Study on distribution of micropore in granitic rock in Japan

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<Introduction>

Understanding of matrix diffusion is quite important for performance assessment of geological disposal of high-level radioactive waste, because retardation such as matrix diffusion and sorpotion could be occurred around pathway of mass transport in deep underground. Micropore is known to act as pathway of matrix diffusion based on the relationship between effective diffusion coefficient and porosity.

The authors found that micropore in plagioclase, which was formed by the magma cooling process, acts as the important pathway for matrix diffusion by the study of the Toki Granite, central Japan (Ishibashi et al., 2016a). Micropore in plagioclase is ubiquitous in the Toki Granite(Ishibashi et al., 2016b, 2017), while there is not much information in the other granitic rocks in Japan. We investigated distribution of micropore in granitic rocks in Japan, and in Switzerland for comparison.

<Method>

We used 16 granitic rock samples; 15 were from Japan, one from the Grimsel Test Site, Switzerland. The granitic rock samples from Japan are rock specimens on the market.

Two thin sections were prepared from one rock sample with a glue containing fluorescent dye followed by the method of Ishibashi et al. (2016b). Micropore was observed by stereoscopic fluorescence microscope observation and porosity was calculated based on the area with fluorescence to total area.

Though this abstract is summarized based on four samples among 15 Japanese samples, we will continue observation and will present the whole result at the meeting.

<Result>

Porosity of four samples from the granitic rock in Japan ranges from 1 to 4 %, and is heterogeneous in the different rock bodies and between two thin sections of one rock sample. Micropore was observed in plagioclase and along microcrack.

The granitic rock sample from Switzerland doesn’t contain micropore in plagioclase so much. Instead, mica clay minerals were observed inside plagioclase. It may suggest that clay mineral secondary filled micropore in plagioclase.

<Future plan>

We continue the observation of thin sections to confirm the distribution of micropore. We will also perform through-diffusion experiment to understand relationship between micropore and matrix diffusion, and petrological study to clarify the mechanism of plagioclase alteration in granitic rock in Japan.

<Reference>

Ishibashi et al. (2016a) JpGU 2016, HCG25-09.

Ishibashi et al. (2016b) Journal of Nuclear Fuel Cycle and Environment, vol.23, 121-129.

Ishibashi et al. (2017) 124th annual meeting of geological society of Japan, R24-O-2.

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