Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SIT38-P05 Room:Poster Time:April 30 18:15-19:30

Synthesis of textural polycrystalline forsterite using colloidal processing in a strong magnetic field.

KOIZUMI, Sanae[1*] ; HIRAGA, Takehiko[1] ; SUZUKI S., Tohru[2] ; SAKKA, Yoshio[2]

[1]Earthquake Research Institute, University of Tokyo, [2]National Institute for Material Science

It is well known that the crystallographic preferred orientation (CPO) of minerals is commonly produced in the Earth's interior. Thus, it is important to understand the physical properties of the mineral aggregates that exhibit CPO. However, silicate minerals are often feeble magnetic and have small anisotropic susceptibilities so that it is difficult to apply a magnetic field effectively to rotate the mineral particles. Tendency of finer particles to spontaneously agglomerate due to strong attractive interactions (van der Waals forces) add further difficulty. We used a technique of slip casting in a high magnetic field (12T) to align certain crystallographic axis of mineral particles. For the particles to rotate easily in the solvent under a strong magnetic field, we improve the method of deflocculating. To control the surface potential of the particles, we applied various types of polymer modification. Vacuum sintering of the powders that were composed of the aligned particles was expected to produce a polycrystalline material aggregate that exhibits CPO. The resultant materials were characterized by X-ray powder diffraction (XRD), secondary electron microscope (SEM) and Electron Backscatter Diffraction (EBSD).

The specimen exposed to a strong magnetic field exhibits preferential A-axis alignment to the magnetic direction. Those synthetic specimens allow us to examine the effect of CPO on the physical properties of the earth's materials in future room experiments.

Keywords: forsterite, polycrystalline, magnetic field, orientation, CPO