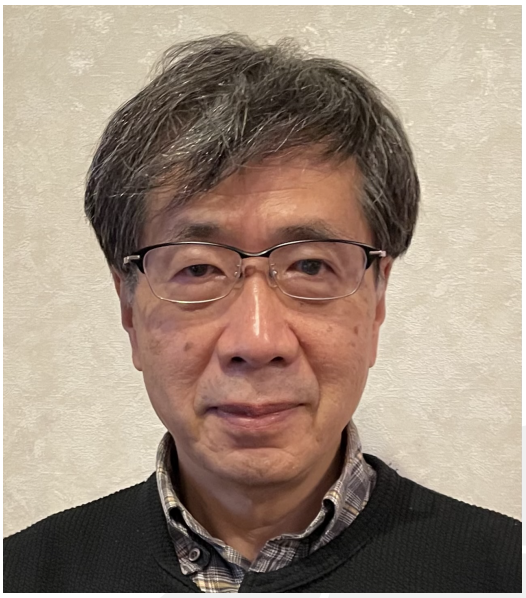

Dr. Tetsuo Irifune
Director, Professor
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2023.01.27 (Fri.) 16:30 ~

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

Solubility of $CaSiO_3$ in bridgmanite: From a historical perspective

There have been reported some impactful experimental results on $CaSiO_3$ perovskite, at almost the same time as it was found in natural diamond ("davemaoite; Tschauner et al., Science, 2021; c.f. Nestola et al., Nature, 2018), including its relatively low shear velocity (Gréaux et al., Nature, 2019), high water content (Chen et al., PEPI, 2020), low strength (Immoor et al., Nature, 2022), although some doubt has been casted on the presence of davemaoite (Walter, Science, 2022). A more recent study based on laser-heated diamond anvil cell experiments reported that bridgmanite could accommodate a significant amount of the "davemaoite" component in its crystal structure with increasing pressure and temperature, suggesting that no separate "davemaoite" can exist in deeper/warmer regions of the lower mantle (Ko et al., Nature, 2022). There were some debates as to the stability of $(Ca,Mg)SiO_3$ perovskite under the lower mantle conditions, and here I introduce such debates in 1970-1990s and discuss the possibility of the formation of the single phase perovskite solid solution under the lower mantle conditions, in the light of these earlier studies and a recent study on the melting relations of the $CaSiO_3$-$MgSiO_3$ system (Nomura et al., PEPS, 2017). I also emphasize the importance of multi-anvil experiments using sintered-diamond anvils to address this and other topics relevant to lower mantle mineralogy.

Keywords:

1. Bridgmanite
2. Davemaoite
3. $(Ca,Mg)SiO_3$ perovskite