Phase relation of $MgSO_4$–H_2O system under low temperature and high pressure

*原田 啓多[1]、近藤 忠[1]、白田 実希[1]、亀卦川 卓美[2]
*Harada Keita[1], Tadashi Kondo[1], Miki Shirata[1], Takumi Kikegawa[2]

1. 大阪大学大学院理学研究科宇宙地球科学専攻、2. 高エネルギー加速器研究機構
1. Department of Earth and Space Science, Graduate School of Science Osaka University, 2. High Energy Accelerator Research Organization

In order to estimate the internal structure of icy bodies, we investigated phase transition of $MgSO_4$-H_2O system under low temperature and high pressure. A diamond anvil cell was used for high-pressure generation. A low-temperature circulating system and a Peltier device were used for temperature control. The experimental temperature and pressure range were from -40 °C to room temperature and ambient pressure to 5 GPa, respectively. We used 0, 5, 10, 15, 17, 20, and 25 wt% $MgSO_4$ aqueous solutions to evaluate the influence of $MgSO_4$ on the phase diagram of pure H_2O.
The pressure was calculated using the ruby fluorescence method. Raman spectroscopy and textural change in the sample room under optical microscope were used for phase identification in laboratory experiments.
To confirm the results of phase identification, we also conducted X-ray diffraction experiments of the solid phases of $MgSO_4$-H_2O system up to about 5GPa at room temperature, at NE-1A station, PF-AR, KEK. We identified Ices VI and VII, magnesium pentahydrate, $MgSO_4$・$5H_2O$, $Mg(HSO_4)_2$ in the samples at high pressure.
Our results were different from previous study by Ohtani and Nakamura(2011), who identified magnesium heptahydrate, $MgSO_4$・$7H_2O$ as the high-pressure phase .
We will report the detailed results of both Raman spectroscopy and X-ray diffraction experiments and possible phase diagram of $MgSO_4$-H_2O system and their application to the icy bodies.

キーワード：氷天体、高圧、硫酸マグネシウム
Keywords: icy body, high pressure, Magnesium sulfate