High precision analysis of Os and W isotopes applied for Earth's rock to elucidate interaction and co-evolution of core and mantle

ASAKO TAKAMASA[1] KATSUHIKO SUZUKI[1]
RYOKO SENDA[1] YUSUKE FUKAMI[1]

[1]JAMSTEC, Yokosuka, Kanagawa 237-0061, Japan

^{182}W is a decay product of ^{182}Hf ($t_{1/2}$=890 million year) which is extinct at present. Therefore, the amount of ^{182}W can give information on evolution of very early solar system at the timescale from tens of thousands of years to hundreds of thousands of years.

Recently, the mass spectrometry in MC-ICP-MS or N-TIMS and chemical separation methods were significantly improved (Touboul et al., 2011), and high precision tungsten isotope analysis of ±5 μ (1ε=100μ) is possible at present. These high precision analyses lead to findings of W isotope anomaly in the early Earth's rocks such as komatiite (2.8 billion years).Variation of these tungsten isotope ratios were discussed with PGE, Nd and Os isotopes but some possibilities remained such as Late Veneer, the differentiation of core-mantle and the within-mantle differentiation.

Osmium isotope is likely to give constraints on evolution of the core-mantle system, because Re (^{187}Re) and Os (^{187}Os, decay product of ^{187}Re) is differentiated in core-mantle interaction. The Os isotopic compositions of the ancient rocks may varify the late veneer hypothesis.

In our study, we are trying to develop the methodology of extremely high precision measurements of W, Nd and Os isotopes using N-TIMS and MC-ICP-MS and will applicate for Earth's rock such as MORBs(Indian MORB and East Pasific Rise), OIBs(Hawaii, French Polynesia and St.Helena), LIPS(On Tong Java), Kimberite(South Africa) and archean rocks(Isua).