



## Occurrence of silicate melt, carbonate-rich melt and fluid during medium pressure anatexis of metapelitic gneisses (Oberpfalz, Bavaria) revealed by melt and fluid inclusions study

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In the last decades our understanding of partial melting processes in the lower crust profited from the investigation of fluid inclusions (Touret et al., 2009) and more recently of anatectic melt inclusions (Cesare et al., 2011) within enclaves and high-grade terranes. The latter finding allowed us to directly analyse the original anatectic melt (Ferrero et al., 2012; Bartoli et al., 2013) preserved within peritectic phases, i.e. mainly garnet, but also ilmenite and spinel, before fractionation, mixing and contamination processes took place. Furthermore, the occurrence of primary fluid inclusions (FI) and anatectic melt inclusions (MI) within enclaves allowed the characterization of the COH fluid present during anatexis under fluid+melt immiscibility conditions (Ferrero et al., 2014).

Primary crystallized MI, or “nanogranites”, and FI have been identified to occur as clusters in garnet from stromatic migmatites (Zeilengneise) from Oberpfalz, Eastern Bavaria (Moldanubian Zone). During the late Carboniferous, these Grt+Bt+Sill+Crd+Spl metapelitic gneisses underwent HT/MP metamorphism, followed by a HT/LP event (Tanner & Behrmann, 1995). Nanogranites,  $\leq 20 \mu\text{m}$  in size, consist of Qtz+Bt+Wm+Ab±Ap, and show abundant nanoporosity, localized in the quartz. Fluid inclusions are smaller, generally  $\leq 10 \mu\text{m}$ , and contain CO<sub>2</sub>+N<sub>2</sub>+CH<sub>4</sub> plus siderite, pyrophyllite and cristobalite, mineral phases not observed in the surrounding rock or as mineral inclusion in garnet. Polycrystalline inclusions containing Cc+Wm+Opx±Qz, commonly  $\leq 10 \mu\text{m}$  in diameter, occur in the same cluster with MI and FI. Microstructural features, negative-crystal shape and the well-developed crystalline faces of calcite within inclusions suggest that they may result from the crystallization of a carbonate-rich melt. The lack of arrays of carbonate-bearing MI, verified by cathodoluminescence investigation, supports their primary nature, i.e. they formed during garnet growth. This would suggest the occurrence of a silicate melt and a carbonate-rich melt during anatexis at relatively shallow crustal levels, but this hypothesis needs to be further tested through re-homogenization experiments by piston cylinder means.

### References

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