The 490th Geodynamics Seminar

Stability of Fe_2O_3 in the lower mantle

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Abstract

Fe_2O_3 hematite is one of the abundant iron oxide on the Earth. Because of the geophysical importance of Fe_2O_3, phase relations of Fe_2O_3 at high pressure have been investigated using a Kawai-type multianvil apparatus (Ito et al., 2009) and a laser heated-diamond anvil cell (e.g., Ono and Ohishi, 2005; Bykova et al., 2016). However, stability of Fe_2O_3 in lower mantle condition is not well understood and there are some inconsistencies among their studies. In this study, we made high pressure and high temperature experiments using KMA with sintered diamond anvils in conjunction with in situ X-ray observations up to 60 GPa and 1500 K in BL04B1, SPring-8. Formation of ι-Fe_2O_3 (Rh_2O_3 II-type) was observed at ~40 GPa region, which is consistent with data reported by Ito et al. (2009). Furthermore, single phase of ζ-Fe_2O_3 ($GdFeO_3$-perovskite-type) was observed above pressures of ~50 GPa. I will talk about stability of Fe_2O_3 and implications for oxygen cycling in the deep part of lower mantle.

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