REE and Y distribution in deep submarine ferromanganese crusts

K. AZAMI[1], N. HIRANO[2], S. MACHIDA[3], K. YASUKAWA[4], Y. KATO[4]

[1]Grad. Sch. Sci., Tohoku Univ., Sendai 980-8578, Japan (keishiro.azami.s7@dc.tohoku.ac.jp)
[2]Cent. NE-Asian Stu., Tohoku Univ., Sendai 980-8576, Japan
[3]JAMSTEC, Yokosuka 237-0061, Japan
[4]Sch. Eng., University of Tokyo, Tokyo 113-8656, Japan

Ferromanganese (Fe-Mn) crusts and nodules are mainly composed by Fe-Mn-(oxyhydr)oxides that occur on submarine environment. Three kinds of origins are generally characterized by concentration of Fe, Mn, Co, Ni, Cu and REE in Fe-Mn crusts and nodules of hydrogenesis (high Co and REE concentration), diagenesis (high Ni and Cu concentration), and hydrothermal (mostly Fe or Mn oxides), most of which have ever sampled from abyssal plains or submarine slopes on seamounts, plateaus, and knolls at 1000m to 3000m in depth.

Hydrogenetic Fe-Mn crusts are mainly composed of vernadite and ferrihydrite which selectively absorb some elemets (e.g. Co, Y, REE, Pb) from sea water. For example, REE (expect Ce) and Y form surface complex on vernadite and ferrihydrite, although the dissolved species of REE and Y generally behave as the carbonate complex in sea water. Concentrations of REE (except Ce) and Y in hydrogenetic Fe-Mn crusts are dominated by the exchange equilibrium between those of carbonate complex in sea water and surface complex on Fe-Mn crusts.

Recently the new kind of volcano on the Earth, petit-spot, are reported on the subducting NW Pacific plate. Fe-Mn oxides covered with submarine lavas and hyaloclastites firstly provide us the relevat information of Fe-Mn oxides from deep submarine environment (5000m to 6000m in depth). We analyzed the chemical composition of Fe-Mn crusts from deep submarine of NW Pacific, using the inductively coupled prasma mass spectroscopy (ICP-MS) in University of Tokyo. We report the chemical compositions of Fe-Mn crusts to be deeper than 5000m in depth. They clearly have different compositions from previously reported Fe-Mn crusts from 1000m to 3000m in depth, particularly the systematic variations in REE and Y with water depth, in spite of geochemical behavior of those elements is quite similar due to their ionic charge and ioic radius.