

A neutron diffraction study of phase transition in lawsonite at high pressure

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Lawsonite is a hydrous mineral which is considered as a main carrier of hydrogen in the subducting slab. It has a wide stability field at the pressures from 3.5 GPa to 10 GPa, and up to 1000 C. Previous single crystal X-ray diffraction and neutron diffraction studies indicate that there exist two phase transitions at low temperature. A property of low temperature is sometimes considered to be equivalent to the behavior at high pressure, and some studies pointed out the possibility of transition at high pressure. To investigate the pressure response of hydrogen bond and phase transition in lawsonite, neutron diffraction experiment was conducted.

Lawsonite was deuterated by D-H exchange reaction in the furnace under deuterated nitrogen atmosphere. High pressure and high temperature neutron diffraction experiment was conducted by 6-ram press at J-PARC MLF. Using 6-6 type anvil with TEL size of 10 mm, neutron diffraction pattern was corrected up to 6 GPa and 800 C. In addition, hydrostatic experiment at ambient pressure was conducted using Paris-Edinburgh press. New peak was observed at 1.83 Angstrom that indicates phase transition at high pressure. Detail of the result will be presented at the talk.

Keywords: Lawsonite, neutron diffraction, hydrous mineral, subducting slab