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アンチゴライトとかんらん石の結晶方位関係
Relationships of crystal orientation between antigorite and olivine in serpentinite mylonite

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Serpentinite mylonite is developed penetrative foliation and consists of antigorite. Serpentinite mylonite is described from sheared ultramafic bodies (e.g., Norrell et al., 1989). Foliated antigorite serpentinite with lattice preferred orientation (LPO) causes seismic anisotropy observed in subduction zones (e.g., Katayama et al., 2009, Jung, 2011). However, formation mechanisms and conditions of antigorite LPO are unclear. To clear the formation process of antigorite LPO, we focus on the relationships of crystal orientation between antigorite and host olivine in the serpentinite mylonite.

Studied serpentinite mylonite is from Kurosegawa belt at Toba area, Kii Peninsula. The serpentinite body undergoes multiple stages of deformation and serpentinization. In outcrop, the serpentinite mylonite is cohesive and is surrounded by incohesive serpentinite which has undergone the serpentinization of later stage under lower temperature.

The serpentinite mylonite mainly consists of antigorite and olivine, and developed mylonitic textures such as shear bands and olivine porphyroclast system. The foliation and lineation is defined by array of blade shape antigorite and elongated olivine grains. Antigorite with blade shape are crystallized in the pressure shadows of olivine porphyroclast and pull-apart of olivine grain. Their occurrences indicate syntectonic growth of antigorite.

We measure the crystal orientation of olivine and antigorite by the U-stage and EBSD. In EBSD measurement of antigorite, we try automatic indexing, in addition to manual indexing. Both indexing methods bring the same fabric pattern. Comparing the antigorite patterns from the U-stage measurement and EBSD measurement, both methods also show the same fabric pattern.

The LPOs of olivine show point maximum or partial girdle distributions, and these concentrations deviate from the foliation and lineation of serpentinite mylonite. The LPOs of olivine are formed before the antigorite serpentinization. The LPOs of antigorite, from olivine free domain, show that b axes are parallel to the lineation, c axes are perpendicular to the foliation or make a partial girdle distribution normal to lineation and a axes are a point maximum or form a partial girdle distribution. The orientations of antigorite grains, growing in olivine grains, show topotactic relationship between antigorite and olivine. However, b axes tend to be parallel to the lineation.

Topotactic relationships between olivine and antigorite are attractive mechanisms for the making antigorite LPO (Boudier et al., 2010). Under the shear deformation condition, the other mechanisms, such as rotation of grains, diffusion-precipitate process and anisotropic growth of grains, also would affect the formation of antigorite LPO, in addition to topotaxial growth.

キーワード: アンチゴライト, かんらん石, LPO, トポタキシー
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