Nanogranitoids in orogenic peridotites from the Bohemian Massif: evidence for partial melting, metasomatism or both?

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Nanogranitoids have been identified for the first time in garnet clinopyroxenites of the Granulitgebirge, Bohemian Massif. These rocks occur in bodies of serpentinized garnet peridotites, hosted in turn in felsic HP granulites. The investigated inclusions are polycrystalline or glassy, 5-20 μm in diameter. They occur as clusters in the inner part of garnet and, due to their random distribution, they are interpreted as primary, i.e. they formed during garnet growth. Nanogranitoids are identified in the same rock type from two different locations. The phases crystallized in the inclusions were identified via Micro Raman and EDS mapping: kumdykolite/albite, phlogopite, osumilite, kokchetavite and a variable amount of quartz occur in inclusions from both locations. Kumdykolite and kokchetavite are polymoprhs of Ab and Kfs respectively and form during rapid cooling of the host rock [1]. Both assemblages support the origin of these inclusions as former droplets of melt.

We have also re-homogenized the inclusions to a hydrous glass of granodioritic/quartz-monzonitic composition in a piston cylinder apparatus at 1000°C, 22 kbar; such conditions correspond to the formation of the host garnet [2] and thus of melt entrapment. Preliminary interpretation of normalized trace element data show that the trapped melt is enriched in Cs, Rb and Pb, whereas Ba, Nb and Sr show a negative anomaly. Such patterns suggest the involvement of mica in the melt-producing reaction.

These nanogranitoids may be the result of two different processes: (a) localized melting of metasomatized mafic rocks already present in the peridotites, with simultaneous production of garnet, or (b) an interaction between melt percolating from the surrounding felsic granulites and metasomatized peridotites, with consequent formation of these garnet clinopyroxenites.

References:

[1] Ferrero S. et al (2016) CTMP **171**, 3. [2] O'Brien PJ & Rötzler J. (2003) JMG **21**, 3-20.