Geodynamics Seminar

第370回ジオダイナミクスセミナー

Equations of state at multi-megabar pressure

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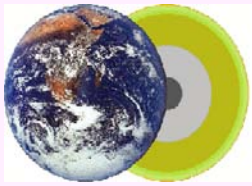
主催：愛媛大学地球深部ダイナミクス研究センター
日時：11/22（金）午後 4時30分～
場所：総合研究棟Ⅰ 4F 共通会議室



EHIME UNIVERSITY GRC GEODYNAMICS RESEARCH CENTER

Abstract

Super Earths which have a few times of Earth's mass were found in the extra solar system. Thus, the compression behaviors of planetary materials at multi-megabar pressure are important to understand the Super Earth's interior. Recently, we performed the compression studies for MgO, Al_2O_3, $MgSiO_3$, Fe and Fe-Ni alloy. Especially, $MgSiO_3$ post-perovskite is a most fundamental silicate phase in such huge terrestrial planets. Here we report the compression behavior of $MgSiO_3$ post-perovskite phase up to 280 GPa.

Mg_2SiO_4 olivine powder mixed with 5 wt.% Au powder was used as a starting material, and $MgSiO_3$ glass powder used as the thermal insulator. We used a symmetric-type diamond anvil cell with the diamond anvils of culet size of 35 and 100 um for high pressure generation. The olivine pellet was coated by thin (150-200 nm) gold layers by conventional sputtering method and loaded into a sample hole that had been drilled in a precompressed tungsten gasket. Sample was annealed by the double-sided laser heating system with fiber laser at each pressure condition to minimize the deviatoric stress in the sample. The unit cell volume of the sample was determined by the synchrotron X-ray diffraction experiment at the SPring-8 BL10XU beamline, Japan.

Although the equation of state (EoS) was highly influenced by the choice of the pressure scale, the EoS based on Tange *et al.*(2009)'s MgO scale was successfully consistent with the prediction by *ab initio* calculation. The volume difference between experimental and theoretical model was only 0.7% at 1 TPa.

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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