Fe isotope variations in peridotite xenoliths from Hannuoba, North China Craton

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The discovery of Fe isotope variation in high-temperature products show that Fe isotopic composition has great potential in addressing some important issues such as planetary formation, differentiation, and evolution of oxidation state [1,2]. As the area is still in its infant stage, some foundamental aspects remain to be further investigated. Here we report the results of Fe isotope compositions of mineral separates from Hannuoba peridotite xenoliths, North China craton.

The Hannuoba mantle xenoliths studied are spinel lherzolite hosted in Tertiary alkali basat. They are residues afer melt extraction during the Paleoproterozoic with equilibration temperatures around 1000^{o}C [3]. Minerals of Ol, Opx, Cpx and Spl were separated. After purification using anion exchange chromatography, Fe isotope ratios of the mineral separates were measured using a Nu Plasma HR MC-ICPMS in conjunction with a DSN 100 desolvating nebuliser following the precedure reported [1]. The results are expressed in ε units which are deviations in parts per 10^4 from the same isotope ratios of the reference material IRMM-14. Fe isotope compositions of the mineral separates analysed so far range in $\varepsilon^{57}Fe/^{54}$ units from -2.5 to 1.4, -1.7 to 0.9 and -2.1 to 2.7 for Ol. Opx and Cpx, respectively. Overalll, Cpx exhibits heaviest Fe isotope composition, whereas Ol lightest, within each samples.

These results confirm that distinguishable variations in Fe isotope compositions exist between mantle minerals, and that Fe isotope composition of lithosperic mantle is heterogeneous at the scale of xenolith samples. Study in process will further characterise the Fe isotope compositions of spinels, and address the mechanisms of Fe isotope variations.

References

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