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Intracrystal microtextures in alkali feldspars from fluid deficient felsic granulites: A chemical and TEM study

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Samples of essentially "dry" high-pressure felsic granulites from the Bohemian Massif (Variscan belt of Central Europe) contain large perthites with several generations of exsolution features. A first generation of albite-rich plagioclase precipitates takes the form of spindles or lenses up to 30 micrometers long with an aspect ratio of 12 to 6. The precipitates show strong shape preferred orientation. A second generation of albite-rich precipitates takes the form of thin (around 30 nanometers wide) up to several 10's of micrometers long lamellae or spindles. In the vicinity of large kyanite, garnet or quartz inclusions, the orthoclase-rich host shows diffuse exsolution features taking the shape of short and narrow spindles (tails) aligned in two directions at an angle of about 45˚. The contacts between the orthoclase-rich host and the plagioclase precipitates of the first generation and the contact between the orthoclase-rich host and large kyanite, quartz and garnet inclusions is lined with a thin rim of albite This albite was formed at a late stage of the petrogenetic history probably related to fluid infiltration and associated albitization. In the vicinity of the large inclusions the plagioclase precipitates of the first perthtite generation become significantly depleted and the perthite microstructure coarsens composed dominantly of tweed orthoclase. The integrated composition corresponds to $Or_{59}Ab_{36}An_5$ in the inclusion free domains and slightly decreases in plagioclase content ($Or_{63}Ab_{33}An_4$) towards the kyanite or quartz inclusion. This chemical change is very gentle.

The primary exsolutions probably formed by spinodal decomposition at around 850-900˚C during the high pressure stage (16-18 kbar). The primary exsolution was followed by primary coarsening and albite twinning of the plagioclase precipitates. The second generation of albite-rich precipitates was formed at around 650-700 ˚C. TEM investigations revealed that the interfaces between the second generation plagioclase lamellae and the orthoclase rich host are coherent or semi coherent. The formation of albite linings at phase boundaries and of patch perthite produced incoherent interfaces. The patch perthites, albitization and secondary coarsening in the vicinity of large inclusions developed below 400˚C contemporaneously with fluid infiltration in the course of deuteric alteration.