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Ru stable isotopic constraints on late accretion

Hopp, T.*, Fischer-Gödde, M., and Kleine, T.

*Institut für Planetologie, University of Münster. Wilhelm-Klemm-Str. 10, 48143 Münster, Germany;
timo.hopp@wwu.de

The suprachondritic Ru/Ir of the Earth's mantle suggests that the late veneer did not consist of known chondrites, was a mixture of chondrites and iron meteorites [1], or that Ru was incompletely removed from the mantle during sulfide segregation ('Hadean matte') at the end of core formation [2]. To distinguish between these different scenarios, we obtained mass-dependent Ru isotopic data for a comprehensive set of iron meteorites, chondrites and mantle peridotites from Earth. Our data reveal large $\delta^{102/99}\text{Ru}$ variations among iron meteorites, and show that Earth's mantle has a chondritic $\delta^{102/99}\text{Ru}$. These data rule out a significant contribution of evolved iron meteorites (which have heavy $\delta^{102/99}\text{Ru}$) to the late veneer, and suggest that either there was no Ru isotope fractionation during sulfide segregation or that a fractionated signature was overprinted by the late veneer.

[1] Fischer-Gödde M. and Becker H. (2012) GCA 77, 135-156. [2] Rubie D. et al. (2016) Science 353, 1141-1144.

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