SIT04-P06 会場:コンベンションホール 時間:5 月 19 日 18:15-19:30

Lattice preferred orientation of stishovite in shear deformation
Lattice preferred orientation of stishovite in shear deformation

Fang XU[1*], Daisuke Yamazaki[1], Noriyoshi Tsujino[1]
Fang XU[1*], Daisuke Yamazaki[1], Noriyoshi Tsujino[1]

[1]ISEI, Okayama University
[1]ISEI, Okayama University

Seismic observations reveal strong polarization anisotropy (VSV> VSH) at around 550 km depth in the lower part of mantle transition zone (Visser et al., 2008). The observed anisotropy can be caused by lattice preferred orientation (LPO) of constituting material when the material is elastically anisotropic. Majorite and ringwoodite, which are the dominant minerals in this region, are nearly isotropic (Chai et al., 1997; Weidner et al., 1984). On the other hand, stishovite, which may occur in significant amounts in this region derived from the delaminated subducting basaltic layer (Karato et al., 1997) and continental crust (Kawai et al., 2012), shows strong elastic anisotropy indicated by the acoustic velocities study (Yoneda et al., 2012) on single crystal of stishovite. Therefore, the LPO of stishovite has a high potential to interpret the seismic anisotropy in the lower part of the transition zone.

To investigate the LPO of stishovite, deformation experiments on stishovite were conducted in the simple shear geometry. We prepared starting material of polycrystalline stishovite with grain size of ˜30 micron at 12 GPa and 1723 K in a Kawai-type high-pressure apparatus. Then shear deformation experiments were carried out at 12 GPa and 1873 K by Kawai-type apparatus for triaxial deformation (KATD) with 200 micron thickness of sample. Shear strain was ˜0.8 estimated from the rotation of platinum strain maker after deformation. The microstructure and crystallographic orientation of the deformed samples were investigated by SEM with EBSD.

Recovered sample shows the recrystallization occurred during deformation, meaning that the dominant deformation mechanism is dislocation creep. Based on preliminary analysis of LPO, the dominant slip system of stishovite is considered to be [001](100). With the assumption of transverse isotropy of polycrystalline stishovite, our result is consistent with seismic observation (VSV>VSH).

キーワード: stishovite, shear deformation, LPO
Keywords: stishovite, shear deformation, LPO