



Corona textures formation in retrogressed eclogites of the Kokchetav complex: a metasomatic model

T. Larikova

Institute of Ore Deposits, Mineralogy, Petrology and Geochemistry of Russian Academy of Sciences, Moscow, Russia (larik@igem.ru)

Typical corona textures usually form on the prograde stage of the metamorphism during the eclogitization of gabbro-norites. Prograde corona textures were studied in the Belomorian ($T=670^{\circ}\text{C}$, $P=8$ kbar) and the Marun-Keu (16 kbar) complexes (Larikova, 2000, in press). In spite of different P-T conditions of LP Belomorian and HP Marun-Keu complexes which influence on the primary plagioclase stability and compositions of corona minerals (garnet is more pyrope-rich, and clinopyroxene - jadeite-rich), the mechanism of coronas formation are supposed to be analogous: sequences of layers in the coronas and their thickness are similar in both complexes. The D.S.Korzhinsky (1959) model of the metasomatism was applied to corona textures: all layers in the coronas are supposed to form simultaneously; zoning of the coronas illustrates this opposing diffusion, and different mineralogical composition and layer sequences are determined mostly by chemical potential gradients of the diffusing components. Experimental modelling of the corona textures confirms the model (Larikova, Zaisky, 2002). Retrograde corona textures were studied in the eastern part of the Kokchetav complex: eclogites of the Borovoe region show a P-T peak conditions (at $T=680-700^{\circ}\text{C}$, $P=16-20$ kbar) of the metamorphism, its decompression stage with symplectite development at 9-12 kbar, and final transformation to garnet amphibolites. During the retrogression, eclogites assemblages became unstable: omphacite was substituted by Cpx-Pl symplectites; garnet and quartz grains were surrounded by coronas. Around quartz only one corona of Cpx is developed, around ilmenite - a titanite rim. The garnet grains are surrounded by two coronas: an inner (adjoining to Grt) made of plagioclase, an outer - of hornblende. The width of the whole corona does not exceed 70 μm . Sometimes the inner plagioclase corona consists of symplectites of Pl and Cpx, but with minor amount of Cpx unlike the Cpx-Pl symplectites, developing after

primary omphacite. Thus a reaction, opposite to the reaction of eclogitization, occurs in retrograde corona textures. Similarly to the prograde coronas, during this reaction both layers must have been formed simultaneously according to the model. However chemical potential gradients of the diffusing components are not well-pronounced here, because the initial Grt and Cpx are not so contrast in composition. According to Korzhinsky, if the chemical potential gradient is low, the zone (layer) front moves faster, therefore the formation of the coronas of this type was probably very fast. Depending on varying mobility of the diffusing components, which is responsible for a number of phases in each layer of the corona texture, mineral set of the coronas is the result of graduated distribution of the diffusing components in the corona interface. To describe quantitatively the relative mobility of the components, phenomenological Onsager diffusion coefficients were calculated for all studied coronas. Thus the metamorphic model can be applied to the corona textures which formed not only during the prograde eclogitization of gabbros, and also during the retrogression of the eclogites. Author thanks Russian Foundation for Fundamental Research (ž 03-05-64487).