

METAMORPHIC EVOLUTION OF THE MOLDANUBIAN ZONE OF THE OBERPFÄLZER WALD/ NE-BAVARIA

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The Moldanubian Zone of the Oberpfälzer Wald shows a strong imprint by a low pressure–high temperature metamorphism, which led to cordierite–K–feldspar gneisses and the development of a large amount of migmatites. The common paragenesis is biotite, cordierite, sillimanite, quartz, K–feldspar, plagioclase (An_{20-32}), ilmenite and hercynitic spinels. Intercalations of garnet–cordierite gneisses contain evidence, such as relict staurolite ($Fe/Fe+Mg = 0.85-0.92$, $ZnO = 0.80-2.20$ wt%), kyanite and rutile inclusions in garnet, for an earlier metamorphism under higher pressures. Relict kyanites are also appearing in the matrix, partly replaced by sillimanite or mostly by a symplectitic hercynite ($ZnO = 2.3-5.6$ wt%). These spinels are normally enclosed in cordierite or plagioclase without any contact to quartz, but one sample contains large (up to 0.5 mm) subidiomorphic spinels ($Fe_{0.80}Mg_{0.05}Zn_{0.15}Cr_{0.12}Fe_{0.07}Al_{1.81}O_4$) in contact with quartz partly replaced by cordierite ($XMg = 0.4$) pointing to the high temperature reaction $spi+qz=>cord$. Another spinel ($Fe_{0.61}Mg_{0.11}Zn_{0.28}Al_{2.0}O_4$) + quartz coexistence in this sample resulted from a high temperature breakdown of staurolite inclusions in garnet. Those reactions point to a peak temperature close to $800^\circ C$ as well as symplectitic dehydration melting textures of biotite, which produced very fine grained (some μm) K–feldspar, albite, quartz, ilmenite and cordierite.

Structural relationships and inclusion patterns point to at least three different garnet growth stages, of which two were before the main deformation and a third syndeformational. These structurally younger garnets contain a lot of orientated sillimanite needles parallel to the foliation. Almost all these garnets show a similar compositional zonation with a flat core region ($XMg = 0.20-0.25$) and strongly zoned rims ($XMg = 0.09-0.11$), with the exception of one garnet in which a previous growth zoning seems to be partly preserved (see fig.). It contains inclusions of biotite, ilmenite, quartz and plagioclase with very variable anorthite contents. Plagioclase in the Ca–rich center of the garnet varies from An_{68} (core) to An_{80} (rim). Calculations with the GASP–barometer yield pressures of 7.8–10.2 kbar using the highest Ca contents in plagioclase and garnet, respectively.

A p–T path will be presented.

