# Evidence for fluid-melt immiscibility during partial melting in the Oberpfalz migmatites, Moldanubian Zone (Bohemian Massif)

WANNHOFF I.[1], FERRERO S.[1], O'BRIEN PJ[1], ZIEMANN MA[1] & HECHT L.[2]

[1] *Universität Potsdam, 14476 Potsdam, Germany (correspondence: wannhoff@uni.potsdam.de)*
[2] *Museum für Naturkunde (MfN), 10115 Berlin, Germany.*

Primary fluid melt immiscibility is mainly the result of the formation of a separate COH fluid during anatexis of graphite-bearing sediments, and they were previously identified in enclaves and garnet xenocrysts. In this study fluid and melt inclusion bearing garnets from partially melted metapelitic rocks from the Oberpfalz, Moldanubian Zone (Bohemian Massif) have been investigated in detail. Partial melting occurred via dehydration melting of biotite at 800-850°C and 0.5-0.7 GPa.

The Oberpfalz migmatites contain garnet, cordierite, biotite, plagioclase, K-feldspar, quartz, green spinel and accessory minerals such as ilmenite, rutile, graphite, apatite, monazite and zircon. At the microscale the presence of melt pseudomorphs, i.e. cuspate lobate grains of microcline, plagioclase, quartz and cordierite, is another direct evidence for partial melting. Microstructural and microchemical investigation confirmed garnet as a peritectic phase, which formed simultaneously with the melt and trapped both fluid and melt as primary inclusions. The garnet shows a significant zoning in Ca with an M-shaped profile, interpreted to be due to various stages of growths at different PT conditions. The inclusions are concentrated in clusters in the Ca-poor core and rim of the garnet, and show anhedral to negative crystal shape, with size 5-25 µm. The fluid consists of mainly $CH_4$, $N_2$ and minor $CO_2$ and $H_2$ (COHN fluid), while the melt shows a $H_2O$-bearing granitic character as it crystallizes micas (biotite and muscovite), albite/kumdykolite and quartz/cristobalite. The formation of kumdykolite and cristobalite, instead of albite and quartz, leads to the conclusion that these inclusions are fully preserved. The presence of $CH_4$ in fluid inclusions in garnet is rarely reported and generally interpreted as the result of selective water-loss or post entrapment modifications. Calcite and siderite may be present in fluid inclusions and are interpreted to have formed, respectively, after entrapment as daughter mineral (calcite) and result of carbonation/hydration reactions between the fluid and the host garnet (siderite).