THE EFFECTS OF GALATIC COSMIC RAY IRRADIATION ON PALLADIUM ISOTOPES IN IRON METEORITES.

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Introduction: Short-lived decay systems, such as ^{182}Hf-^{182}W [e.g. 1] and ^{107}Pd-^{107}Ag [e.g. 2 & 3] are frequently utilized to date early solar system processes such as core formation on planetesimals. The accuracy of ages obtained from these systems can be affected by exposure to galactic cosmic rays (GCR) [4] and hence acquiring correct ages requires knowledge of the exposure history of these meteorites. Our study aims to evaluate the GCR effects on Pd isotopes and the suitability of Pd as an in-situ dosimeter to correct for the shift in ^{109}Ag/^{107}Ag, predicted by [4], affecting the ^{107}Pd-^{107}Ag decay system. A companion study on Pt isotopes on the same samples will enable a thorough evaluation of GCR effects on Pd.

Palladium is a highly siderophile element with six naturally occurring isotopes, one p-process (^{102}Pd), one s-process (^{104}Pd) and four isotopes that are mixtures between the s- and r-process (^{105}Pd, ^{106}Pd, ^{108}Pd, ^{110}Pd) [5]. Hence, Pd isotopes can potentially also be affected by nucleosynthetic heterogeneities and enable us to study not only exposure to GCR, but also the origin of nucleosynthetic anomalies in the solar system.

Analytical Methods: Palladium was separated from the matrix following the procedure outlined in [6]. Aliquots for Pt isotope analyses were also recovered for use by a companion study. The final Pd/Ru ratio of all samples measured is less than 0.005, which is vital to ensure an accurate isobaric correction for Ru on ^{102}Pd and ^{104}Pd. All samples were analyzed on a Thermo Scientific Neptune *Plus* MC-ICP-MS with a Cetac Aridus II desolvating nebulizer following the method described in [6].

Results and Discussion: Samples from the IAB, IIAB, IVA and IVB iron meteorite groups are currently being analyzed. Preliminary results suggest correlated variations between ^{104}Pd and the more established Pt dosimeter, in accordance with [7,8,9]. Several samples (e.g. Caddy County (IAB) and Gibeon (IVA)) do not show isotopic variations within analytical uncertainty. This confirms the low exposure to GCR indicated by Pt isotopes, and shows that these samples possess no nucleosynthetic anomalies. Negative or near-zero anomalies in ^{104}Pd for two IVB meteorites (Tawallah Valley, Santa Clara) in combination with large GCR exposure (deduced from Pt isotopes determined on the same aliquots) tentatively support the reported nucleosynthetic anomalies in IVB meteorites [9].

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