

HP-METAMORPHISM OF A RODINGITE FROM THE RHODOPE MASSIF, GREECE

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The Rhodope Metamorphic Province (RMP) in northeastern Greece is one of only five localities where UHP-metamorphism has led to the formation of diamonds in metapelitic lithologies, indicating exceptionally deep subduction of continental crust. The diamond-bearing felsic gneisses of the RMP are associated with tonalitic to granodioritic metaplutons and an ultramafic complex of \pm serpentinized lherzolites with lenses of Grt-clinopyroxenites and eclogites. In the ultramafic complex we have found a rock containing Grt + Cpx + Ky + Mg-St + Zo + Cam + Tur + Pmp + Rt + Zrn + Ap. The bulk composition is Si-poor and Al-, Ca-, and Mg-rich with 42.1 wt% SiO₂, 19.9 wt% Al₂O₃, 16.4 wt% CaO and 10.9 wt% MgO similar to that of metarodingites (e.g. LI et al., 2004 and references therein). An extremely high bulk Zr-content of 434 ppm along with 51 ppm Th and 22 ppm U gives rise to numerous zircons in part with strong BSE- and CL zoning. Grt of this sample is Mg- and Ca-rich with Prp₄₁₋₅₂ Alm₂₅₋₃₀ Grs₂₁₋₂₄ Sps₀₋₁; Cpx is a Di-Cats solid-solution with very low Jd_{ss} (Di₇₈₋₈₂Cats₈₋₁₁Jd₀₋₅) corresponding to the low bulk Na₂O content of 0.7 wt%. Zo shows evidence of metasomatic alteration in the form of irregular zones strongly enriched in Sr with 0.8-1.1 wt% SrO. Both Zo and Grt contain numerous Ky-inclusions. Mg-St has an X_{Mg} of 0.59 - 0.62 and is exclusively present as inclusions in Zo. Metamorphic temperatures based on the Fe/Mg-exchange between Cpx and Grt are between 700 – 740 °C. Metamorphic pressures are more difficult to constrain due to the low bulk Na-content but the presence of Mg-St indicates $P \geq 1.5$ GPa. Textures and phase compositions point to a complex history of hydrous fluid infiltration during uplift and exhumation of the metarodingite involving amphibolitization followed by Pmp-formation and a very late tourmalinization in part consuming Pmp. Whether or not Zr- and Sr-metasomatism occurred under peak metamorphic conditions, however, cannot be deduced from the mineral textures.

Reference

LI, X.-P., RAHN, M. & BUCHER, K. (2004): *Inter. Geol. Rev.*, 46, 28-51.