Geophysical Research Abstracts
Vol. 12, EGU2010-7046, 2010
EGU General Assembly 2010

Garnet - two pyroxene rock from the Gridino complex, Russia: a record of the early metasomatic stage

Alena A. Morgunova (1) and Alexei L. Perchuk (1,2)

(1) Institute of Experimental Mineralogy, Russian Academy of Sciences, Chernogolovka, 142432, Russia, (2) Department of Petrology, Geological Faculty, Moscow State University, Moscow, 119992, Russia (alp@geol.msu.ru, +7 4959328889)

The Gridino complex is one of the oldest high pressure complexes on the Earth. The most spectacular exposures occur in islands and in a 10-50 m wide belt along the shore of the White Sea in the Gridino area. The exotic blocks show wide range of compositions. In addition to predominating amphibolites and eclogites, there are also peridotites, zoisitites and sapphirine-bearing rocks. The peridotites are represented by garnet - two pyroxene rocks and orthopyroxenites. It this paper we present an intriguing results of the petrological study of the garnet- two pyroxene rock.

The garnet- two pyroxene rock considered occurs as elliptical body 4×6 m in size within amphibole-biotite gneiss in the island Visokii. The rock consists of mosaic of coarse-grained primary garnet, clinopyroxene and orthopyroxene. Accessories are represented by magnetite, ilmenite, pyrite and zircon. Garnet contains inclusions of clinopyroxene, Mg-calcite and chlorite. The chlorite inclusions always intergrow with dendritic mineral enriched in REE (mainly Ce) situated on the wall of vacuole which shows the tendency of negative crystal shape. Similar chlorite inclusions are hosted by clino- and orthopyroxenes. The chlorite is of diabantite composition. The inclusions are often surrounded by the two systems of cracks - radial and concentric, which is really exotic phenomenon for crystalline rock. The primary minerals experienced different degree of the retrograde alteration expressed as amphibolization and/or growth of the orthopyroxene-amphibole-garnet symplectites. The retrogression is patchy in the central part of garnet- two pyroxene body, but intensifies towards the rims where primary minerals are absent. Mineral thermobarometry reveals HP rock equilibration at 670-750 and 14-20 kbar followed by subisothermal decompression down to 640-740 and 6-14 kbar.

Specific composition of the chlorite and its association with REE phase in all rock-forming minerals suggests that anhydrous HP mineralogy was developed after some metasomatic rock. Fragments of this rock that have been trapped by the minerals during HP metamorphic event are likely experienced dehydration melting and subsequent crystallization under close system conditions. Such interpretation elegantly explains location of the REE phase, expansion and contraction of the inclusions resulted in the exotic phenomenon - two systems of cracks.

Financial support by RFBR grants N 09-05-01217 and 09-05-00991.