Behavior of platinum group elements in the ocean island basalts from Polynesia

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Platinum group elements (PGEs; Os, Ir, Ru, Rh, Pt and Pd) provide a key information to understand deep mantle processes, because PGEs are highly siderophilic and rarely contained in crustal rocks. So far, many analyses of PGEs in peridotites have been carried out to establish whether upper mantle materials have chondritic PGE abundance ratios. On the other hand, it has been recognized that some ocean island basalts (OIB) have elevated 187Os/188Os ratios compared with those in chondrites. It has been debated whether the elevated 187Os/188Os isotopic ratios were due to the recycling of ancient oceanic crusts or the entrainment of the earth's outer core material having high Re/Os ratio to the plume. Recently, Brandon et al. (1999) found that the 186Os/188Os ratios of Hawaiian picrites, where 186Os was decayed from 190Pt, were positively correlated with 187Os/188Os ratios, suggesting that the latter is more likely and Hawaiian plume was derived from the core-mantle boundary. In line with their work, we are applying 190Pt-186Os isotopic systematics to the OIBs derived from HIMU type source (high 238U/204Pb), which is the candidate of the deepest mantle products, in Polynesia.

PGE abundance in OIBs has been little reported so far, because the abundance of Os, Ir, Ru are 1-2 order lower than that of peridotites. Tatsumi et al. (2000) reported that PGE abundances in HIMU basalts from Polynesia decreased with increase in the degree of fractional crystallization of the basalts and the correlation among them was not observed in non-HIMU basalts. This was explained that HIMU magma was saturated with sulfur but not non-HIMU magma. Sulfides should be crystallized collecting PGEs in their crystals.

In this study, we aimed to confirm that sulfur-saturation is characteristics of HIMU magma at first and, second, to examine the possibility that PGE abundance in OIBs is applicable to characterize OIBs derived from the other types of geochemical reservoir. PGE abundances of the samples were determined using the slightly modified method established by Oguri et al. (1999). Before the Polynesian OIBs are analyzed, some basalt and pridotite geological standard rocks (JP-1, JP-1, BHVO-2, BCR-2, DTS-2) are analyzed to evaluate the reliability of this technique in the sample with low PGEs such as basalts. We will further apply it to the Polynesian OIBs