

($^{207}\text{Pb}/^{206}\text{Pb}$)* ID-TIMS AGES OF NWA801 CHONDRULES AND MOKOIA CAIS BY A PROGRESSIVE STEPWISE DISSOLUTION

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Introduction: Episodes and intervals of solid-object formation in the early solar nebula can be delineated by precise and accurate Pb/Pb ages from carbonaceous chondrites. Here we have experimented with a ‘progressive stepwise dissolution’ of CAIs from the CV chondrite Mokoia, and with chondrules from the CR2 chondrite NWA801, for the purpose of obtaining $^{207}\text{Pb}/^{206}\text{Pb}$ age information from the corresponding radiogenic leaches.

Samples & Method: The CR2 chondrite NWA801 (Royal Ontario Museum, loan #LM53334) contains large (1-2 mm or larger) ~Fo-90 olivine chondrules, typically armoured by either single or multiple Fe-Ni rims. In some cases, single rims are observed only within the interior olivine. The CV chondrite Mokoia (NHM, London, loan #BM1910,729) contains large (1-3 mm or larger) CAIs dispersed throughout the friable fine-grained matrix. Both samples (1-3 g) were subjected to an automated freeze-thaw disaggregation to liberate the respective CAIs and chondrules from each meteorite. Following an extensive washing to remove surficial Pb, chondrule and CAI samples were subjected to 9 progressively stronger acid leaches/dissolutions in clean Savillex capsules (beginning with HBr and ending with HF/HNO₃). This was done to extract different Pb components of increasing radiogenicity, thereby defining an isochron. Lead was isolated and purified from each of the 9 leaches using AG1X8 resin (two passes in HCl) in 0.1 mL Teflon columns with a 205Pb-235U spike. After loading by the standard Si-gel/H₃PO₄ method [1] on rhenium filaments, data was acquired on a VG-354 TIMS in either Daly or multi-dynamic-Faraday modes above 1380C. Typically the final ratios were averages of several measurements of 20 ratios/block. Fractionation, blank and spike-corrections were performed using ‘UTilAge’; regressions were done via ‘IsoPlot’.

Results: Weighted regressions through the leaches for three chondrule fractions (12.6, 31.5 and 35.7 mg) showed identical ages within error. A regression through the nine most radiogenic HF leaches of these three NWA801 chondrule fractions yielded a $^{207}\text{Pb}/^{206}\text{Pb}$ age of 4564.6 ± 1.0 Ma (95% confidence, MSWD=1.3) assuming the lead is a mixture between blank and primordial Canyon Diablo Troilite Pb. This shows the usefulness of obtaining lead isotope ages data using a progressive stepwise dissolution technique, which provides a large spread in Pb-Pb space.

Discussion: Our age for NWA801 chondrules is identical to the $^{207}\text{Pb}/^{206}\text{Pb}$ age of chondrules in the CR2 chondrite Acfer 059 (4564.7 ± 0.6 Ma [2]) whereas chondrules from CB chondrites are ~2 Myr younger, and those from Allende (CV3) are at most ~2 Myr older. This suggests that all chondrules in CR2 chondrites formed as a result of the same nebular event. However the complex multi-rimmed textures of the chondrules in NWA801 suggest that multiple and as yet unresolved processes were involved during their formation. Lead leach results for Mokoia CAIs, and a comparison of ages between Mokoia CAIs and NWA801 chondrules, will be discussed at the meeting.

References: [1] Gerstenberger, H., Haase, G. 1997. *Chemical Geology* 136:309–312. [2] Amelin, Y., Krot, A.N., Hutcheon, I.D., Ulyanov, A.A. 2002. *Science* 297:1678-1683.