremovka AOAs and CAIs [4], the Allende AOAs do not define a statistically significant isochron (MSWD=4.5), indicating a more severe disturbance of the ^{26}Al-^{26}Mg systematics in Allende inclusions as compared to Efremovka. However, similarly to Efremovka AOAs, the regression of the Allende AOAs intercepts the solar ^{27}Al/^{24}Mg ratio of 0.1 at a μ^{26}Mg* value of 29 ± 8 ppm, that is, significantly higher than the terrestrial μ^{26}Mg*. This observation may be interpreted as reflecting a higher abundance of ^{26}Al in the CAI-AOA forming reservoir compared to Earth's precursor material, implying a heterogeneous distribution of ^{26}Al in the solar protoplanetary disk and, a more complicated significance of ^{26}Al-^{26}Mg data, as an extra variable needs to be constrained[4].

References: [1] Komatsu, M. *et al.* 2001. MAPS 36: 629-641. [2] Trinquier, A. *et al.* 2009. Science 64:185-239. [3] Sugiura, N. and Krot, A.N. 2007. MAPS 42: 1183-1195. [4] Larsen, K. *et al.* 2010. GCA, this meeting.