

SGC065-P06

Room: Convention Hall

Time: May 23 17:15-18:45

Diffusion of tungsten in mantle mineral polycrystals

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To constrain the process of core-mantle interaction and mantle isotopic heterogeneity of tungsten, we investigated the effect of the grain boundary diffusion in the Earth's mantle, and carried out the experiments of grain boundary diffusion of tungsten and platinum through the polycrystalline forsterite(Fo)-enstatite(En) mantle mineral. We tried to determine the diffusion coefficient of tungsten in Fo-En polycrystal by in-situ analysis using SIMS and succeeded in obtaining the preliminary diffusion coefficient data of tungsten using synthesized highly-dense Fo-En aggregates (average grain size under 5 micro meter). Tungsten grain boundary diffusion coefficient(D_{gb}) through Fo-En polycrystal is $\sim 10^{-10} \text{m}^2/\text{s}$ at 1200 ~ 1300 C, and its lattice diffusion (D_{latt}) coefficients is $\sim 10^{-16} \text{m}^2/\text{s}$.

These diffusion parameters are one of the fundamental data for understanding W isotopic heterogeneity in the mantle and the important factors controlling element's mobility in the mantle. It is necessary to understand the diffusion process of incompatible elements such as the diffusion pass and mechanisms in future studies.