

Selective Cs sorption in biotite on granite

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The radiocesium released from the Fukushima Daiichi nuclear power plant is retained at the surface soils around the power plant (Tanaka *et al* 2012). Abukuma granite distributes in the most of the affected areas. Therefore, the contaminated soil minerals has been originated from Abukuma granite (e.g. Kamei *et al* 2003). Mica and/or vermiculite are thought to be the one of the candidate for the host phases of radiocesium. It is reported these hardly desorped radiocesium (Qin *et al* 2012). The purpose of the present study is to elucidate of Cs sorption mechanism of biotite in Abukuma granite.

The thin section made from Abukuma granite was soaked in the solution containing 10 μ M Cs⁺ in 0.01 M NaCl solution at pH 4, 5 and 6 for 24 hours. The thin sections after the reaction with Cs were analyzed by means of electron probe micro analyzer (EPMA).

Abukuma granite was composed of quartz, plagioclase, feldspar, amphibole, biotite and chlorite. Chlorite is alteration products from biotite. Among these minerals, Cs distribution was observed only in biotite.

According to the quantitative analysis by EPMA, biotite contains Cs up to 6.7 wt%. Biotite accumulated Cs several tens of thousands times than that of Cs in solution. The Cs concentration in biotite was negatively correlated with K concentration in biotite. These observations suggested that Cs selectively sorbs on biotite in granite and the sorption mechanism is considered to be the cation exchange reaction in the inter layer of biotite.

[1] H. Qin, Y. Yokoyama, Q. Fan, H. Iwataki, K. Tanaka, A. Sakaguchi, Y. Kanai, J. Zhu, Y. Onoda and Y. Takahashi, *Geochemical Journal*, Vol. **46**, pp. 297 to 302, 2012 [2] K. Tanaka, A. Sakaguchi, Y. Kanai, H. Tsuruta, A. Shinohara, and Y. Takahashi, *J. Radioanal. Nucl. Chem.*, in press. A. Kamei, T. Takagi, K. Kubo, *Geol. Surv. Japan*, vol. **54**, p.395 – 409, 10 figs., 2 appendix tables.

Geology, lithostratigraphy and geochemistry of the oldest Eoarchean BIFs, Northern Labrador

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Banded Iron Formation (BIF) is chemical sediment, which is a key of deciphering chemical evolution of seawater throughout the Precambrian. However, there are found only few pre-3.6 Ga BIF: the 3.71-3.83 Ga Isua supracrustal belt and Akilia Island, >3.75 Ga Nuvvuagittuq supracrustal belt and the Nulliak supracrustal belt, respectively. Recently, reassessment of zircon U-Pb dating suggested that the Nulliak supracrustal belts were formed >3.9 Ga [1]. This work presents the geology and geochemistry of the oldest BIF in the earth, in the Nulliak supracrustal belts, Labrador.

Geology and lithostratigraphy shows that there are two types of BIFs in the area: thin BIF layers associated with mafic rocks and BIF layers interlayered with carbonate rocks, respectively. The former is typical Algoma-type BIF, common in the Eoarchean supracrustal belts. The latter is also thin and sporadically distributed in the area, similar to the Algoma-type BIF but its lithostratigraphy is similar to the Superior-Type BIF, uncommon in the Eoarchean BIF. Mineral assemblages of the BIFs are similar each other, and comprises magnetite + quartz + actinolite + cummingtonite, which are typical of amphibolite facies assemblages for BIFs.

PAAS-normalized rare earth elements plus yttrium distribution diagrams (REY_{SN}) of the BIFs exhibit positive La_{SN} + Y_{SN} anomalies, super-chondritic Y/Ho values and LREE, MREE depletion relative to HREE. The geochemical characteristics are shared with modern seawater. In addition, the REY patterns lack negative Ce anomaly whereas display large positive Eu anomaly, suggesting reduced and hydrothermal fluid-influenced seawater. On the other hand, their high abundances of Al₂O₃ and HFSE contents suggest that detritus input was common in the sedimentary environments of the Nulliak supracrustals. In addition, their high abundances of Ni and Zn contents (>50 ppm) indicate that the >3.9 Ga seawater was enriched in the transitional metals due to high hydrothermal activities or alteration of (ultra)mafic crusts, analogous to the Archaean BIFs [2].

[1] Shimojo *et al.*, (2013), *Mineral. Mag.*, this volume. [2] Konhauser *et al.*, (2009), *Nature* **458**, 750-753.