

Report for the Joint Use/Research of the Institute for Planetary Materials, Okayama University for FY2023

05/29/2024

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

Name of the research project: Electrical conductivity and EOS of high-pressure SiO₂: double shocked stishovite

Principal applicant: Guillaume MORARD

Affiliated institution and department: IMPMC, CNRS, Sorbonne University

(please note that my affiliation has been modified since the application in October 2023)

Collaborator

Name: Takashi YOSHINO

Affiliated institution and department: IPM, Okayama University

Research report:

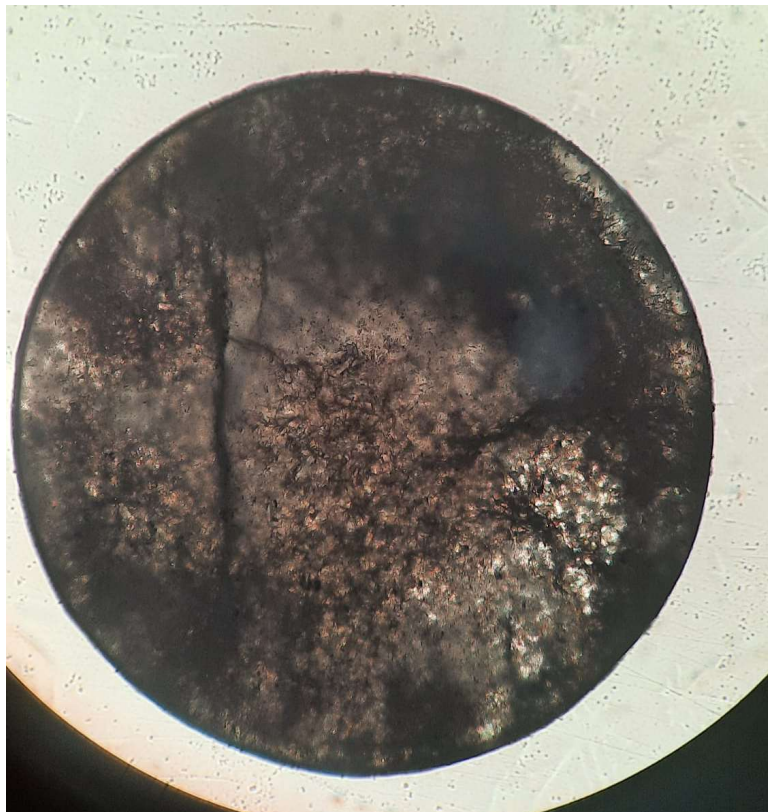
List of collaborators:

Lélia LIBON	IMPMC, Sorbonne University, France	Postdoc
Jean-Alexis HERNANDEZ	ESRF, Grenoble, France	Beamline scientist
Alessandra RAVASIO	LULI, Ecole Polytechnique, France	CNRS Researcher
François SOUBIRAN	CEA DAM-DIF, Arpajon, France	Researcher
Sébastien MERKEL	UMET, Université de Lille, France	Professor
Steeve GREAU	GRC, Ehime University	Researcher

The present project aims to synthesize large, transparent samples of stishovite to perform laser-driven off-Hugoniot shock compression experiments. To measure the properties of stishovite under extreme conditions during shock, the samples need to be transparent to track shock wave propagation within the crystal.

Professor Yoshino conducted 11 runs using a multi-anvil press at IPM. Despite these efforts, none of the synthesized samples were fully transparent. Polishing tests were carried out on the most

promising sample (5K3872, 18/11, 15MN at 1773 K for 1 hour). A picture of the polished sample is presented here:



The central portion of the sample is partially transparent. However, further polishing is required to reduce the sample thickness to approximately 150 μm and determine if this improves transparency.

Unfortunately, the current project has not succeeded in producing the approximately 40 transparent targets (2x2 mm and 150 μm thickness) needed for a planned beamtime at LULI in February 2024. Nevertheless, new opportunities for laser compression experiments are anticipated in the coming years, and we hope to continue this synthesis project with Professor Yoshino. The capabilities of IPM are unique and essential for these syntheses.