

Neutron diffraction study of hydrous sodium silicate melt at high pressure and high temperature

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Since silicate melts are generated and stabilized locally in Earth's mantle through the presence of volatiles. Determining the structure of hydrous silicate melts, which is largely different from anhydrous melts, is therefore important to acquire the microscopic insights into their properties such as density and viscosity. Here, the structures of $\text{Na}_6\text{Si}_8\text{O}_{19}\text{-D}_2\text{O}$ melts, which is a typical hydrous ternary composition, were investigated by using in situ neutron diffraction technique at 0–7 GPa. The experiments have been conducted at the BL11 PLANET beamline in the Material and Life Science Experiment Facility of J-PARC, Ibaraki, Japan. This study aims at obtaining a systematic view of the structural changes with pressure and water content, at understanding the chemical-bonding states and at relating these insights to macroscopic properties.