

実験報告書様式(一般利用課題・成果公開利用)

(※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。)

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|    | 承認日 Date of Approval 2014/10/22<br>承認者 Approver TAKEDA Masayasu<br>提出日 Date of Report 2014/10/22  |
| 課題番号 Project No.<br>2014A0068<br>実験課題名 Title of experiment<br>Study on in-plane magnetic structure of neutron polarizing multilayer mirrors<br>実験責任者名 Name of principal investigator<br>Ryuji Maruyama<br>所属 Affiliation<br>J-PARC Center, Japan Atomic Energy Agency | 装置責任者 Name of responsible person<br>Masayasu Takeda<br>装置名 Name of Instrument/(BL No.)<br>BL17<br>実施日 Date of Experiment<br>2014/06/21-2014/06/26 |

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。(適宜、図表添付のこと)  
 Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

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| 1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.  |
| Sample A: Fe/Ge multilayer consisting of 30 bilayers with a d-spacing of 6 nm<br>Sample B: Fe/Ge multilayer consisting of 30 bilayers with a d-spacing of 20 nm |

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| 2. 実験方法及び結果 (実験がうまくいかなかった場合、その理由を記述してください。)<br>Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.   |
| <p>Off-specular scattering (OSS) measurement with polarization analysis was performed for the samples stated above. The external fields to the samples A and B were chosen as 60 and 89 Oe, respectively, where the samples are magnetized approximately to 70% of saturation so that both the spin-flip and non-spin-flip scattering from magnetic domains is expected because the average deviation angle of magnetization with respect to the external field is regarded as 45 degrees. The data are collected by a 2-D position sensitive detector. Although the magnetic scattering where our interest lies seems to have successfully been observed, there are still critical problems in the measurement as follows.</p> <p>Although the resolution in space and the maximum count rate were much improved compared with a single <math>^3\text{He}</math> tube, the noise level was high in the pixels around intense peaks such as the specular reflection. This basically results from the low detector efficiency estimated to be about 30% for thermal neutrons. This problem is expected to be overcome by an increase in the <math>^3\text{He}</math> gas pressure of the detector chamber scheduled in this fiscal year. In addition to that, we cannot access the measured scattering images where the wavelength,</p> |

## 2. 実験方法及び結果(つづき) Experimental method and results (continued)

spin state, and position of detection are resolved because a certain part of the software for the data reduction is not currently available. The improvements related to the above offer a possibility to give access to the in-plane magnetic structure of layered systems.