Partial melting under UHT and dry conditions: constraints from high-pressure and high-temperature melting experiments

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Melting experiments of quartz-feldspar (with trace amount of orthopyroxene) aggregates separated from UHT metamorphic rock of the Napier Complex were carried out in the temperatures ranging from 1000C to 1150C at 1.0 GPa under dry conditions. A sub-micron scale of quenched glass (melt) is generated at 1100C, and relatively voluminous quenched glass occurs along the grain boundary between quartz and plagioclase grains at 1150C. These result evident the partial melting possibly take place at the peak conditions of the Napier Complex under the dry conditions. Generated quenched glass illustrates the chemical nature of A-type granitoids, suggesting its relation with the generation of A-type granitoids reported from some of the outcrops in the Napier Complex.

Melting experiments under dry conditions for ultrahigh-temperature metamorphic rock were carried out in the temperatures ranging from 1000C to 1150C at 1.0 GPa using a piston-cylinder apparatus. The starting materials are mineral fragments of quartz, plagioclase (with antiperthitic exsolution lamellae) and a trace amount of orthopyroxene that are separated from garnet-orthopyroxene gneiss from the Mt. Riiser-Larsen area of the Napier Complex, East Antarctica. A trace amount and sub-micron scale of quenched glass (melt) is generated in the run product of the 1100C experiment, and relatively voluminous quenched glass occurs as thin films, < 20

in width, along the grain boundary between quartz and plagioclase grains at 1150C. These result evident the partial melting possibly take place at the peak conditions of the Napier Complex under the dry conditions. Generated quenched glass illustrates the chemical nature of A-type granitoids, suggesting its relation with the generation of A-type granitoids reported from some of the outcrops in the Napier Complex. Exsolution lamellae within plagioclase are still remained at 1100C, but is completely disappeared at 1150C. This is consistent with the peak temperature estimations of >1100C for the same area using the feldspar geothermometer (Hokada, 1999). These results support the field and petrological observation that the feldspathic patches or veins near the locality of the sample used in the experiments are the products of partial melting under UHT and dry conditions (Hokada et al., 2000).