Nanogranitoids in UHT and (U)HP mafic and ultramafic rocks of the Bohemian Massif

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Primary melt inclusions have been identified in UHT-HP garnet clinopyroxenite of the Granulitgebirge and in the UHT-UHP eclogite of the Erzgebirge, Bohemian Massif. The Granulitgebirge samples are coming from two different localities in which garnet clinopyroxenite are single layers in the surrounding peridotite. The inclusions, 5-20 μm in diameter, are polycrystalline, i.e. nanogranitoids, and glassy and they occur in clusters in the inner part of the garnet. The nanogranitoid mineral assemblage, determined by Raman spectroscopy and EDS mapping, is kumdykolite/albite, phlogopite, osumilite, kokchetavite and a variable amount of quartz. Microstructural and microchemical features suggest that they were former droplets of melt trapped while the garnet was growing as a peritectic phase along with the clinopyroxene. We have re-homogenized the nanogranitoids to a hydrous glass of trondhjemitic to granitic composition in a piston cylinder apparatus at 1000-1050 °C, 22-15 kbar; such conditions correspond to the expected formation of the host garnet and thus of melt entrapment. Trace element data show an enrichment in Li, B, Cs, Rb, Ba and Pb that suggest the involvement of white mica/phengite, i.e. a crustal component, in the melt-producing reaction. The presence of a granitoid melt in mantle rocks can be the result of two different processes: (1) localized melting of a phengite-bearing rock with a simultaneous production of melt, garnet and clinopyroxene or (2) infiltration of an external melt which generates the pyroxenite via metasomatic interaction with the peridotites.

In the Erzgebirge, the eclogite occur in lenses and blocks in diamond-bearing gneiss. Their preliminary investigation showed polycrystalline inclusions, 5-25 μm in diameter, with occasional presence of glass in the inner part of the garnet where they form clusters. The phase assemblage in the inclusions includes biotite, quartz/cristobalite, white mica, kumdykolite/albite with a variable amount of kokchetavite, carbonate and graphite. The detailed study of the Erzgebirge samples will allow us to better constrain the processes related to melt presence in continental crust at mantle depths.