[EE] Evening Poster | S (Solid Earth Sciences) | S-IT Science of the Earth's Interior & Tectonophysics

[S-IT22]Interaction and Coevolution of the Core and Mantle in the Earth and Planets

convener:Tsuyoshi Iizuka(University of Tokyo), Hidetoshi Shibuya(Department of Earth and Environmental Sciences, Faculty of Advanced Science and Technology, Kumamoto University), Taku Tsuchiya(愛媛大学地球深部ダイナミクス研究センター, 共同), Kenji Ohta(Department of Earth and Planetary Sciences, Tokyo Institute of Technology)

Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Recent observational and experimental investigations have significantly advanced our understanding of the structure and constituent materials of the deep Earth. Yet, even fundamental properties intimately linked with formation and evolution of the planet, such as details of the chemical heterogeneity in the mantle and light elements dissolved in the core, remained unclear. Seismological evidence has suggested a vigorous convection in the lower mantle, whereas geochemistry has suggested the presence of stable regions there that hold ancient chemical signatures. The amounts of radioactive isotopes that act as heat sources and drive dynamic behaviors of the deep Earth are also still largely unknown. We provide an opportunity to exchange the achievements and ideas, and encourage persons who try to elucidate these unsolved issues of the core-mantle evolution using various methods, including high-pressure and high-temperature experiments, high-precision geochemical and paleomagnetic analyses, high-resolution geophysical observations, geo-neutrino observations, and large-scale numerical simulations. Since this session is co-sponsored by geomagnetism, paleomagnetism and rock magnetism division of the SGEPSS, contributions in geomagnetism and geodynamo simulation are also encouraged.

[SIT22-P17]*Ab initio* lattice thermal conductivity of $MgSiO_3$ post-perovskite

*Haruhiko Dekura[1], Taku Tsuchiya[1,2] (1.Geodynamics Research Center, Ehime University, 2.Earth-Life Science Institute, Tokyo Institute of Technology)

Keywords:Lower mantle minerals, Lattice thermal conductivity, Ab initio calculation

Lattice thermal conductivity (κ$_{lat}$) of the lowermost mantle (D'' layer) is one of the key properties controlling the thermal evolution of the Earth and $MgSiO_3$ post-perovskite (PPv) is believed to be the most abundant mineral in this region. Ohta et al. (2012) measured the κ$_{lat}$ of PPv but only at 300 K, far from the mantle temperature. On the other hand, the κ$_{lat}$ of PPv was computed under lowermost mantle *P,T* (Haigis et al., 2012; Ammann et al., 2014) but using interatomic model potentials with adjustable parameters. Reported κ$_{lat}$ of PPv under the lowermost mantle *P,T* are inconsistent with each other. We recently established an *ab initio* technique to compute κ$_{lat}$ based on the density-functional theory (DFT) combined with fully solving the phonon Boltzmann transport equation, which was successfully applied to MgO (Dekura and Tsuchiya, 2017). In this study, using this technique, κ$_{lat}$ of PPv is calculated under the lowermost mantle condition, and it is found ~20% lower than those reported in the model potential studies. We also find that the κ$_{lat}$ of PPv is ~50% larger than that of Brg. This indicates that the lateral variations in the core-mantle boundary heat flux would be enhanced by the Brg-PPv phase transition. Effects of anisotropy in the κ$_{lat}$ of PPv on the heat flux will also be discussed.