THE VIGARANO CAI REFERENCE SUITE, II. HIGH-PRECISION AL-MG ISOTOPIC STUDIES. G. J. MacPherson[1] , N. T. Kita[2], E. S. Bullock[3], T. Ushikubo[2], A. M. Davis[3,4]. [1]US National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA 20560. E-mail: macphers@si.edu. [2]Wisc-SIMS, Univ. of Wisconsin/Madison, Madison, WI 53706. [3]Dept. of the Geophysical Sciences, Univ. of Chicago, Chicago, IL 60637, USA. [4]Enrico Fermi Institute, Univ. of Chicago, Chicago, IL 60637, USA.

Introduction: Vigarano (CV3) CAIs have far less secondary alteration than do Allende CAIs, and have not experienced the intense (presumably shock-induced) flattening observed in Efremovka and Leoville. Thus they may be the most pristine representatives of CV3 CAIs. Preliminary Mg isotope data are given here for high-Al/Mg phases in 4 Vigarano CAIs extracted as part of the CAI Reference Suite Project [1] – one fluffy Type A (FTA), one amoeboid olivine aggregate (AOA), and 2 Type B2s.

Samples and Techniques: Vigarano 3138-F1 and -F2 are Type B2, both showing minimal secondary alteration except for minor nepheline within anorthite. Inclusion 3138-F5 is an exceptionally unaltered AOA, consisting of unzoned forsteritic olivine ($Fo_{97–100}$), numerous small nodules of spinel that are rimmed by pyroxene, and a 350 µm diameter spherule consisting entirely of melilite ($Åk_{5–15}$) and spinel, with a thin outer pyroxene rim. Inclusion 3138-F8 is an unaltered FTA that contains abundant melilite ($Åk_{0–17}$) and hibonite, with lesser spinel. The Cameca IMS-1280 ion microprobe at the Univ. of Wisconsin was used for Al-Mg isotope analyses in EM-monocollection mode for high (5–1000) Al/Mg phases using a 5µm-diameter primary $^{16}O^-$ beam.

Results: Analyses of Al-rich melilite in the AOA and melilite+hibonite in the FTA yielded undisturbed isochrons corresponding to initial $^{26}Al/^{27}Al$ ratios of $(5.5\pm0.4)\times10^{-5}$ (AOA) and $(5.3\pm0.3)\times10^{-5}$ (FTA), both close to the assumed canonical value of 5×10^{-5} [2] and the recently determined "whole-CAI" isochron [3] value of 5.2×10^{-5}. Melilite in both Type B2s yielded reasonably well-defined isochrons of $\sim5\times10^{-5}$, although with relatively large uncertainties. The Al-Mg system in anorthite in these Type B2s has been almost completely reset by some later event. Anorthite in 3138-F1 retains ^{26}Mg excesses that do not correlate positively with Al/Mg, and no resolvable ^{26}Mg excesses were found anorthite in 3138-F2.

Discussion: The two primitive CAIs (FTA, AOA) have initial $^{26}Al/^{27}Al$ ratios consistent with the recently updated "canonical" ratio of 5.2×10^{-5}. The behavior of the Al-Mg system in the two Type B2s is quite different from that in Allende: the CAIs in the latter seem to have experienced near-closed-system partial isotopic exchange between high- and low-Al/Mg phases [e.g. 4], but the resetting of the Al-Mg system in anorthite in the two Vigarano Type B2s may be the result of fluid-controlled isotopic exchange.

References: [1] Bullock E. S. & MacPherson G. J 2008. *Meteoritics & Planetary Science* 43:A29. *[2]* MacPherson G. J., Davis A. M. & Zinner E. K. 1995. *Meteoritics & Planetary Science* 30:365–386. [3] Jacobsen B. et al. 2008. *Earth and Planetary Science Letters* 272:353–364. [4] Podosek F. A. et al. 1991. *Geochimica et Cosmochimica Acta* 55:1083–1110.