

Research period FY2018

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

Results of collaboration work in FY2018 include the following accomplishments:

- A new cell assembly with large opening was developed for the externally-heated Mao-type symmetric diamond anvil cell in order to combine *in situ* monitoring of fluids behavior, formation of the mineral phases and phase transitions with the spectroscopic analysis in the near-infrared, mid-infrared regions and Raman analysis.

- Designed cell assembly was used to perform a series of experiments with C-O-H fluid component and basaltic glass as starting materials, with the crystallization of eclogitic suite minerals at high pressures and high temperatures. Infrared and Raman spectroscopy provided comprehensive information about the types and chemical characteristics of the fluid phases, closely associated with diamond formation.

- Complete miscibility between the water and methane components in the fluid, coexisting with silicate minerals, was observed *in situ* in the chosen system at temperatures exceeding 800 °C.

- Since the change of fluids state was detected during quenching and evaporation of the fluid took place upon opening/decompression of the experimental cell, developed *in situ* techniques and analytical methods gave an opportunity to obtain important data for the reconstruction of C-O-H fluids behavior at the upper mantle conditions.

- Research achievements of this work were presented at the international scientific meetings and acquired data were processed for submission of manuscripts to the international journals.