	<h1>MLF Experimental Report</h1>	提出日 Date of report
		Apr. 14, 2014
実験装置名/BL番号 Name of Instrument/BL		
High-Pressure Neutron Diffractometer PLANET/BL11		
実験装置責任者 Name of the person responsible for the instrument:		
Takanori Hattori		
所属 Affiliation: Japan Atomic Energy Agency		

1. 研究成果概要 (a)装置グループ内の成果、(b)ユーザー課題実装時における特筆すべきサポート、(c)ユーザー課題の執行状況について、まとめてください。A4 サイズ用紙使用のこと。

Outline of your activities. Following results at your instrument should be reported in A4 size papers: (a) results of your instrument group, (b) significant user support works, and (c) statistical summary of user experiments.

(a) Results of your instrumental group

In this proposal, we aim at realizing following items

Extension of accessible pressure and temperature range by 6-8 compression method

So far in the PLANET, the pressure and temperature have been generated by the 6-6 compression method with a 6-axis press, ATSUHIME. We succeeded in generating 10 GPa and 1000K, but further extension of the *PT* range is indispensable to investigate states in the deeper interior of the Earth.

In this proposal, we tried to apply the 6-8 compression method that can generate higher pressures and temperatures, to the in-situ neutron diffraction experiments. This development was also performed in the collaboration with a general proposal of 2013B0118.

In a 6-8 compression, we used diamond anvils sintered with silicon carbide that are much harder than conventional anvils made of tungsten carbide. The results confirmed the generation of 15GPa and 1400K, and in-situ neutron diffraction at that condition (Fig.1). The accessible condition is extended, but the generated *PT* condition is still far from the targeted condition of 20GPa and 2000K. Further developments will be conducted in future.

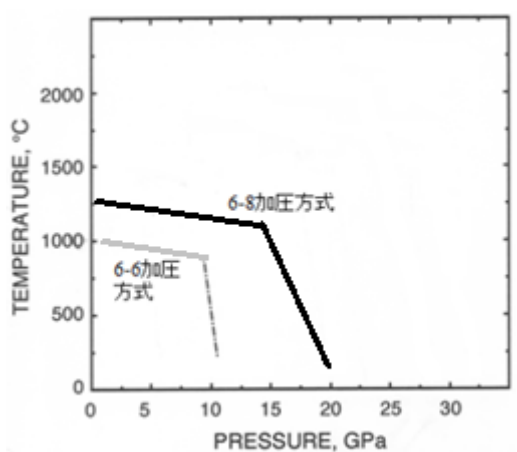


Figure 1 *PT* region extended by a 6-8 compression method

1. 研究成果概要(つづき) Outline of experimental results (continued).

Deformation experiments under high pressure condition

At first, we planned to conduct deformation experiments under high pressure condition, utilizing the independent nature of each ram in the ATSUHIME. However, the experiments could not be done due to unexpected shutdown of MLF by the accident at Hadron Facility. Furthermore, device troubles in the 6-axis press, that is leakage of oil from the hydraulic pumps, prevent us to conduct the experiments. This development will be done in future.

(b) Significant user support works

Besides usual user supports, such as assists in data collection, high-*PT* generation etc, we managed the radiological safety about the "blowing-out" of the press (extrusion of the sample out of the compressed space due to imbalance of the compression by six anvils). Especially, we dealt with the change in the classification of the radiation controlled area from the 2nd level to the 1st one on Feb. 20 in 2014.

(c) Statistical summary of user experiments

Some experiments in 2013A have canceled due to the shutdown of MLF operation. On the other hand, user experiments before it were successfully conducted as scheduled. The results were presented in several conferences, and some of them have been submitted to peer-reviewed journals.

As for 2013B, all the accepted proposals have been conducted. Some experiments are interrupted by miss detection of "blowing out" due to aforementioned troubles in the press. And, some experiments for high-pressure liquids have failed due to the leakage of the sample during the compression. We changed the capsule from platinum cup into an aluminum cube. For this reason, accessible temperature is limited only to room temperature. The high-*PT* experiments for liquids are most promising science targets in our beamline, so methods to confine liquids need to be developed as soon as possible.

必要に応じて、A4 サイズの用紙に続きを記入して下さい。

Please use A4-size papers for further reporting, if necessary.