カレドニア造山帯トロムセ・ナップに産する珪長質片麻岩中のざくろ石組成累帯構造の多様性
Variation of garnet chemical zoning in felsic gneisses from the Tromso Nappe in the Scandinavian Caledonides

*門田 康弘[1]、平島 崇男[1]、Janak Marian[2]
*Yasuhiro Monta[1], Takao Hirajima[1], Marian Janak[2]

1. 京都大学大学院理学研究科、2. スロバキア科学アカデミー
1. Graduate School of Science, Kyoto University, 2. Slovak Academy of Sciences

Felsic rocks in the ultrahigh pressure metamorphic terranes were generally suffered the lower pressure overprint (e.g., amphibolite facies) during the exhumation stage. However, rigid minerals such as garnet and zircon play an important role for protecting inclusions from later stage overprint. Therefore, investigation of inclusion minerals in garnet and/or zircon grains provides us information about prograde and/or peak metamorphic history. In addition, zirconology has a potential giving a metamorphic timing. The Tromsø Nappe belongs to the uppermost tectonic units in the Scandinavian Caledonides formed by the continent collision during Ordovician to Silurian. It is mainly composed of felsic schists/gneisses and marbles with minor amounts of eclogites and peridotites. Krogh et al. (1990) estimated high pressure conditions of 700 °C and 1.8 GPa for a pelitic schist from southern unit. UHP conditions were reported from some eclogites by pseudosection modelling and the conventional geothermobarometry (Ravna & Roux 2006; Janák et al., 2012) and one country gneiss by the presence of microdiamond (Janák et al., 2013). However, the firm evidence of UHP metamorphism except for microdiamond has not recognized from the Tromsø Nappe. This study intends to verify other UHP evidence except for diamond in the Tromsø Nappe based on the inclusion mineralogy in garnet and zircon grains using EPMA and Raman spectrometry. Three felsic samples from the northern unit of the Tromsø Nappe show a similar gneissose texture represented by the development of plagioclase augen structure and commonly contain hornblende, plagioclase and micas. Coarse-grained garnets (several tens of micrometer to one millimeter) include inclusions of quartz, rutile, zircon and apatite with minor amounts of biotite, muscovite, kyanite. Some garnet grains show a zoning structure; Ca-content increases from the core to the rim. Ca-content of the garnet core is different for each sample and each grain (XGrs = ˜0.12, ˜0.15, ˜0.18 and ˜0.22), and that of the rim is almost constant (˜0.26). One felsic sample from the southern unit is composed of the intercalation of leucocratic and melanocratic domains. The former mainly consists of plagioclase and potassium feldspar, and the latter consists of quartz and biotite. Garnet grains occur in both domains and have inclusions of quartz, plagioclase, potassium feldspar, biotite, muscovite, rutile, zircon and apatite. Some garnet grains show a zoning structure; Ca-content slightly decreases from the core (XGrs = 0.26 -0.29) to the rim (XGrs = 0.23 -0.26). Zircon grains in all samples are euhedral to subhedral and occur in the matrix and as inclusions in garnet and micas. These zircon grains show the same zoning structure; oscillatory-zoned core, oscillatory-zoned or dark mantle and bright rim in the CL image. Inclusion phases in zircon are quartz, plagioclase, muscovite, biotite and apatite. In spite of the careful inclusion mineralogy, UHP evidence was not found from the four pelitic samples. However, Ca zoning patterns of garnet grains in felsic samples differ between northern and southern units as mentioned above. Furthermore, Janák et al. (2013) reported slightly Ca-increasing pattern (0.18 to 0.20) from core to rim in garnet for a microdiamond-bearing rock in the northern unit, but Krogh et al. (1990) reported Ca-decreasing pattern (0.22 to 0.11 and 0.32 to 0.25) from felsic samples in the southern unit. These facts suggest two possibilities. The first possibility is difference of the protolithes for the cores and effect

of bulk composition for the rims. The second is that the northern part of the Tromsø Nappe suffered different evolution from southern unit. More detailed analysis (e.g., trace element analysis) and U–Pb study will reveal this problem.

キーワード：カレドニア造山帯、ざくろ石、ジルコン
Keywords: Caledonian Orogeny, garnet, zircon