Highly precise $^{182}W/^{183}W$ isotopic compositions of terrestrial samples using MC-ICP-MS

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Among five W isotopes (M = 180, 182, 183, 184, 186), ^{182}W isotope is a product of β-decay of ^{182}Hf with the short half life of 8.9 m.y. Both Hf and W are highly refractory elements and are accumulated in the early stage of the proto-earth. As Hf and W are a lithophile and a siderophile elements, respectively, ^{182}Hf-^{182}W system could give constraints on 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. Improvement of analytical techniques of W isotope analyses using TIMS and MC-ICP-MS equipped with a desolvating device allows us to obtain highly precise $^{182}W/^{183}W$ ratios of terrestrial rocks, which leads to findings of $\mu^{182}W$ 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 anamalies of those such as the Loihi and Samoa basalts (Mundl et al., 2017).

In our study, high-precision W isotope ratio measurement with MC-ICP-MS (Thermo co. Ltd., NEPTUNE PLUS) has been developed. We have measured the W standard solution (SRM 3163) and obtained the isotopic compositions with an enough high precision of ± 5ppm. However, the standard solution, which was separated by cation or anion exchange resin, has systematical $^{183}W/^{184}W$ drift of -5ppm, which was also reported by Willbold et al. (2011). 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 leads to the reproducible W isotopic compositions with reproducibility of several ppm. We have obtained the negative $\mu^{182}W$ for the basalts with the high $^{3}He/^{4}He$ isotopic composition from the Loihi, Hawaii, through the developed analytical method. This result is consitent with that of Mundl et al., (2017). As negative anomaly of $\mu^{182}W$ could be created by the early earth core segregation, it is probably a signature of core-mantle interaction.