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Neutron capture on Pt isotopes in iron meteorites and the Hf-W chronology of core formation in planetesimals

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The short-lived ^{182}Hf-^{182}W system can provide powerful constraints on the timescales of planetary core formation, but its application to iron meteorites is hampered by neutron capture reactions on W isotopes resulting from exposure to cosmic rays. Here we show that Pt isotope variations in magmatic iron meteorites result from capture of (epi)thermal neutrons and are correlated with variations in ^{182}W/^{184}W. This makes Pt isotopes a sensitive neutron dosimeter for correcting cosmic ray-induced W isotope shifts. The pre-exposure ^{182}W/^{184}W derived from the Pt-W isotope correlations of the IID, IVA and IVB iron meteorites are higher than previous estimates and are more radiogenic than the initial ^{182}W/^{184}W of Ca,Al-rich inclusions (CAI). The Hf-W model ages for core formation range from +1.6±1.0 Myr (for the IVA irons) to +2.7±1.3 Myr after CAI formation (for the IID irons), indicating that there was a time gap of at least ~1 Myr between CAI formation and metal segregation in the parent bodies of at least some iron meteorites.

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