



Partitioning of water in mantle minerals

T. Inoue (1), M. Katsuda (1), T. Irifune (1), H. Yurimoto (2)

1. Geodynamics Research Center, Ehime University, Japan, (2) Department of Earth Sciences, Hokkaido University, Japan (inoue@sci.ehime-u.ac.jp / Fax: +81-89-927-8167 / Phone: +81-89-927-9658)

Water is the most abundant volatile component on the Earth's surface, and it has been supplied to the Earth's interiors by subducted slab. Water influences the physical properties and melting temperature of minerals. Olivine and garnet are the abundant minerals in the mantle, and it is clarified that the high-pressure polymorphs of olivine, wadsleyite (Wd) and ringwoodite (Rw), can contain ~3wt% H₂O (e.g. Inoue et al., 1995; Kohlstedt et al, 1996). The partitioning of H₂O among those mantle minerals should be important, however there are few data except for the result in the system MgO-SiO₂-H₂O (Bolfan-Casanova et al., 2000). We have determined the partitioning of H₂O between Wd, Rw, perovskite (Pv) and majorite garnet (Mj) to clarify the distribution of H₂O in the mantle using the model mantle composition.

High-pressure experiments were conducted by MA-8 type (Kawai-type) high-pressure apparatus in Ehime University. We used pyrolite composition which was approximated with respect to five major components, CaO, MgO, FeO, Al₂O₃ and SiO₂. Two starting H₂O contents, 2.9 and 8.3 wt% were selected. The experimental P-T conditions were 18-23 GPa and 1200-1700°C. The recovered samples were polished and then the chemical compositions were determined by EPMA in Ehime University and the water contents of minerals were measured by SIMS in Hokkaido University.

We succeeded to synthesize large (~30-50μm) coexisting crystals of Wd, Rw, Pv and Mj to determine the H₂O partitioning between those phases. The H₂O content of Wd and Rw decreased with increasing temperature, which is consistent with Ohtani et al. (2000). However the H₂O content of Mj did not change so much with increasing temperature. As the results, the partition coefficients between Wd and Mj, and between

Rw and Mj decreased with increasing temperature. Further details will be presented.