AL-MG SYSTEMATICS IN A CAI FROM THE NWA 6991 CV3 CHONDRITE.

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Introduction: Since the recent work demonstrating $^{238}U/^{235}U$ variations in calcium-aluminum-rich inclusions (CAIs) [1], there have only been a few studies where Pb-Pb ages have been reported for CAIs for which the U isotope compositions were also measured [2-4]. These ages range from 4567.2±0.5 Ma and 4567.3±0.2 Ma for CAIs from Allende [2] and Efremovka [4], respectively, to 4567.9±0.3 Ma for a CAI from Northwest Africa (NWA) 6991 [3]. Thus far, Al-Mg systematics have not been reported for any of these CAIs to determine if there is concordance between the Pb-Pb and Al-Mg chronometers. Here we report Al-Mg isotope systematics of the NWA 6991 CAI for which we previously reported U and Pb isotope data [3].

Analytical Methods: A polished section was prepared from a fragment of the coarse-grained CAI (B4) from NWA 6991, a CV3 chondrite with low shock and weathering grades [5]. This section was documented using a JEOL 8800 scanning electron microscope at ASU. Magnesium isotopes and Al/Mg ratios were measured with a Thermo-Finnigan Neptune MC-ICPMS instrument and a Photon Machines excimer laser ablation system at ASU using methods similar to those described in [6]. Analyses were conducted in medium resolution mode. Individual measurements typically consisted of 40 integration cycles, each of 8.4 sec duration. The laser spot size was typically ~50-75 µm, and signal intensity for ^{24}Mg ranged from 0.5 to 3.0×10^{-11} A. All measurements employed sample-standard bracketing, using isotopically well-characterized synthetic glasses from evaporation experiments having CAI-like compositions [7]. Based on repeated measurements of these glasses, typical external reproducibilities (2σ) for $^{27}Al/^{24}Mg$ ratios and $\delta^{26}Mg^*$ are ±5% and ±0.15‰, respectively.

Results and Discussion: We made ~65 spot analyses on NWA 6991 CAI B4, with $^{27}Al/^{24}Mg$ ratios ranging from ~3 to ~17. The $\delta^{26}Mg^*$ values (calculated assuming a $\beta = 0.514$, as recommended by [8] for CAI compositions) for these analyses ranged from ~0.9 to ~5.9. These data yield an initial $^{26}Al/^{27}Al$ ratio of $(5.5 \pm 0.3) \times 10^{-5}$ for this CAI, for which we previously obtained an internal Pb-Pb isochron age (determined using its measured U isotope composition) of 4567.9±0.3 Ma [3]. This initial $^{26}Al/^{27}Al$ ratio is in agreement with the canonical value obtained for other CAIs (e.g., [9,10], suggesting that the Al-Mg systematics in this object are undisturbed. Additional Al-Mg investigations of other CAIs for which U and Pb isotope systematics are also determined will be required to assess the concordance of these two chronometers.

References: [1] Brennecka G. et al. 2010. *Science* 327: 449-451. [2] Amelin et al. 2010. EPSL 300: 343-350. [3] Bouvier A. et al. 2011. Abstract #9054. *Workshop on Formation of the First Solar System Solids*. [4] Connelly et al. 2012. *Science* 338: 651-655. [5] Meteoritical Bulletin 100, MAPS 46. [6] Janney P. E. et al. 2011. *Chemical Geology* 281: 26-40. [7] Richter F. M. et al. 2007. *GCA* 71: 5544-5564. [8] Davis A. M. et al. 2005. Abstract #2334. *36th LPSC*. [9] Jacobsen B. et al. 2008. *EPSL* 272: 353-364. [10] MacPherson G. J. et al. 2010. *ApJL* 711: L117-L121.