

Lattice thermal conductivity of CaSiO_3 perovskite at high pressures and high temperatures

*恩賀 皓太郎¹、太田 健二¹、長谷川 暉^{1,2}、八木 貴志²、廣瀬 敬^{3,4}、大石 泰夫⁵

*Kotaro Onga¹, Kenji Ohta¹, Akira Hasegawa^{1,2}, Takashi Yagi², Kei Hirose^{3,4}, Yasuo Ohishi⁵

1. 東京工業大学理学院地球惑星科学系、2. 産業技術総合研究所、3. 東京工業大学地球生命研究所、4. 東京大学大学院理学系研究科地球惑星科学専攻、5. 高輝度光科学研究センター

1. Department of Earth and Planetary Sciences, Tokyo Institute of Technology, 2. National Institute of Advanced Industrial Science and Technology, 3. Earth-Life Science Institute, Tokyo Institute of Technology, 4. Department of Earth and Planetary Science, The University of Tokyo, 5. Japan Synchrotron Radiation Research Institute

Laboratory measurements of thermal conductivity of deep Earth materials provide important information on the dynamics and thermal evolution of the mantle and the core. CaSiO_3 perovskite (CaPv) is a constituent of pyrolitic lower mantle and of the subducting oceanic crust at depth greater than 560 km. In recent years, there are many reports of the laboratory-based lower mantle thermal conductivity profiles, but the thermal conductivity of CaPv has never been measured and included in the models [1,2,3,4,5]. CaPv is an unquenchable high-pressure phase at ambient conditions, and temperature-induced structure change from tetragonal to cubic occurs at around 500 K [6]. Therefore, *in-situ* high pressure and temperature X-ray diffraction (XRD) and thermal conductivity measurements are required to determine the thermal conductivity of CaPv in the Earth's deep interior.

In this study, we determined the thermal conductivity of CaPv at about 50 GPa and high temperature to 1950 K by a combination of synchrotron XRD measurements and the pulsed light heating thermoreflectance technique. Based on our experimental results, we consider the effect of the presence of CaPv on the thermal conductivity of the pyrolitic lower mantle and the subducting oceanic crust.

Reference: [1] Manthilake, G. et al., *Proc National Acad Sci.* **108**, 17901–17904 (2011). [2] Ohta, K. et al., *Earth Planet Sc. Lett.* **349**, 109–115 (2012). [3] Ohta, K. et al., *Earth Planet Sc. Lett.* **465**, 29–37 (2017). [4] Okuda, Y. et al., *Earth Planet Sc. Lett.* **474**, 25–31 (2017). [5] Hsieh, W.-P. et al., *J. Geophys. Res. Solid Earth* **122**, 4900–4917 (2017). [6] Komabayashi, T. et al., *Earth Planet Sc. Lett.* **260**, 564–569 (2007).

キーワード：カルシウムペロフスカイト、熱伝導率、下部マントル

Keywords: CaPv, thermal conductivity, lower mantle