

SMP044-04

会場:301B

時間:5月25日 11:00-11:15

X線マイクロトモグラフィを用いた吸収法による高圧密度測定技術の開発 Development of density measurement method using X-ray micro tomography under pressure

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Density of melt is an important property for discussing melts related geodynamics processes in the deep Earth. Density measurement of melt at high-pressure is challenging because of its technical difficulties. Several methods, such as sink-float and the shock experiments have been developed to measure the densities of melts, but they are not enough. We have developed the novel X-ray absorption technique to measure the densities of melts at the desired P-T conditions using the multi-anvil press and synchrotron radiation. However, it has an intrinsic uncertainty because the length of sample is not measured directly. X-ray tomography is a breakthrough technique, which can yields the sample length as well as the sample absorption for X-ray. Thus, we are developing the new density measurement technique for melts using the high-pressure X-ray micro-tomography. Here we report the results of the reconnaissance experiments using the polycrystalline KBr up to 3 GPa.

X-ray tomography experiments were carried out using the tomography press TPH at BL20B2, SPring-8. The TPH is the 80 tons uniaxial press with two wide windows for observation and equips the toroidal type opposed-anvils. The TPH was set on the X-Y-Z-rotating stage and X-ray shadowgraphs of sample were acquired each 0.2 degree during rotation of the TPH. X-ray absorption of sample (I/I_0) was calculated from the shadowgraph image, and the sample length t was evaluated using the tomography slice image. Then, the densities of KBr at high pressures were calculated based on the Lambert-Beer law. The mass absorption coefficient of KBr was evaluated from the data acquired at 0.1 MPa, where the density is well defined.