Reexamination of iron partitioning between perovskite/post-perovskite and ferropericlase in the lower mantle condition

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The Fe^{2+}-Mg distribution coefficients (K_D) between perovskite/post-perovskite and ferropericlase have been repeatedly studied by laser heated diamond anvil cell (LHDAC) experiments [Kobayashi et al., 2005; Auzende et al., 2008; Sinmyo et al., 2008], however the results exhibit large inconsistency. This is possibly due to the chemical heterogeneity in the LHDAC sample. Previous study revealed that laser heating center was strongly depleted in iron, and K_D values significantly change with the local bulk FeO content [Sinmyo et al., 2008]. Here we reinvestigated K_D in $(Mg,Fe)_2SiO_4$ bulk composition with chemically homogenous sample. High-pressure and -temperature experiments were carried out by LHDAC. Chemical analyses were made on recovered samples with transmission electron microscope (TEM) and field-emission-type electron probe microanalyzer (FE-EPMA). All samples with commonly-used cell assemblage exhibited a strong heterogeneity in iron content. On the other hand, the sample sandwiched by foil laser absorber was chemically homogeneous. This may be a result of the relatively small temperature gradient in the sample. The results demonstrate that the iron partitioning between perovskite/post-perovskite and ferropericlase changes little at a given temperature throughout the lower mantle pressures. Both electronic transition of iron and post-perovskite phase transition have small effects on iron partitioning.