

Phase equilibrium study of grossular garnet ($\text{Ca}_3\text{Al}_2\text{Si}_3\text{O}_{12}$) under high pressure and temperature

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Before clarifying the behavior of grossular garnet under pressure, an equation of state study of CaSiO_3 perovskite was extended to high temperature up to 1700 K. All the experiments were performed using SPEED1500 high pressure apparatus.

Many controversial results have been reported on the high pressure behavior of $\text{Ca}_3\text{Al}_2\text{Si}_3\text{O}_{12}$ garnet. In order to get definite conclusion, it is necessary to know the precise equation of state of CaSiO_3 perovskite. In the previous experiment(1997B0020), the measurements were made up to 1400K while higher temperature data were obtained in the present study. Fig. 1 and 2, respectively, represent the diffraction profiles at about 20 GPa from the sample before heating and at about 1100 K. Well crystalline perovskite was formed at about 1000K. Sample assembly was basically the same as before and it worked stably up to 1700K. Above this temperature, however, thermocouple became unstable and no reliable measurement was made. On release of pressure, a transition from high pressure phase to low pressure phase was observed. The structure of recovered sample was different from that of the starting material and the detailed analysis is in progress.

Effect of the size of anvil truncation (2 or 3 mm) was compared. In 2mm anvil, efficiency of the pressure generation is higher while the gap between anvils became very small above 650ton. As a result, the X-ray intensity dropped

considerably and reliable measurement becomes very difficult above this load.

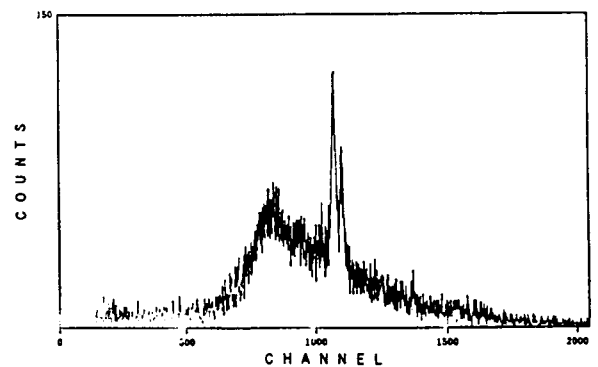


Fig. 1. Diffraction from CaSiO_3 at about 20 GPa before heating.

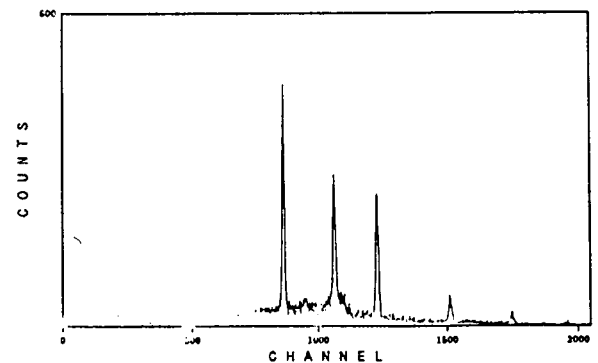


Fig. 2. Diffraction obtained from the above sample at 1100 K. Well crystallized perovskite phase was formed.