Externally heated lever type diamond anvil cell: application in high-pressure experiments involving COH components

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In recent years, increasing attention has been paid to the stability of hydrous and carbon-bearing solid phases in the Earth’ s mantle, since these phases can play an important role as the sources of volatiles in the deep Earth (e.g., [1-4]). Though the phase diagrams of silicate rocks with pure H_2O component are thoroughly established in the wide pressure and temperature ranges (e.g., [5-9]), there is a lack of high-pressure data for the complex systems of silicates with COH components.

In this study, we employed a lever type diamond anvil cell with a designed external heating system for the investigation of phase relationships in the basalt–$C_2H_2O_4$ system using *in situ* Raman spectroscopy as an analytical probe in the experiments at temperatures up to 900 ˚C and pressures up to 6.5 GPa. The quenched experimental products were further examined by the electron microprobe analysis and FTIR spectroscopy. At the highest experimental conditions, garnet, clinopyroxene and coesite were observed among the silicate phases and were coexisting with the carbon-rich polymeric phase. The absence of fluid phase in this assembly indicates that polymerization phenomenon can affect the phase boundaries in the carbon-rich silicate systems at high pressures.

References

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