

# Report for the Joint Use/Research of the Institute for Planetary Materials, Okayama University for FY2024

05/31/2025

**Category:** International Joint Research General Joint Research Joint Use of Facility  
Workshop

**Name of the research project:** Elasticity of Fe-bearing Dry and Hydrous Ringwoodite Revealed by Brillouin Scattering at High Pressures and Temperatures

**Principal applicant:** Luo Li

**Affiliated institution and department:** The University of Texas at Austin

## Collaborator

**Name:** Takayuki Ishii

**Affiliated institution and department:** Institute for Planetary Materials, Okayama University

## Research report:

Seismology provides an efficient method to constrain the structure and composition of planetary interior using seismic observation. Mars is the second well-studied planet after Earth. Experimental data for the Martian mantle mineral velocities are crucial in connecting the seismic observations and refining our knowledge of the composition and temperature. However, there is currently limited experimental data on the composition of the Martian mantle, with measurements available up to 16 GPa. In this study, the single-crystal elasticity of ringwoodite and majorite were determined in externally heated diamond anvil cells (EHDACs) using Brillouin scattering up to 25 GPa and 700 K. Combined with literature data, we have modeled the sound velocity of Martian mantle with different Fe content varying areotherms to explore the velocity structure and compared with seismic profile. These results are helpful to reveal a net effect of composition and temperature on Martian velocity profile and better understand the seismic observations.

- 1) Please write the research report with free format, but include followings: research purpose, actually conducted research, and research outcomes. If necessary, you can add another page.
- 2) For the workshop, please write the report for the workshop. Also, attach the program, abstracts, and list of the participants etc.
- 3) Please add Collaborator's Name, Affiliated institution and department as needed.
- 4) Please answer the question on the next page.