Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SMP43-P08 Room:Convention Hall Time:May 24 18:15-19:30

Petrological studies of spinel and quartz-bearing paragneiss from Zayetkwin-Onzon area, central Myanmar

Ye Kyaw Thu[1*] ; ENAMI, Masaki[2]

[1]Graduate School of Environmental Studies, Nagoya University, [2]Center for Chronological Research

The Mogok Metamorphic Belt (MMB) extends for over 1450 km, from the Andaman Sea to the eastern Himalayan syntaxis along the western margin of the Shan-Thai block. This belt is mainly composed of high-grade metamorphic rocks, from upper-amphibolite facies to granulite facies, and younger intrusions. Previous studies concluded that an assemblage of the high-grade metamorphic rocks formed during a Paleogene regional metamorphic event that was caused by collision or underthrusting of the Indian microcontinent with the Eurasian continent. The study area is situated in the middle part of the MMB, 100 km north of Mandalay, and is mainly composed of paragneisses overlain by marbles and calc-silicate rocks. These lithologies are intruded by quartz syenite, biotite-granite, and pegmatite. The marbles and calc-silicate rocks are mainly composed of diopside, forsterite, phlogopite, spinel, graphite, and chondrodite, which record upper amphibolite facies equilibria. Paragneisses are mainly garnet-biotite gneisses with intercalations of biotite gneisses and leucogneisses, and show general NE - SW foliation. Paragneiss samples studied are medium- to coarse-grained, well-banded, and show porphyroblastic and gneissose texture. Most of them contain garnet, biotite, plagioclase, quartz, sillimanite, and K-feldspar with a minor amount of graphite, ilmenite and monazite. Porphyroblastic garnet grains are 2 - 5 mm in diameter, and contain numerous inclusions of biotite, plagioclase, quartz, and sillimanite. Biotite grains occur as four-generation phases, an inclusion phase in garnet, an isolated phase in the matrix, a symplectitic aggregate around garnet, and a vein phase replacing cracks in the garnet.

Coexisting spinel and quartz are newly found in a garnet-biotite gneiss collected from the Zayetkwin-Onzon area. This sample contains porphyroblastic garnet and cordierite, and biotite, plagioclase, quartz, and graphite in the matrix. Spinel and sillimanite coexisting with quartz, plagioclase, biotite, and ilmenite occur only as inclusions in cordierite. Spinel is a Zn-poor spinel-hercynite solid solution with X_{Mg} [= Mg/(Mg + Fe^{2+})] = 0.34 - 0.35, Y_{Al} [=Al/(Al + Fe^{3+})] = 0.97 - 0.99, TiO_2 = 0.0 - 0.2 wt%, and ZnO = 1.8 - 2.3 wt%. The matrix assemblage gives pressure/temperature estimates of 0.7 - 0.8 GPa/780 - 840 ℃ using a garnet-biotite geothermometer and garnet-biotite-plagioclase-quartz geobarometer. Biotite grains in the spinel-bearing sample and associated paragneisses contain a distinctly high TiO_2 content of up to 6.9 wt% (0.39 per formula unit for O = 11), which probably progressed mainly because of the $Ti\diamondsuit R_{-2}$ substitution (R is the sum of divalent cations and ♢ represents vacancy in the octahedral sites). The fluorine content is up to 2.0 wt%, and the chlorine content is less than 0.1 wt%. The Ti-rich biotite suggests temperatures of 800 ℃ or higher if Ti is employed in the biotite geothermometer, as proposed by Henry et al. (2005).

The occurrence of a spinel-quartz-cordierite-sillimanite assemblage in the Zayetkwin-Onzon sample and the high-temperature estimates of around 800 ℃ suggest granulite facies equilibrium of the Mogok metamorphic rocks. Orthopyroxene-bearing garnet-gneisses were reported from the Mogok area, about 80 km NE of the Zayetkwin-Onzon area (Yonemura et al., 2013). These data suggest wide distributions of granulite facies metamorphic rocks in the northern part of the MMB.

Keywords: spinel, paragneiss, P-T conditions, Mogok Metamorphic Belt, Myanmar