I130-P007 **Room: Poster Session Hall** **Time: May 17**

Creep experiments on polycrystalline forsterite under atmospheric pressure

Tomonori Miyazaki[1]; Takehiko Hiraga[1]; Hidehiro Yoshida[2]

[1] ERI; [2] NIMS

Gas-medium and/or the solid-medium deformation apparatuses have been commonly used to deform mineral aggregates in earth science, since cavitations and cracking are difficult to avoid during the deformation of major minerals of crust and mantle. Under high pressure, it is difficult to obtain accurate stress and other physical properties due to spatial, limitation around the specimen. Here, we aim to develop a technique to deform the mineral aggregates under atmospheric pressure, which will allow to measure accurate creep property and other physical properties at the same time. It is expected that the smaller grain size the easier to deform without cracking, since the creep strength should be reduced by 2 or 3rd power at diffusion creep regime, thus, it is ideal to deform polycrystalline material with finer grain size and higher density.

We are successful in developing a technique to synthesize pore-free forsterite aggregates of ~5mm in diameter and 10mm in height with average grain size of 300 nm. Such samples were used to deformation experiments. Stress was monitored under constant compression rate (0.01 - 0.08 mm/min) at 1300 degrees under atmospheric pressure until strain of ~30 percent. After the experiments, microstructure of the specimens was observed by SEM and we did not find any cracks and cavities. Stress exponent (n) of 1.2~1.4 was obtained from stress-strain curves indicating deformation mechanisms of grain boundary diffusion and/or grain boundary sliding were operative. With grain size correction, our samples exhibit one or two orders of magnitude lower strain rate compared with that was obtained from olivine aggregates synthesize from sol-gel (Faul and Jackson 2007).