Stable Isotope Variation of Tellurium in Surface Layer of Marine Ferromanganese Crusts

YUSUKE FUKAMI[1*], TERUHIKO KASHIWABARA[1], AKIRA USUI[2], JUN-ICHI KIMURA[1], AND KATSUHIKO SUZUKI[1]

[1]Japan Agency for Marine-Earth Science and Technology, 2-15 Natsushima-cho, Yokosuka 237-0061, Japan (*correspondence: fukamiy@jamstec.go.jp)
[2]Kochi University, Kochi-shi, Kochi 780-8520, Japan

Marine ferromanganese crusts (Fe-Mn crusts) are important materials for (paleo)oceanographic studies because of their wide distribution on the seafloor. Tellurium (Te) is one of the highly enriched elements in Fe-Mn crusts by a factor of 10^4 relative to the continental crusts [1]. A recent spectroscopic study revealed that molecular-scale mechanism of the Te enrichment into marine ferromanganese oxides consists of several surface processes including redox change of Te(IV) on Mn oxides and structural substituion of Te (VI) into Fe oxides [2], which are generally associated with isotope fractionation. In this study, we performed the Te isotope analysis of the surface layer of Fe-Mn crusts. Our purposes are to reveal the stable isotope variation of Te in natural Fe-Mn oxides, and its relathionship with the ambient seawater.

Fe-Mn custs were collected from the slope of Takuyo-daigo seamount in the western Pacific, covering 900-5500 m water depth. Sampling were performed by remotely operated vehicles (ROVs), which benefits us for allowing *in-situ* monitoring of water depth and crust occurrence. The Te isotope analysis was applied to the surface layer (outermost 0-1 mm) of Fe-Mn crusts. The Nd isotope data of these samples suggests the equilibrium between the Fe-Mn crusts and seawater for the Nd [3]. Isotope analysis was performed by MC-ICPMS (Neptune *plus*) at JAMSTEC.

For the result of preliminary measurement, the Te concentration of the surface layer of Fe-Mn crusts had the higher Te concentration at the shallower the water depth. The Te isotope compositions also had the variation correlated with the sampling water depth; the sample from shallow water depth had heavier isotope compositons than that from large water depth. The consideration of the relationship among the Te concentratin and isotope compositions in Fe-Mn crusts, the water depth and the ambient seawater is a future issue.

[1] Hein and Koschinsky (2013) *Treatise on Geochem.* **13**, 237-291. [2] Kashiwabara *et al.* (2014) *GCA* **131**, 150-163. [3] Amakawa *et al.* (2017) *Geochem. J.* **51**, e1-e7.