

## High-Pressure Neutron Beamline PLANET for investigating "Water" in the Earth

HATTORI, Takanori<sup>1\*</sup> ; SANO, Asami<sup>1</sup> ; ARIMA, Hiroshi<sup>2</sup> ; INOUE, Toru<sup>3</sup> ; KAGI, Hiroyuki<sup>4</sup> ; YAGI, Takehiko<sup>3</sup>

<sup>1</sup>Japan Atomic Energy Agency, <sup>2</sup>Institute for materials research, Tohoku university, <sup>3</sup>Geodynamics Research Center, Ehime University, <sup>4</sup>Geochemical Laboratory, Graduate School of Science, University of Tokyo

The PLANET is the world's first neutron beamline specialized for high-pressure and high-temperature experiments. The most characteristic feature is the capability to investigate the state of water and hydrogen in minerals at high-pressure and high-temperatures up to 20GPa and 2000K with the multi-anvil high-pressure apparatus. The construction was started in 2008 and the experiments have been conducted since Nov. 2012. In this talk, the design and performance of the PLANET are introduced.

PLANET is designed so as to investigate structures not only of crystalline but also of amorphous (liquid) materials. The resolution of the diffraction pattern ( $\Delta d/d=0.6\%$ ) was found to be almost equal to the designed value(0.5%). The elimination of the background from the sample surrounding materials, which is the most important issue in the high-pressure experiments, was found to be accomplished by using the severe incident and receiving collimators. With this development, PLANET offers very clear patterns even at high pressures. This character made the PLANET one of the most innovative beamlines among several high-pressure neutron beamlines in the world.

Keywords: neutron, high pressure, beamline, hydrous

