Effect of water on melting relation of diopside (CaMgSi2O6) up to 13GPa

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Melting experiments were conducted on CaMgSi2O6-H2O system at pressures of 5.8, 7.7 and 13 GPa and temperatures between 1273K and 1873K in various water contents (7.7wt%, 14.3wt%). The present result shows the congruent melting behavior of diopside up to 13 GPa under hydrous condition. The solidus temperatures were ~1523K, ~1523K and ~1723K at 5.8, 7.7 and 13 GPa, respectively, which is ~873Kand ~1023K lower than those of anhydrous solidus at 6 and 13 GPa. The hydrous solidus of diopside has a positive Clapeyron slope from 8 to 13 GPa, which is similar to those of enstatite and pyrope garnet, but different from that of forsterite. Consequently, the present results indicate that MgO-rich liquid could be generated by mantle melting with increasing pressure above 8 GPa.

Melting experiments were conducted on CaMgSi2O6-H2O system at pressures of 5.8, 7.7 and 13 GPa and temperatures between 1273K and 1873K in various water contents (7.7 wt% an 14.3wt%). Perchuk et al.(1988) determined the melting relation on CaMgSi2O6-H2O system up to 3 GPa using piston cylinder apparatus, however further high pressure studies have not been done yet using multi-anvil apparatus. The aim of this study is the determination of the melting relation on CaMgSi2O6-H2O system above 3 GPa. The present result shows the congruent melting behavior of diopside up to 13 GPa under hydrous condition. The solidus temperatures of diopside under hydrous condition were ~1523K, ~1523K and ~1723K at 5.8, 7.7 and 13 GPa, respectively, which is 873K and ~1023K lower than those of anhydrous solidus at 6 and 13 GPa. The hydrous solidus temperature of diopside has a positive Clapeyron slope from 8 to 13 GPa, which is similar to those of enstatite and pyrope garnet, but different from that of forsterite which has a negative Clapeyron slope. Consequently, the present results indicate that MgO-rich liquid could be generated by mantle melting with increasing pressure above 8 GPa. In addition, the liquidus temperature decreases with increasing H2O content. This result shows that the amount of the generated magma depends on the H2O content in the mantle.