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Excess ^{176}Hf in differentiated meteorites not caused by irradiation

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The long-lived ^{176}Lu - ^{176}Hf decay system is a potentially precise chronometer, but when applied to meteorites, it often yields dates up to 300 Myr older than Pb-Pb. Irradiation by gamma rays [1] or cosmic rays [2] has been suggested as the reason for this discrepancy, because it accelerates ^{176}Lu decay and rotates isochrons around their initial $^{176}\text{Hf}/^{177}\text{Hf}$.

However, internal Lu-Hf isochrons [3, 4] show a negative correlation between high apparent ages and low initial $^{176}\text{Hf}/^{177}\text{Hf}$ values that cannot be explained by irradiation. Another mechanism is required, that can also explain the observed scatter on internal isochrons of eucrites [4] and angrites [5]. Hot desert finds are often affected by terrestrial weathering [6]. We are currently developing new mineral separation and digestion methods to avoid weathered portions of a sample.

[1] Albarède, F. et al. (2006) GCA 70, 1261-1270. [2] Thrane, K. et al. (2010) Astrophys J 717, 861-867. [3] Bizzarro, M. et al. (2012) G³ 13, 10.1029/2011GC004003. [4] Bast, R. et al. (2012) LPSC, abstract 2542. [5] Bast, R. et al. (2013) Min Mag 77(5), 665. [6] Crozaz, G. et al. (2003) GCA 67, 4727-4741.

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Cite abstract as:

Bast, R., Scherer, E.E., Sprung, P., Fischer-Gödde, M., et al. (2013) Excess ^{176}Hf in differentiated meteorites not caused by irradiation. Paneth Kolloquium, Nördlingen (Germany), abstract URL: <http://www.paneth.eu/PanethKolloquium/2013/0009.pdf> (abstract #0009).