

**U-Pb DATING OF THE ALLENDE CAI A63 1-C-1.** Q.-Z. Yin<sup>1</sup>, Y. Amelin<sup>2</sup>, P. Koefoed<sup>2</sup>, M. H. Huyskens<sup>1</sup>, M. E. Sanborn<sup>1</sup>, K. Yamashita<sup>3</sup>.<sup>1</sup>Earth and Planetary Sciences, University of California, Davis, One Shields Avenue, Davis, CA 95616 USA. E-mail: qyin@ucdavis.edu. <sup>2</sup>Research School of Earth Sciences, The Australian National University. <sup>3</sup> Graduate School of Natural Science and Technology, Okayama University.

**Introduction:** In order to establish the evolutionary history of the early solar system, precise and accurate geochronology is required, including absolute as well as relative chronometers. This is essential to determine the duration and timing of calcium-aluminum-rich inclusions (CAIs) and chondrule formation. To this date, there are only four high-precision U-Pb ages reported for CAIs that are calculated based on measured  $^{238}\text{U}/^{235}\text{U}$  ratios [1, 2]. These four ages do agree within error and suggest a narrow time interval for the formation of CAIs consistent with uniform  $^{26}\text{Al}/^{27}\text{Al}$  also found in these inclusions. Here we investigate a new spherical CAI recently identified in the CV3 chondrite Allende to further investigate the timing of CAI formation.

**Materials and Methods:** The sample investigated in this study is the CAI A63 1-c-1 from Allende. This CAI is composed of the minerals melilite, spinel, Al-Ti-rich augite, and anorthite. Four different fractions were separated and hand picked based on grain size and color. These fractions were subjected to a series of leaching steps to remove components with variable radiogenic Pb content and create an adequate spread in  $^{207}\text{Pb}/^{206}\text{Pb}$ - $^{204}\text{Pb}/^{206}\text{Pb}$  space [3]. These steps included 0.5 M  $\text{HNO}_3$ , 7 M  $\text{HNO}_3$ , 6 M  $\text{HCl}$ , 0.2 M  $\text{HF}$  and 1 M  $\text{HF}$  followed by complete dissolution in conc.  $\text{HF}+\text{HNO}_3$ . All fractions were spiked with a  $^{202}\text{Pb}$ - $^{205}\text{Pb}$ - $^{233}\text{U}$ - $^{236}\text{U}$  spike and U and Pb were separated in an HBr based anion exchange chemistry followed by a UTEVA separation for U isotope dilution measurement. The Pb isotopic composition was measured on a modified MAT 261 thermal ionization mass spectrometer at the Australian National University and U isotope dilution measurements were performed on a Neptune Plus multi-collector inductively coupled plasma mass spectrometer at the University of California, Davis.

**Results and Discussion:** The leaching steps removed increasingly radiogenic Pb from the samples with the most radiogenic fraction being removed in the first step involving HF (wash 3). The first wash is influenced by terrestrial contamination and is excluded. The washes 2 to 4 of all fractions do define a precise isochron age of  $4568.24 \pm 0.29$  Ma (MSWD=0.51, n=12, no rejection of any data points) assuming  $^{238}\text{U}/^{235}\text{U}=137.786$  [2, 3]. The date is subject to change pending final U isotopic composition measured in the same sample. The Pb isotopic ratios for the residues fall below this line. This has been observed before and was interpreted in different ways. [3] suggested that a phase with terrestrial non-radiogenic Pb was stable until complete dissolution, whereas [1,4] suggest that this effect is due to leaching induced isotopic fractionation. The U isotopic determination are underway, which are critical to determine an accurate date [5].

**References:** [1] Amelin Y. et al. 2010. *EPSL*. 300:343-350. [2] Connelly J.N. et al. 2012. *Science* 335: 651-655. [3] Brennecka G.A. et al. 2010. *Science* 327:449-451. [4] Connelly J.N. & Bizzarro M. 2009. *Chemical Geology*. 259:143-151. [5] Koefoed P. et al. 2015. Abstract #1842. 46<sup>th</sup> LPSC.