

High-precision $^{142}\text{W}/^{144}\text{W}$ ratios of oceanic island basalts and Large Igneous Province basalts.

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Among five W isotopes, ^{182}W is a product of β -decay of ^{182}Hf with the relatively short half life of 8.9 m.y. As Hf and W are lithophile and siderophile, respectively, the ^{182}Hf - ^{182}W radiometric system could constrain metal-silicate (core-mantle) differentiation, especially core segregation, in the very early Earth system because of its large fractionation between metal-silicate and the short half life of ^{182}Hf . Recent improvements of analytical techniques of W isotope analyses using TIMS and MC-ICP-MS equipped with a desolvating device allow to obtain highly precise $^{182}\text{W}/^{184}\text{W}$ ratios of terrestrial rocks. These led to findings of $\mu^{182}\text{W}$ anomalies (mostly positive) in old komatiites (2.4 –3.8 Ga) and young volcanic rocks with positive anomalies of 12 Ma Ontong Java Plateau and 6 Ma Baffin Bay (Rizo et al., 2016) and with negative anomalies of those such as the Loihi and Samoa basalts (Mundl et al., 2017). Recently, Kruijer and Kleine (2018) proposed that the ^{182}W excesses for an OJP sample by Rizo et al. (2016) may result from the nuclear field shift effect leading to defect of ^{183}W , as the NTIMS analyses utilized a double normalization involving the $^{183}\text{W}/^{184}\text{W}$ ratio.

In our study, high-precision W isotope ratio measurement with MC-ICP-MS (Thermo co. Ltd., NEPTUNE PLUS) equipped with desolvating nebulizer (ARIDAS II) following the chemical separation using both cation and anion exchange resin has been developed. We have measured the W standard solution (SRM 3163) and obtained the isotopic compositions with a precision of $\pm 5\text{ppm}$. However, the standard solution, which was processed by the cation or anion exchange chemistry in the same way as for rock samples, has systematic $^{182}\text{W}/^{184}\text{W}$ drift of -5ppm, which was also observed by Willbold et al. (2011) and Kruijer and Kleine (2018). This shift likely resulted from the nuclear field shift effect as mentioned by Kruijer and Kleine (2018). Therefore, we corrected the measured W isotope ratios of samples with the standard solution processed by the same method as that of the samples. This technique led to obtaining of the W isotopic compositions with reproducibility of several ppm. We have obtained negative $\mu^{182}\text{W}$ for the basalts with the high $^3\text{He}/^4\text{He}$ isotopic composition from the Loihi, Hawaii, through the developed analytical method. This result is consistent with that of Mundl et al., (2017). As the Earth's core should have a negative $\mu^{182}\text{W}$ value of ca. -210, the Loihi sample we analyzed probably contains a component with a signature of core-mantle interaction. We have obtained the high-precision W isotope data for the fresh drilled basalts from Louisville. Louisville is known to have been originated from the primordial deep mantle source. We will discuss the obtained results and the early evolution of the deep mantle.

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