

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

05/30/2025

Category: ☒International Joint Research ☐General Joint Research ☐Joint Use of Facility
☐Workshop

Name of the research project: Synthesis of Single-Crystal Phase-D and hydrous Stishovite under HP-HT Conditions Using Multi-Anvil Apparatus

Principal applicant: Maoshuang Song

Affiliated institution and department: Guangzhou Institute of Geochemistry, CAS

Collaborator

Name: Daisuke Yamazaki

Affiliated institution and department: Institute of Planetary Materials, Okayama University

Research report:

Research Purpose: We plan to synthesized single crystals of phase D (Mg-endmember, FeAl-bearing and Al-rich) and hydrous stishovite using multi-anvil apparatus and then measure their single-crystal elasticity at HP/HP-HT conditions by Brillouin scattering spectroscopy. The obtained elasticity data will be important to decipher seismic observations and understand water circulation in subduction zones.

Actually Conducted Research: During our visit in IPM, we conducted eight single-crystal synthesis experiments, four of which failed due to blowout and heater unstable. We succeeded in synthesizing large crystals of Mg-endmember phase D and Al-rich phase D, but the products of two FeAl-bearing phase D synthesis experiments are complex. However, we have obtained some crystals of FeAl-bearing phase D. Hydrous stishovite was not synthesized according to Prof. Yoshino's suggestion.

The synthesized crystals of phase D have been checked and characterized by XRD, Raman and EPMA. My Ph. D student Mr. Pu Xiao is working on these samples in UT-Austin. He has finished the Brillouin scattering measurements on the high-pressure single-crystal elasticity of FeAl-bearing phase D at ambient temperature, and will do the measurements at high temperatures next. Also, he is preparing for the Brillouin scattering measurements on Al-rich phase D.

Research Outcomes:

We haven't got any outcome yet, but we expect to publish 1-2 papers next year with the synthesized phase D samples.