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Petrology of high pressure metapelite from the Kamieniec Metamorphic Belt (Sudetes, NE Bohemian Massif): combined Raman spectroscopy of quartz inclusions in garnet and PT pseudosections approach

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The Kamieniec Metamorphic Belt, in the north-eastern part of the Variscan Belt of Europe, comprises fragment of a volcano-sedimentary succession exposed within the collision zone between crustal domains represented by the Saxothuringian and Brunovistulian microplates. In this abstract we present PT estimates for the micaschist sample from the Kamieniec metamorphic Belt obtained using phase equilibria integrated with laser Raman spectroscopy of quartz inclusions in garnet. The metamorphic evolution of the investigated micaschist comprise an early HP/LT assemblage M1 with garnet I (forming cores of garnet porphyroblasts), phengite (observed as inclusions in garnet I as well as abundantly present in the matrix of the rock) and rutile followed by a M2 mineral assemblage comprising garnet II (defining rims of garnet porphyroblasts), white mica II (with low Si content), biotite, plagioclase and ilmenite. Based on the measured garnet I composition (Xgrs, Xsps and Xalm) and constructed phase diagram, three possible P-T conditions can be found (18 kbar, 470 ^{o}C; 14 kbar. 500 ^{o}C; 6 kbar, 560 ^{o}C). Similarly, isopleths calculated for fractionated rock composition and garnet II intersect at various places but only one is located within the stability field of M2 mineral assemblage (c. 550-600 ^{o}C and 6.5-8.5 kbar). To better constrain the P-T history, especially for pressure, independent quartz-in-garnet Raman barometry is applied. About 44 quartz inclusions in garnet host have been identified with laser Raman spectroscopy. The spectral shifts of three Raman bands at wavenumbers 128, 206 and 464 cm^{-1} relative to a fully relaxed quartz crystal in the matrix are obtained. All three Raman bands yield very consistent residual pressure. The maximal residual quartz inclusion pressure is ca. 6.4 kbar. Using the measured garnet composition and a 1D isotropic elastic model, the maximal entrapment pressure is determined to be 15$\sim$16 kbar. The entrapment temperature is chosen to be 500 ^{o}C but it does not significantly influence the estimated entrapment pressure. Summing up, thermodynamic modelling combined with laser Raman spectroscopy suggests that mineral assemblages record peak-pressure conditions of c. 16$\sim$18 kbar and 470 ^{o}C (M1) followed by decompression to 6-8 kbar and 550 to 600 ^{o}C (M2). Presented data provides the first report on mica schists from the Kamieniec metamorphic Belt metamorphosed under eclogite-facies conditions.

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