

SMP046-10

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High-Mg cores of the garnets in the Sambagawa pelitic schists from the Besshi district, central Shikoku, Japan High-Mg cores of the garnets in the Sambagawa pelitic schists from the Besshi district, central Shikoku, Japan

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Pelitic schists adjacent to the Seba metagabbro consist mainly of garnet, phengite, epidote and quartz with small amounts of amphiboles (Na-Ca and Ca-amphibole), albite, chlorite, biotite and carbonaceous matter. Rutile, titanite, ilmenite, calcite, paragonite, hematite and zircon are occasionally present as accessory minerals. A schistosity is defined by preferred orientation of coarse-grained phengite (3.5 mm).

Garnets in the pelitic schists occur as euhedral to subhedral grains up to 3 mm across. The garnets are optically zoned, from pale red-colored cores to colorless rims. The garnets have almandine-rich composition ($X_{Alm}=0.50-0.60$) with variable amounts of the grossular ($X_{Grs}=0.18-0.31$) and pyrope ($X_{Prp}=0.08-0.24$) components. Two zones (almandine-pyrope rich core and almandine rich rim) were identified based on chemical composition. The cores are abundance of rich in pyrope, decreasing toward the core-rim boundary ($X_{Prp}=0.24-0.18$) and they show antithetic zoning of X_{Alm} (0.50-0.56). The boundary between the core and the rim shows a sharp chemical discontinuity. In the rim, X_{Alm} (0.56-0.58) and X_{Prp} (0.09-0.13) increase, X_{Sps} (0.02-0.01) decreases, and X_{Grs} (0.29-0.31-0.28) increases and then decreases slightly. The garnets contain inclusions of epidote, Ca-amphibole (Mg-hornblende), phengite (Si=6.53-7.27 pfu), paragonite, albite (An 0-3), chlorite, calcite, ilmenite, rutile, titanite and zircon. The garnets also contain polyphase inclusions of Mg-hornblende+paragonite+quartz; epidote+paragonite; epidote+paragonite+quartz and epidote+albite. Garnets are partly replaced by aggregates of amphibole (Mg-hornblende), phengite (Si=6.47-6.52 pfu), epidote and albite (An 0-3) and symplectites of Ca-amphibole (Mg-hornblende) and albite (An 0-5) with rare quartz. The margins of the garnets are occasionally replaced by chlorite, phengite and biotite, or by biotite and calcite aggregates.

Amphiboles occur in the matrix as subhedral to anhedral prismatic grains up to 2 mm long. Some amphiboles in the matrix are zoned from winchite, barrosite cores to Mg-hornblende rims.

According to the petrography and chemical compositions of the minerals the pelitic schists are adjacent to the Seba metagabbro mass probably suffered high-pressure metamorphic condition. The chemical discontinuity between the core and the rim of the garnets is formed in the different metamorphic conditions for the core and the rim. Similar zoning of garnets have been reported by Higashino and Takasu (1982), Takasu (1984) and Nomizo (1992) from the Besshi district. Takasu (1984) reported similar garnet from the Seba metagabbro mass, the core of garnet undergone an eclogite facies metamorphism at higher temperature conditions (720-750 C, 12-24 kbar) and the rim together with the surrounding Seba eclogitic basic schists (610-650 C, 7-24 kbar).

Reference:

Higashino, T and Takasu, A., 1982, Journal of Japan Association of Mineralogy, Petrology and Economic Geology. 77, 362-367. Takasu, A, 1984, Journal of Petrology. 25, 619-643. Nomizo, A, 1992, Journal of Geological Society of Japan. 98, 49-52.

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