

^{53}Mn - ^{53}Cr AGE OF A HIGHLY-EVOLVED, IGNEOUS LITHOLOGY IN POLYMICT UREILITE DaG 165.

¹C.A. Goodrich, ²I.D. Hutcheon and ¹K. Keil. ¹HIGP, University of Hawaii at Manoa, Honolulu HI 96822, USA (cyrena@higp.hawaii.edu). ²Lawrence Livermore National Laboratory, Livermore CA 94551, USA (hutcheon1@llnl.gov).

Introduction: Ureilites have old but imprecisely determined igneous ages [1,2]. We present new data for ^{53}Mn - ^{53}Cr systematics of a feldspathic igneous clast in the polymict ureilite DaG 165, providing a well-defined crystallization age similar to the oldest eucrites [3].

Petrology: DaG 165 clast-19 is an ~450 μm -size fragment consisting of (i) glass rich in FeO (molar Fe/Mg ~15-20), P_2O_5 (~2 wt.%), K_2O (~3%) and TiO_2 (1-2%), containing needles of ilmenite flanked by dendritic silica and (ii) three subhedral crystals of pigeonite (mg 44-38, Wo 13-20). Clast-19 appears to be a sample of mesostasis from a highly-fractionated igneous lithology (albitic plagioclase + FeO-rich pigeonite + phosphates + ilmenite + silica + glassy mesostasis) represented by a population of clasts in polymict ureilites DaG 165 and DaG 319 [4-6]. Oxygen isotope data (N. Kita, personal communication) for one clast of this group [6] are consistent with derivation from the ureilite parent body.

^{53}Mn - ^{53}Cr Systematics: Glass in clast-19 is Mn-rich, consistent with high FeO, and virtually Cr-free (possibly because Cr is sequestered in ilmenite). SIMS analyses reveal large enrichments in ^{53}Cr of up to 1500‰, linearly correlated with Mn/Cr. Data from glass and pyroxene define a linear correlation on a ^{53}Mn - ^{52}Cr evolution diagram (Fig. 1) with slope $(^{53}\text{Mn}/^{55}\text{Mn})_0 = (2.91 \pm 0.19) \times 10^{-6}$. Data from phosphates in related clasts-9 and -20 also lie on this line, albeit with large uncertainties.

Discussion: The ^{53}Mn - ^{53}Cr systematics indicate clast-19 formed 4.5 ± 0.4 Ma prior to the angrites and essentially contemporaneously with the oldest eucrites [3]. The absolute age of 4562.3 ± 0.4 Ma, calculated relative to angrites, records the time of late igneous activity on the ureilite parent body and sets a lower limit to the onset of melting on the ureilite parent body.

References: [1] Goodrich C.A. et al. (1991) *GCA* **55**, 829. [2] Torigoye-Kita N. et al. (1995) *GCA* **59**, 2319. [3] Lugmair G.W. & Shukolyukov A. (1998) *GCA* **62**, 2863. [4] Goodrich C.A. & Keil K. (2002) *LPS* **33**, #1777. [5] Goodrich C.A. & Cohen B. (2002), this vol. [6] Ikeda Y. et al. (2000) *Antarc. Meteorite Res.* **13**, 177.

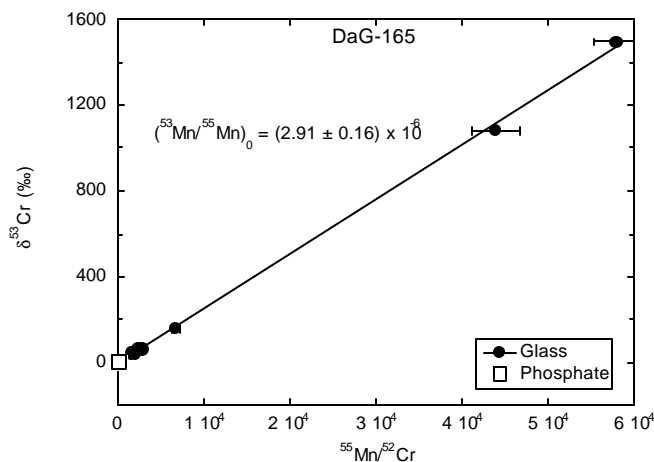


Fig. 1. ^{53}Mn - ^{53}Cr systematics for igneous clasts in ureilite DaG 165.