Melting relations in the system of $MgSiO_3$ –SiO_2 at high pressures

*Takuya Moriguti[1], Akira Yoneda[1], Eiji Ito[1]

1. Institute for Planetary Materials, Okayama University

Melting relations in the MgO–SiO_2 system at high pressures have been extensively studied to simulate chemical differentiation in a deep magma ocean formed in the early stage of the Earth (e.g. Kato and Kumazawa, 1985; Ito and Katsura, 1992). Almost all of these works have been carried out on the compositions ranging from MgO to $MgSiO_3$, assuming that the bulk mantle composition is peridotitic or close to that derived from CI chondrite. Recently enstatite chondrite (E-chondrite) was proposed as the bulk earth source material (Javoy et al., 2010) because the isotope systematics over O, N, Mo, Re, Os, and Cr for the Earth and Moon are almost identical to that of E-chondrite. In E-chondrite, the silicate composition is characterized by MgO/SiO_2 = 0.5 (in weight ratio) which is substantially lower than that of the peridotitic mantle (~0.85).
In this context, melting relations on compositions more SiO_2 enriched than $MgSiO_3$ are indispensable to clarify the mantle fraction. However, available information regarding phase relations in the system $MgSiO_3$ –SiO_2 is so far limited to 1 GPa. In the present study, therefore, we would determine the melting relations at pressures 5 to 20 GPa, focusing on the compositions of MgO-xSiO_2 (x = 0.8 to 1.2). We expect to present some new results.

Keywords: enstatite chondrite, melting relation, magma ocean, mantle differentiation, high pressure

