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The Hf-W chronology of FUN CAIs

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Refractory inclusions (CAIs) represent the oldest solar system solids and provide information on the formation of the Sun and its protoplanetary disk. CAIs carry evidence of short-lived radioisotopes (e.g. ^{26}Al and ^{182}Hf) produced in stars and added to the protosolar cloud before or during its collapse. Whereas most CAIs formed with a canonical ^{26}Al/^{27}Al of ~5×10^{-5}, rare CAIs (FUN CAIs) record nucleosynthetic isotopic heterogeneity and ^{26}Al/^{27}Al $<5\times10^{-6}$, possibly reflecting their formation before canonical CAIs. Thus, FUN CAIs may offer a unique time-window into the earliest solar system and the origin of short-lived radioisotopes. However, their chronology is unknown. We show that a FUN CAI with a condensation origin from a solar gas formed coevally with canonical CAIs, but with ^{26}Al/^{27}Al of ~3×10^{-6}. Admixing of stellar-derived ^{26}Al to the disk occurred during the epoch of CAI-formation and, therefore, the ^{26}Al-^{26}Mg systematics of CAIs cannot define their formation interval. In contrast, our results support ^{182}Hf homogeneity and chronological significance of the ^{182}Hf-^{182}W clock.

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