

Research period FY2017

Subject title Experimental modeling of diamond formation from the C-O-H fluid in the Earth's mantle

Name Nadezda Chertkova

Affiliation Geodynamics Research Center, Ehime University

Host researcher at IPM Shigeru Yamashita

Collaboration work in FY2017 was focused on development of the diamond anvil cell (DAC) technique, that can generate high pressures at simultaneous high temperatures and provide wide optical access to the sample for *in situ* infrared and Raman spectroscopic measurements.

In the first series of experiments, a Bassett-type externally heated DAC with a modified heating system was tested for generation of high pressures. The heater was placed in the central part of the cell around the pre-indented metal gasket, containing sample. With the chosen DAC configuration, it was difficult to maintain experimental pressure above 4 GPa at high temperatures.

In the second series of experiments, a Mao-type externally heated DAC was employed, which was shown to provide effective pressure generation due to the perfect alignment of the upper and lower platens. Pressures exceeding 5.5 GPa were achieved with this cell at temperatures above 500 °C. High-quality infrared and Raman spectra were collected during the experiments using FTIR/Raman system in combination with an optical microscope, installed at the Institute for Planetary Materials. Visual observations and spectroscopic measurements in the silicate-C-O-H system allowed to determine phase relationships and types of fluid species, which formed at high-temperature and high-pressure conditions.