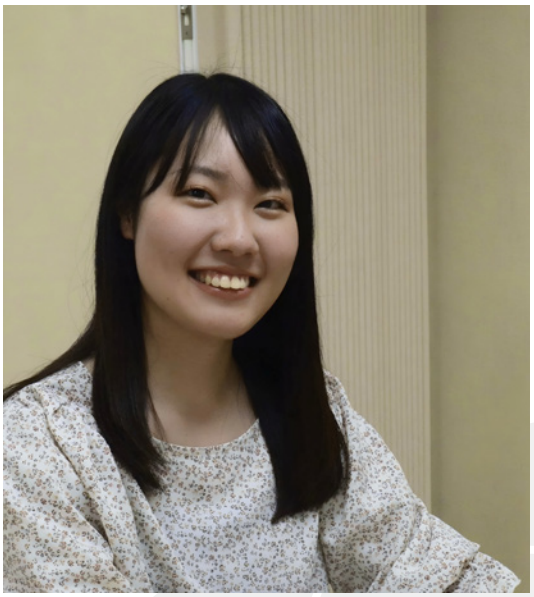

Ms. Mizuho Sakurahara

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Venue: Meeting Room #486

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Keywords:

1. Magma ocean
2. Glass structure
3. Laser levitation furnace

Effect of iron content on the structure of peridotite and pyroxene glasses

Study of the effect of iron content on the structure and physical properties of peridotitic magmas is of primary importance for understanding changes in the formation and evolution of the Earth's magma ocean. In particular, in the earliest stages, before core separation, the magma ocean is thought to have been an extremely iron-rich peridotite-composition magma and the amount of iron in the magma ocean was greatly reduced during the subsequent core formation process. It is known that the effect of iron on the melt structure differs depending on its valence, which change depending on factors such as the surrounding redox state, temperature, pressure and chemical composition. However, there are only few experimental studies on Fe^{3+}/Fe^{2+} in olivine-composition glass, and the effect of chemical composition on the valence state of iron is still unknown.

This study aims at clarifying the relation between iron content and melt structure by investigating the structure of $(Mg,Fe)SiO_3$ glass and peridotite-composition glass with varied iron content (Fe#=Fe/(Fe+Mg)). The glasses were synthesized in different gas environments of air and $Ar+H_2$. Our results showed $(Mg,Fe)SiO_3$ glasses depolymerized as the iron content increased while peridotite glasses polymerized as the iron content increased. The depolymerization of it is thought to be caused by the presence of Al, which plays the role of forming tetrahedral structure. The structure of glasses synthesized with $Ar+H_2$ showed less change than that of the glasses synthesized in air. Assuming that Fe^{3+} acts as a modifier atom, it is thought that this is because the synthesis was carried out in a reducing environment, causing a decrease in $Fe^{3+}/\Sigma Fe$ and limiting further depolymerization.

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