

SIT041-P04

会場:コンベンションホール

時間: 5月24日17:15-18:45

高圧下における $K_2TiSi_4O_9$ メルトの粘度

Viscosity of $K_2TiSi_4O_9$ melt at high pressure and high temperature

鈴木 昭夫^{1*}, 大谷 栄治¹, 西田 圭佑¹, 立山 隆二¹, 柴崎 裕樹¹, 亀卦川 卓美²

Akio Suzuki^{1*}, Eiji Ohtani¹, Keisuke Nishida¹, Ryuji Tateyama¹, Yuki Shibazaki¹,
Takumi Kikegawa²

¹東北大・理・地球惑星物質科学, ²物構研, 高エネ機構

¹Earth Planet. Mater. Sci., Tohoku Univ., ²IMSS, KEK

Viscosity of magma (silicate melt) at high pressure is very important to understand the magmatic processes in the terrestrial planets. However, detailed knowledge about the relation between the pressure dependence of viscosity and the pressure-induced structural change of melt is still insufficient. In this study, the viscosity of melt with $K_2TiSi_4O_9$ composition was measured by in-situ falling sphere method at high pressure, because the structures of $K_2TiSi_4O_9$ glasses quenched from melts at high pressure were investigated using XANES (X-ray absorption near edge structure) spectra by Paris et al. (1994). The viscosity was measured using an X-ray radiography technique with a large volume multi-anvil apparatus at BL14C2 beamline at the Photon Factory, KEK, Japan. The settling velocity of a platinum sphere was measured in X-ray images. X-ray diffraction data of a pressure marker was collected by the energy-dispersive method using a pure-Ge solid state detector soon after the observation of the sphere falling. The pressure at the run condition was determined by using the equation of state for MgO. We observed that the viscosity of $K_2TiSi_4O_9$ melt decreased up to 3.3 GPa. However, viscosity increased with increasing pressure above 4.2 GPa. On the basis of XANES spectra of $K_2TiSi_4O_9$ glasses, Paris et al. (1994) showed that the coordination number of titanium increased with increasing pressure. The viscosity minimum of $K_2TiSi_4O_9$ melt between 3.3 and 4.2 GPa suggests that the melt becomes depolymerized under high pressure.

キーワード: マグマ, 珪酸塩メルト, 粘度, 高圧

Keywords: magma, silicate melt, viscosity, high pressure