Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SIT037-P08 Room: Convention Hall Time: May 26 17:15-18:45

MELTING EFFECT ON GRAIN GROWTH OF FORSTERITE

Tamio Kobayashi[1*], Takehiko Hiraga[1]

[1]ERI, University of Tokyo

Grain size is one of the key parameters to control physical properties of the earth's mantle: seismic wave attenuation (Jackson et al., 2001), permeability of melt (Faul, 2001) and viscosity of mantle (Hirth & Kohlstedt, 1995). In order to estimate the size, grain growth experiment is usually performed. However, these experiments are mostly done at melt-free condition except for the few cases (Hirth & Kohlstedt, 1995; Faul & Scott, 2006). In these studies, range of melt fraction in the partially molten aggregates is limited, and grain growth rate at melt fraction is very low (e.g. less than 1wt%) is not well understood.
In this study, we performed two different experiments in order to understand how melt generation and melt fraction affect grain growth of olivine:
1. Partial melting/grain growth experiments in forsterite + diopside system
For the experiments, we used forsterite+diopside aggregates synthesized by vacuum sintering for the starting material. To simulate melt generation, the sample was annealed at the temperature above solidus (1370 and 1380). Then we investigated grain growth rate for the sample to understand how melt generation affects grain size of aggregates.
2. Grain growth experiments in forsterite + anorthitic melt system
We also used forsterite + anorthitic melt sample with different melt fraction of 0.1, 0.5, 1, 5, and 10wt% under fixed sintering temperature condition of 1370. Then we investigated grain growth rate in the samples to understand how melt fraction of partially molten aggregates affects grain growth.
In the presentation, we will discuss the influence of melt generation/melt fraction on grain size evolution of forsterite.

Keywords: grain growth, partially molten aggregates