Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.19984

The platinum stable isotope signature of the Earth's mantle

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Platinum is a refractory and highly siderophile element (HSE) which displays chalcophile behaviour [1]. Along with the other HSEs, Pt is depleted in the Earth's mantle and mostly resides in the core. The geochemistry of HSEs [2] is widely applied to investigate key events during the early Earth including core formation, late accretion [3] and the exsolution of an Fe-S rich liquid, termed the 'Hadean matte' [4]. More recently, non-traditional stable isotopes have shown the ability to trace these events. An analytical method for determining the Pt stable isotope composition of natural samples has been developed [5], and the use of Pt stable isotopes to trace early Earth processes has been investigated [6]. These samples, ranging from terrestrial magmatic samples, chondrites and iron meteorites presented variable $^{198/194}$Pt signatures and were assessed as tracers of core formation processes and the accretion of late chondritic materials [6].

We have refined the chromatographic separation of Pt in natural samples and developed a double-spike analytical protocols for the analysis of ^{198}Pt composition using by MC-ICP-MS for sample loads of <60 ng of natural Pt with a precision of <0.2 ‰ (2 S.D.). We will present new Pt isotope data on a range of samples formed from a high degree of mantle partial melting to characterize the Pt stable isotope signature of the mantle. We will use this data to evaluate whether the observed Pt isotope signature is consistent with core formation and accretion processes [6] or whether an event such as the 'Hadean matte' is also required [7].

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