

High pressure phase relation in CaSiO₃-FeSiO₃ and its application to the lower mantle

Kiyoshi Fujino[1]; Hiroyuki Izumi[2]; Daisuke Hamane[2]; Yusuke SETO[3]; Takaya Nagai[4]; Nagayoshi SATA[5]

[1] Divi. of Earth and Planetary Sci., Hokkaido Univ.; [2] Earth and Planetary Sci., Hokkaido Univ.; [3] Earth and Planetary Sci., Hokkaido Univ.; [4] Earth and Planetary Sciences, Hokkaido Univ.; [5] IFREE, JAMSTEC

High pressure phase relation in CaSiO₃-FeSiO₃ at the lower mantle condition was studied by a laser-heated diamond anvil cell experiment, synchrotron X-ray radiation experiment and analytical electron microscopy. CaSiO₃ perovskite was stable down to the condition of the lowermost part of the lower mantle, while a mixture of FeO and SiO₂ was stable for FeSiO₃, and CaSiO₃ perovskite, FeO and SiO₂ phases coexisted in the intermediate region of the CaSiO₃-FeSiO₃ system at the same high pressure and high temperature conditions. CaSiO₃ perovskite has the Fe solubility of about 0.15 per formula unit at around 60 GPa and the Fe solubility seems to increase with pressure. All the Fe containing CaSiO₃ perovskites in the present study were tetragonal at room temperature and high pressure.