

Trace element partitioning during partial melting in main zone of the Hidaka metamorphic belt

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The Hidaka metamorphic belt which represents a titled crustal section of a magmatic arc of tertiary age, is situated in the central part of Hokkaido, northern Japan. Opx amphibolite which were metamorphosed under granulite-facies conditions, are distributed in this area, and has been reported orthopyroxene bearing leucosome by dehydration melting of hornblende (Osanai et al., 2006). In recent years, new partition coefficient be reported from migmatite in lower crustal condition (e. g. Nehring et al., 2010). This study focus on Opx amphibolite involving Opx leucosome, and discuss about trace element partitioning at lower crustal P-T condition.

Opx amphibolite consist of orthopyroxene ($En_{0.58-0.62}$), brown-hornblende, plagioclase, quartz and ilmenite. Plagioclase rim show high-anorthite (An) content (An_{70-85}) against low-An core (An_{45-69}). Opx leucosome contain euhedral orthopyroxene ($En_{0.54-0.64}$) which be thought as new product by following incongruent melting; $Hbl+Qz \rightarrow Opx+melt$ (Osanai et al., 2006). Opx leucosome lacks K-feldsper, and consist of orthopyroxene, plagioclase (An_{28-43}), quartz, ilmenite and apatite.

We analyzed bulk and mineral composition including trace elements (Rb, Sr, Y, REEs and Hf). Kawanami et al. (2006) report bulk chemical composition of low-grade amphibolite which show N-MORB characteristics. REE pattern of Opx amphibolite show same or higher REE than N-MORB, and have a negative Eu anomaly. Opx leucosome show 52.8-64.4 [wt. %] of SiO_2 , and LREE-rich and HREE-deplete REE pattern having negative to positive Eu anomaly. REE pattern difference remarkably depend on modal amount of apatite.

We estimated melt compositions using simple calculation that remove orthopyroxene composition from bulk chemical composition, and calculate trace element ratio between orthopyroxene and melt. REE ratio between orthopyroxene and melt, become less than 1, and show LREE-deplete and HREE-enrich (0.6-6.1) pattern. This pattern almost same as previous partition coefficient (e. g. Green et al., 2000). And, we also find characteristics that minerals/plagioclase REE ratio in Opx leucosome become almost same between each samples collected from different place in main zone of the Hidaka metamorphic belt. In this presentation, we discuss more detail about melt composition, equilibrium and meanings of mineral/melt and mineral/mineral trace element ratio.

Keywords: Hidaka metamorphic belt, Japan, trace element, partitioning, LA-ICP-MS