

Fig.1. CH_4 - CO_2 replacement in CH_4 clathrate hydrate (MH) bearing sediments below seafloor

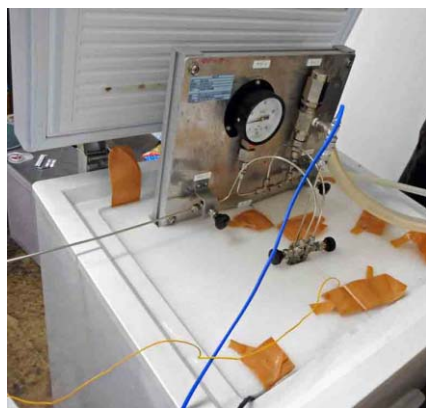


Fig.2. High-pressure reactor **Fig.3.** Crystal of FeGa_3

Content:

Dynamics of molecules and electrons in materials controls transport properties such as conductivity, thermal and mass diffusivities. Investigations for the dynamics will contribute to better knowledges for the elemental processes of the transport phenomena.

Our research subjects are (1) the proton and molecular dynamics in ice and gas clathrate hydrates, and (2) the electron dynamics in thermoelectric materials. For the first subject, we investigate the CH_4 - CO_2 replacement reaction in CH_4 hydrate (MH) using infrared (IR) spectroscopy and diamond anvil cell. This study will help realize the recovery of CH_4 from MH bearing sediments below seafloor (Fig. 1). A high-pressure reactor dedicated to the synthesis of MH has been constructed for this subject (Fig. 2). For the second subject, the electron dynamics near the Fermi level in a thermoelectric material, FeGa_3 (Fig. 3), is investigated using IR spectroscopy and He cryostat.

Keywords : proton dynamics, IR spectroscopy, high pressure, diamond anvil cell

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