

リュッツホルム岩体オングル島に産するザクロ石角閃岩中の反応縁の微細組織

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Microstructure of reaction rim of garnet amphibolites from the Lützow-Holm Complex at Ongul Island

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In the Lützow-Holm Complex, metamorphic grade increases from amphibolites facies in the northeast to granulite facies in the southwest [1]. The granulite facies metamorphic rocks are widely distributed throughout East Ongul Island [2]. The rock types are mainly garnet gneiss and hornblende gneiss [3]. Ultramafic rocks occur as thin layers in garnet gneiss. The ultramafic analyzed in this study rocks are composed mainly of hornblende and porphyroblasts of garnet. Corona structure occurs between garnet and hornblende in these rocks. In this study, we prepared thin sections of matrix and corona, and described the microstructure and crystal size distribution of biotite in the corona.

Microstructure

In the matrix, hornblende-rich domain and plagioclase-rich domain occur. Both domains consist of hornblende, plagioclase, brown biotite, and orthopyroxene. Clinopyroxene occurs only in the plagioclase-rich domain. The corona consists mainly of plagioclase and green biotite, and occurs around the outer edge of garnet. Crystal size of green biotite and plagioclase increases as increasing the distance from garnet. Grains of plagioclase in the matrix and the corona have twin and compositional zoning. Garnet (about 15mm diameter) is roughly spherical but locally shows concavo-convex shape (around 0.5mm). Garnet (long axis 0.10-0.45mm) that is rounded and irregularly shaped locally occurs at the extension of embayed part. In immediate proximity to garnet, biotite of which the long axis orientates at right angles to garnet tends to occur at the embayed part of garnet.

Crystal Size Distribution

Measuring crystal size distribution for all biotite grains(about 3300 grains) in the corona shows that the frequency has mode in 0.10-0.15mm, and gently decrease on the coarse-grained side as compared with the fine-grained side. The average of the grain size is 0.23mm. The crystal size distribution is similar to lognormal distribution. However, spatial distribution of crystal size is not homogeneous, but mostly increases as increasing the distance from garnet (~3.67mm). Measuring the fine-grained part close to the garnet and the coarse-grained part far from the garnet separately shows that both have mode in 0.10-0.15mm, and are lognormal distribution. The coarse-grained part has high standard deviation relative to the fine-grained part.

Discussion

The mode of crystal size distribution is smaller than average and similar to lognormal distribution, suggesting that biotite maintained continuous nucleation and growth during corona formation. The crystal size distribution of fine and coarse grains parts is also lognormal. This can't be explained by the traditional idea of which thickness of the corona increases by formation of products in reaction front, but explained such that nucleation occurs everywhere in the corona not only in garnet interface.

References

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