

# Garnet-diopside-K-feldspar granulites from Chepelare shear zone, Central Rhodope massif, Bulgaria

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The Chepelare shear zone is squeezed between the migmatic gneisses of the Arda lithotectonic unit. The zone includes different lithologies, that preserve high-pressure granulite facies mineral assemblages, interpreted as late metamorphic overprint products, after UHP metamorphism, during the Late Jurassic time.

Mesocratic carbonate-free rocks with big garnet porphyroblasts (up to 1.5 cm) form a distinct (1-2 m-thick) level close to the southern part of the Marble quarry. The medium-grained homogeneous matrix of diopside-K-feldspar-plagioclase(An<sub>62-98</sub>)-quartz is locally replaced by coarse-grained parts with big garnet porphyroblasts that intergrowth with K-feldspar and diopside ± late amphibole. Garnet porphyroblasts often occur as clusters of smaller hypidioblastic grains with almandine-grossular dominated composition and strong variation of all compounds (Alm<sub>38-62</sub>, Grs<sub>22-48</sub>, Pyr<sub>4-10</sub>, Sps<sub>5-13</sub>). This variation is due to grossular content change at plagioclase breakdown and marks two garnet generations. K-feldspar is Ab-rich (up to 12 mol%) and the amphibole from the intergrows refers to ferropargasite. Late fine-grained bands of chloritized biotite, margarite, K-feldspar, albite and deformed matrix minerals are extended at small angle towards the matrix foliation, and bend along the porphyroblasts. The accessory minerals comprise big titanite, epidote, allanite, zircon, apatite and pyrite. The observed variations in mineral composition and grain sizes reflect successively changed P-T and fluid regime conditions.

The peak mineral assemblage of porphyroblastic garnet, clinopyroxene and K-feldspar was formed beyond the plagioclase stability field. The expense of plagioclase could explain the formation of grossular enriched garnet and high XAb in K-feldspar. At 1 GPa, the garnet-clinopyroxene thermometer [1] yields temperatures ranging from 740°C to 810°C, which are similar to those obtained from Zr-in-titanite thermometry 730-820°C [2]

The examined mineral assemblage of garnet-diopside-K-feldspar marks high-pressure granulite facies, and it appears after another “dry” assemblage of plagioclase-diopside-K-feldspar.

[1] Krough Ravna (2000) *JMG* **18**, 211-219. [2] Heyden *et al.* (2008) *Contrib. Mineral. Petrol.* **155**, 529-540.