THE EFFECT OF COSMIC RAY IRRADIATION ON PLATINUM ISOTOPES IN IRON METEORITES.

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Introduction: Platinum has six naturally occurring isotopes (^{190}Pt, ^{192}Pt, ^{194}Pt. ^{195}Pt, ^{196}Pt and ^{198}Pt), and is proposed to be a useful neutron dosimeter as a result of the burnout of ^{195}Pt on to ^{196}Pt [1]. Additionally, neutron-capture by ^{191}Ir can result in the production of ^{192}Pt [1]. Therefore, depending on the Ir/Pt ratio of the sample, as well as shielding and exposure age, it is possible to produce large ^{192}Pt excesses. This relationship is demonstrated for several iron meteorite groups, including the IVA and IVB irons [2, 3, 4], and shows that Pt isotopes are a powerful tool for correcting the effects of galactic cosmic ray (GCR) irradiation in short-lived chronometers such as the ^{182}Hf-^{182}W system [2, 3, 4].

In this study we aim to collect Pt and Pd isotopes from the same sample aliquot in order to assess the effects of neutron-capture in various iron meteorite groups. We present new data for the IVA and IVB iron meteorites. Palladium data are presented in a companion abstract at this meeting [5].

Methods and Discussion: All samples were free of fusion crust and weathered edges, and were leached in 1 M HCl before dissolution in aqua regia. Palladium and Pt were separated using anion exchange resin following a procedure adapted from [6]. A second ion exchange column was developed for further purification and removal of Ir, which causes tailing effects onto Pt isotopes during measurement by MC-ICP-MS. In previous studies Ir tailing resulted in the need to make corrections of between ~2 and ~15 ε^{192}Pt units [2]. Iridium was reduced before the samples were loaded onto anion exchange resin, and then separated from Pt. This procedure was repeated twice in order to achieve a ^{191}Ir/^{195}Pt of less than 0.16, thus minimizing the effect of tailing from Ir isotopes onto Pt. Finally, Pt cuts were dried in a mixture of aqua regia and perchloric acid in order to volatilize any remaining Os, which generates isobaric interference on Pt isotopes.

Samples were measured using a Thermo Scientific Neptune *Plus* MC-ICP-MS with a Cetac Aridus II desolvating nebulizer. All six Pt isotopes were collected simultaneously. In addition, ^{188}Os and ^{200}Hg were monitored to correct for isobaric interferences, and ^{191}Ir was monitored to check tailing effects onto Pt isotopes. Analyses were corrected for instrumental mass bias using the exponential law, and were internally normalized to both ^{198}Pt/^{195}Pt = 0.2145 and ^{196}Pt/^{195}Pt = 0.7464 [2]. Samples were measured relative to NIST SRM 3140 Pt standard solution.

Yields for Pt are between 60 and 70 %, and total procedural blanks are approximately 1 ng. After chemistry, both Os and Ir are removed to an adequate level. In particular, ^{191}Ir/^{195}Pt ratios are less than 0.02 such that no additional correction for tailing of Ir onto Pt is necessary, therefore overcoming a major analytical uncertainty. New data for the IVA meteorite group confirm previous analyses by [2], which suggest that these meteorites were weakly exposed to the effects of neutron capture due to GCR.

References: [1] Leya, I. and Masarik, J. 2013. *Meteoritics & Planetary Science* 48:665-685. [2] Kruijer, T. S. et al. 2013. *Earth and Planetary Science Letters* 361:162-172. [3] Wittig, N. et al. 2013. *Earth and Planetary Science Letters* 361:152-161. [4] Kruijer et al. 2014. *Science* 344:1150-1154 [5] Ek, M. et al. 2014. *this meeting*. [6] Rehkamper, M. and Halliday, A.N. 1997. *Talanta* 44:663-672.