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

SIT036-P05 会場:コンベンションホール 時間: 5月24日17:15-18:45

超高圧下におけるマントル物質の融解現象

Study of melting phenomena under the deep mantle conditions

西谷 尚也[1*], 大谷 栄治[1], 境 毅[1], 村上 元彦[1]

Naoya Nishitani[1*], Eiji Ohtani[1], Takeshi Sakai[1], Murakami Motohiko[1]

[1]東北大学大学院理学研究科地学専攻

[1]graduate school of science, Tohoku Univ

The seismological studies indicate the presence of Ultra-Low Velocity Zone (ULVZ) above the core-mantle boundary (Williams and Garnero, 1996). This region exhibits the reduction of seismic velocities at least 10% and the thickness of the region is about 5-40 km. The most probable cause of seismic velocities reduction is partial melting of the lowermost mantle. 10% and 30% reduction of compressional and shear wave velocity may be explained by 5-30vol% of partial melting.

It is known that the plate tectonics carry the Earth's surface materials (such as the basaltic crust) to the Earth's deep interior. As a result, the mantle will be a strong chemical heterogeneity. At the core-mantle boundary, there is a possibility that Mid Ocean Ridge Basalt (MORB) melt exists and causes the seismic anomalies. The melting temperature of MORB composition was examined up to 63 GPa by Hirose et al. (1999) using a diamond anvil cell. They suggested that if the temperature exceeds 4,000 K at the core-mantle boundary, the basaltic crust would be partially molten. We carried out melting experiments of MORB using a laser heated diamond anvil cell up to 73 GPa, 3 600 K. We determined the melting temperature by the change of heating efficiency during laser heating and textual observations of the recovered sample. In-situ X-ray diffraction experiments were performed at SPring-8 to determine the subsolidus phase assemblage. The solidus temperature at 46 GPa was determined to be between 2200 and 2600 K, which is lower than that of the previous study. Our results suggest that the basaltic crust would be partially molten at the temperature lower than that estimated previously at the base of the lower mantle.