I128-P005 **Room: Poster Session Hall** **Time: May 27**

Density of basaltic magma at high pressure

Tatsuya Sakamaki[1]; Satoru Urakawa[2]; Eiji Ohtani[3]; Akio Suzuki[4]; yoshinori katayama[5]

[1] Inst.Mineral. Petrol.& Econ. Geol., Faculty of Sci.,Tohoku Univ.; [2] Dept Earth Sci, Okayama Univ.; [3] Depart. Earth and Planetary Materials Science, Tohoku Univ; [4] Inst.Mineral. Petrol.& Econ. Geol., Faculty of Sci.,Tohoku Univ; [5] JAEA QuBS

The density of magma is one of important properties for discussion about magma differentiation and volcanic action. It is generally believed that magma is less dense than mantle minerals and therefore magma moves upward. However, the density of magma would become close to or even higher than that of coexisting mantle minerals in the planetary interior because the bulk modulus of the mantle minerals are sufficiently smaller than that of magma. Therefore, it is necessary to measure the density of magma at high pressure and temperature for discussions about migration magma.

In the Earth, most of water is trapped in the mantle, especially in the transition zone. Water has a property that it melts into the magma rather than mantle minerals. Therefore there is a probability that magma, which is generated under hydrous condition, becomes hydrous magma. Water is much lighter than magma, so that water may have a large effect on the density of hydrous magma. For understanding the effect of water on the density of magma, we have measured the density of dry and hydrous basaltic melts at high pressure and high temperature using X-ray absorption method. These experiments were carried out using a DIA-type cubic press on BL22XU beamline at the SPring-8. X-ray absorption method is much more accurate method for the density measurement of magma under desired pressure and temperature condition than the others. This method for density measurements by means of X-ray absorption under high pressure and high temperature using a multi-anvil apparatus, combined with a synchrotron radiation source, was developed by Katayama et al. (1993). This method is based on the Lambert-Beer's law. To overcome the effect of the variation of the sample thickness under pressure, the sample was put in a diamond capsule to calibrate the thickness and the intensity of the transmitted X-ray beam was measured as a function of sample position.

We succeeded in measuring the density of dry basaltic melt up to 4.6 GPa and up to 2000K. The compression curve of this study is different from that of previous work. Therefore there is a possibility that the density relation between crystals, such as olivine, and magma differs from the relation reported by previous work.

We succeeded in measuring the density of hydrous basaltic melt up to 4.0 GPa and up to 1673K. The partial molar volume of H_2O was calculated by using the obtained densities of dry and hydrous basaltic melt. Using calculated values at several pressures, we obtained the compression curve of the partial molar volume of H_2O. This shows that the property of H_2O in magma is compressible and indicates that the density of hydrous magma at high pressure is larger than expected.