



Dr. Nozomi Kondo

Post-doctoral fellow

Geodynamics Research Center

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Venue: Zoom

A link will be sent @grc-all within 30 minutes before the beginning of the seminar.

Keywords:

1. Glass structure
2. Pyroxene composition
3. High pressure

Different structural behavior of MgSiO_3 and CaSiO_3 glasses at high pressures

Understanding the structural behavior of silicate melts and/or glasses at high pressures is fundamental in discussing the nature and properties of silicate magmas in the Earth's interior. Efforts have been made to understand the behavior of Si-O structure under high pressure conditions, while the effect of cation atoms on the high-pressure structural behavior of silicate melts and glasses has not been well investigated. In this study, we investigated the structures of MgSiO_3 and CaSiO_3 glasses up to ~ 5 GPa by X-ray pair distribution function measurements. We found that the structural behaviors of MgSiO_3 and CaSiO_3 glasses are different at high pressures. The structure of MgSiO_3 glass changes by shrinking Si-O-Si angle with increasing pressures, which is consistent with previous studies for SiO_2 and MgSiO_3 glasses. On the other hand, CaSiO_3 glass shows almost no change in Si-Si distance at high pressures, while the intensities of two peaks at ~ 3.0 Å and ~ 3.5 Å change with increasing pressure. The structural change in CaSiO_3 glass at high pressure is interpreted as the change of the fraction of the edge-shared and corner-shared CaO_6 - SiO_4 structures. The different high-pressure structural behavior obtained in MgSiO_3 and CaSiO_3 glasses may cause difference in the properties such as viscosity of MgSiO_3 and CaSiO_3 melts at high pressures, implying importance of the different structural behavior due to different cation atoms to discuss the nature and properties of silicate magmas in the Earth's interior.