[JJ] Evening Poster | S (Solid Earth Sciences) | S-MP Mineralogy & Petrology

[S-MP38]Physics and Chemistry of Minerals

convener:Hiroaki Ohfuji(Geodynamics Research Center, Ehime University), Seiji Kamada(Frontier Research Institute for Interdisciplinary Sciences, Tohoku University)

Thu. May 24, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

In this session, we will discuss the physics and chemistry of the Earth and planetary materials (including amorphous and melts) based on the results obtained from various experimental methods such as X-ray diffraction, FT-IR, Raman spectroscopy, electron microscopy and computer simulations.

[SMP38-P03]Phase equilibrium relations in $MgSiO_3$ – SiO_2 system under high pressures

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Melting relations in the MgO–SiO_2 system have been extensively studied since Bowen and Anderson (1914) under atmospheric pressure. Chemical differentiations in the deep magma ocean have been simulated based on the high pressure experimental data (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, however, enstatite chondrite (E-chondrite) has been payed attention 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 nearly identical to those 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, understanding of melting relations over compositions between SiO_2 and $MgSiO_3$ is indispensable to clarify the mantle fractionation. It also relates to investigations of chemical compositions of the crust at early stage of the Earth. However, there have been very limited works on the effect of pressure in the $MgSiO_3$–SiO_2 system. In addition, available information regarding phase relations in the system is so far limited to 5 GPa (Dalton and Presnall, 1997). In this 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), covering silicate compositions of E-chondrite.

References

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Kato and Kumazawa (1985) Garnet phase of $MgSiO_3$ filling the pyroxene-ilmenite gap at very high temperature. *Nature 316*, 803-805.