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# The formation process of the oligoclases and ternary feldspars in the felsic gneiss from Mt. Riiser-Larsen in Napier Com

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Mt. Riiser-Larsen, East Antarctica is the one component of the Napier Complex. The Napier Complex consists of granulite-facies metamorphic rocks formed by multiple thermal events, including Late-Archean ultrahigh temperature metamorphism(Harley and Black, 1997). Based on ternary feldspar solvus models, the bulk compositions of ternary feldspars in felsic gneiss from Mt. Riiser-Larsen yield the minimum of metamorphic temperatures ranging from 1000 to 1110C(Hokada, 2001). TH97012006(hereafter shortend to 12006) is the garnet-porphyroblast-bearing portion of a garnet-bearing felsic gneiss from Mt. Riiser Larsen. This sample is almost composed of oligoclase(An29Ab70Or1; hereafter shortend to Olg), and anti to mesoperthitic ternary feldspar(hereafter shortend to TF) composed of Olg lamellae and orthoclase(An2Ab8Or90; hereafter shortend to Or). The mode of occurrence and textures of Olg grains and TF grains are heterogeneous.

We observed the micro-textures of TF grains using by transmission electron microscope(TEM) and revealed the formation process of the common type of micro-textures of TF grains in 12006, (-901) exsolution lamellae of TF grains. But it became apparent that some micro-textures were not explained by (-901) exsolution lamellae and coexistence of Olg grains and TF grains was not explained.

In this study, some elemental analyses and cathodo luminescence (CL) observations on Olg grains and TF grains that have different exsolution lamellae in 12006 were carried out using by scanning electron microprobe(SEM) and wavelength-dispersive X-ray spectroscopy(WDX), and more detailed formation process of these feldspars in 12006 was suggested.

In this sample, Olg grains and TF grains are distributed heterogeneously. Hokada(2001) and Kodama(2010, Annual Meeting of Japan Association of Mineralogical Sciences) reported that no significant compositional difference was found between the chemical compositions of Olg grain and those of Olg lamellae in TF grains. However, K-rich Olg grains were found in this study. Significant differences in distribution of K and CL are observed between some Olg grains. Therefore, these Olg grains formed at different stages. This could result from the following process; First, K-free Olg grains and K-rich melt arose from Olg-rich protolith by partial melting caused by metamorphism. After that, during cooling process, K-rich Olg grains crystalized from melt.

On the other hand, TF grains that have An23Ab56Or21 as bulk composition, and are composed of coarse Olg lamellae about 100um in width and TF lamellae-like textures that are composed of (-901) fine Olg lamellae and Or lamellae up to 10um in width(hereafter shortend to TF lamellae) were found. The TF lamellae are consistent with common TF grains in the orientation of Olg-Or boundaries and the bulk composition(TF lamellae: An17Ab43Or40, common TF grains: An21Ab48Or31). Therefore, these TF lamellae were formed by spinodal decomposition too. Orientation of boundaries of coarse Olg lamellae and Or lamellae is not consistent with (-901),and the scale of these TF lamellae almost correspond to coarse oligoclase lamellae. Therefore, these textures suggest that coarse Olg and TF lamellae decomposed at higher temperature, and after, fine Olg and Or lamellae decomposed from coarse TF lamellae by spinodal composition at lower temperature. However, the former decomposition is not explained by any decompositional process in current phase diagram. For more informations about these textures, the reexamination of phase relationships of An-Ab-Or system at high temperature is needed.

Keywords: ternary feldspar, exsolution texture