

Hydrothermal alteration in the Toki granitic body, central Japan -Mass transfer associated with precipitation of carbonate minerals-

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The hydrothermal alteration has been observed ubiquitously in granitic rocks. In the Toki granitic body, Nishimoto et al. (2008) and Nishimoto and Yoshida (2010) described how the hydrothermal alteration in the granitic rock is constrained mainly by the dissolution –precipitation process during the infiltration of hydrothermal fluid. The hydrothermal alteration of the granite progressed through three successive stages: 1) biotite chloritization, 2) plagioclase alteration, and 3) precipitation of carbonate mineral. Yuguchi et al. (2015 and 2019) also described quantitative discussions about mass transfer associated with biotite chloritization and plagioclase alteration, respectively. Thus, this study focuses on the mass transfer between carbonate mineral and hydrothermal fluid in the Toki granite, which corresponds to final phenomena in the hydrothermal alteration processes.

The Toki granite in the Tono district, Central Japan, is one of the Late Cretaceous plutonic intrusives in the Sanyo Belt, the Inner Zone of Southwest Japan. The Toki granite, a zoned pluton, has three rock facies grading from muscovite-biotite granite at the margin through hornblende-biotite granite to biotite granite in the interior. The samples were collected from the rock mass around 500 m depth in Mizunami Underground Research Laboratory (MIU).

The carbonate minerals were observed by pluralization microscope and scanning electron microscope (SEM), which are categorized into massive (patchy) occurrence and vein (fracture-filling) occurrence, and then are subdivided in terms of their shape and alteration degree. The carbonate minerals were observed by cathodoluminescence image in order to evaluate the growth process and the chemistry of the carbonate minerals were analyzed by EPMA.

Our study presents A) the classification of growth patterns of carbonate minerals and B) the minute amounts of components including the carbonate mineral. In case of the carbonate mineral in contact the altered chlorite, iron and manganese occurs, which may be outflux components derived from previous alteration processes such as biotite chloritization and plagioclase alteration.

Keywords: Carbonate minerals, SEM, Cathode luminescence image, Minor elements, EPMA, Mass transfer