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Former melt inclusions in garnets from granulites of the Góry Sowie Block, NE Bohemian Massif

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Studies of melt inclusions in metamorphic minerals have recently become an important trend in petrology. Such inclusions typically consist of crystalline polyphase aggregates with granitoid composition, and for this reason they are called “nanogranitoids”. The melt trapped in these inclusions is representative of the bulk composition of crustal melt (Cesare et al., 2015) and may also provide insights into the cooling history (Ferrero et al., 2016) in rocks where the melting history is overprinted by later metamorphic events. Nanogranitoids have been so far identified and characterized in several different metamorphic belts all over the world. Recently melt inclusions in garnets were also recognized in granulites of Orlica-Śnieżnik Dome in Central Sudetes, NE margin of Bohemian Massif (Ferrero et al., 2015; 2016). Encouraged by this discovery, other granulitic bodies of Bohemian Massif, the Góry Sowie Block (GSB) were investigated in detail to identify further occurrence of melt inclusions. The GSB is a tectonic block composed of high-grade Variscan polimetamorphic rocks, mainly paragneisses and migmatites with minor granulites associated with mafic and ultramafic bodies (e.g. Kryza et al., 1996). Our study focus on the best preserved granulites, cropping out near Zagórze Śląskie.
Studies revealed strong zonation of garnet porphyroblast with a distinct core and rim, which suggests the presence of two generations of garnet, related to garnet grow during granulitic and subsequent amphibolitic metamorphic episodes respectively. Atoll garnets, also present in the sample, have the same composition of the garnet rim, suggesting they grew at the same time of the garnet rim. Optical microscopy reveals clusters of small, polycrystalline inclusions in garnet porphyroblasts. Most of the studied inclusions have negative garnet crystal shape, a typical feature of melt inclusions. Polycrystalline inclusions are located in the garnet cores which implies their formation during the early stage of garnet growth, while the garnet rims are inclusion-free. Raman micro spectroscopy showed the presence of quartz, cristobalite, feldspars polymorphs (kokchetavite, kumdykolite), micas (muscovite, biotite), and limited amounts of carbonates and graphite. Occasionally methane was observed. Zircon is the most common accessory suggesting that melt droplets may “stick” preferentially to zircon grains. Apatite, rutite, titanite have been also observed in nanogranitoids. In conclusion, the present study confirms for the first time the presence of nanogranitoids in garnet grains of GSB granulites using optical microscope and micro-Raman spectroscopy as main tools of investigation. These nanogranitoides are evidence for presence of melt during early stage of peritectic garnet growth.

References

Cesare B. Acosta-Vigil A., Bartoli O., Ferrero S. (2015) Lithos, 239, 186-216.
Ferrero S., Wunder B., Walczak K., O’Brien P.J & Ziemann M. (2015) Geology, 43, 5, 447-450.
Ferrero S., Ziemann, M.A., Angel R., O′Brien P.J., Wunder, B. (2016) Contributions to Mineralogy and Petrology, 171, 3.
Kryza R., Pin C., Vielzeuf D. (1996) Journal of Metamorphic Geology, 14, 531–546.