Geodynamics Seminar

第354回ジオダイナミクスセミナー

High-pressure phase transitions in $MgCr_2O_4$ up to 34 GPa

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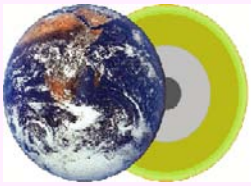
主催：愛媛大学地球深部ダイナミクス研究センター
日時：4/19（金）午後 4時30分～
場所：総合研究棟 4F 会議室



EHIME UNIVERSITY GRC GEODYNAMICS RESEARCH CENTER

Abstract

Kawai-type multianvil apparatus (KMA) and diamond anvil cell (DAC) has been widely used as a device to study phase transition and physical properties of the Earth's minerals at high pressure and high temperature. Compare to DAC, marked advantages of KMA are larger sample chamber and homogeneity of generated P-T condition. Recently, we have worked to develop a cell assembly for high-pressure generation with maintenance of large volume sample chamber. Furthermore we have been studied phase transitions related to several minerals making up a cell assembly, one of them is $MgCr_2O_4$ (magnesiochromite).

Generally, semi-sintered MgO is commonly used to pressure medium for KMA. CoO or Cr_2O_3 are added in moderate amounts to MgO in order to increase a function as thermal insulation material. In case of CoO doped MgO, these minerals form a solid solution that has a rocksalt type structure. However, Cr_2O_3 doped MgO include two minerals: a host of MgO (periclase) and minor amount of $MgCr_2O_4$ (magnesiochromite). Therefore, if this mineral has a phase transition under high-pressure and high-temperature condition, it can have blockade effect on higher-pressure generation. Thus, to clarify the phase relations in this mineral is useful in high-pressure technology on KMA.

$MgCr_2O_4$, magnesiochromite that is one of a spinel group mineral. Although, this magnesiochromite are studied in several early studies by theoretical calculation and DAC, their results have no success in doing demonstrate reliable conclusion because their experiments are conducted under low temperature condition up to about 300℃ or room temperature. In addition we could see considerable discrepancies between their overtures. So, we started to research phase relations on magnesiochromite by use of KMA.

The present results suggested that $MgCr_2O_4$ (magnesiochromite) dissociates into the post-spinel assemblage (Cr_2O_3, escalate + $Mg_2Cr_2O_5$, new phase 1) and recombines to form two type of $MgCr_2O_4$ new phase (NP2 and NP3) on a higher pressure up to about 34 GPa. A structural change to NP3 observed even during cold compression through a mixture of spinel and high-pressure phase. This phenomenon can be important issue to high-pressure generation because pressure medium occupy the large part of cell assembly.

In this presentation, I will introduce you to several emerging technologies and new insights appertain to high-pressure experiment on KMA.

詳細は当センターホームページ: http://www.ehime-u.ac.jp/~grc/をご覧ください
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