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Ruthenium stable isotope fractionation during crystallization of planetesimal cores

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Iron meteorites are the only available samples of cores from differentiated planetary bodies. Hence, investigations on these materials provide critical insights into the formation and crystallization of planetary cores [e.g. 1]. Highly siderophile elements are uniquely useful to study these processes, because these elements are quantitatively removed into the core. To investigate the process of core crystallization in iron meteorite parent bodies, we have developed a ^{98}Ru - ^{101}Ru double spike for the precise measurement of mass-dependent Ru isotope variations in iron meteorites. The isotope measurements are conducted using a Neptune *Plus* MC-ICPMS at the University of Münster, and the data reduction is made off-line using the double spike toolbox [2]. For each group of irons (IIAB, IIIAB, IVA) we observe Ru isotope fractionations, which for the IIAB and IIIAB correlate with Ru concentrations. The heaviest Ru isotope compositions are observed for late-crystallized samples, indicating that the crystallizing metal is isotopically light compared to the remaining liquid, leading to a progressively heavy isotope composition of the residual melt. In δRu vs. Ru space, the data do not define a single fractionation trend, most likely because the investigated samples contain variable amounts of trapped liquid metal.

[1] Scott & Wasson (1975) *Rev. Geophys.* 13, 527–546.+ [2] Rudge et al (2009) *Chem. Geol.* 265, 420–431. +

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