

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 2014/6/17<br>承認者Approver Masayasu Takeda<br>提出日Date of Report 2014/6/17   |
| 課題番号 Project No.<br>2012B0144<br>実験課題名 Title of experiment<br>GISANS measurement using precisely figured focusing mirrors<br>実験責任者名 Name of principal investigator<br>Dai Yamazaki<br>所属 Affiliation<br>J-PARC Center | 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>2012/11/21-28 |

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. |
| No sample was measured.<br>Performance test of focusing mirrors were carried out.      |

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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。)   |
| Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.   |
| <p>Following the experiment 2012A0085, where a single thin mirror was developed and measured, a stacked focusing mirror was developed. The stacked mirror is composed of four focusing supermirrors which are coated on quartz substrates of 1.0mm in thickness. Figure1 shows the photograph of the stacked mirror.</p> <p>The focusing geometry, illustrated in Fig.2, is based on ellipsoids each of which prescribes a single supermirror in the stack and shares their two focusing points. The first focal point was located at 6950 mm from the moderator where the slit S1 is installed while the second one at 18000 mm from the moderator which correspond to the detector position. The stacked focusing mirror was placed on a goniometer for optical devices at 14175 mm from the moderator. In the experiment neutron beam was narrowed by the slit S1, extracted downward and then reflected upward by the focusing mirror to focus vertically on the detector surface.</p> <p>Profile of a focused beam by the stacked mirror is shown in the “SUM” panel of Fig.3. The width of peak was about 0.60 mm in full-width at half maximum (FWHM) and the peak shape is not sharp but blurred. In order to</p> |

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

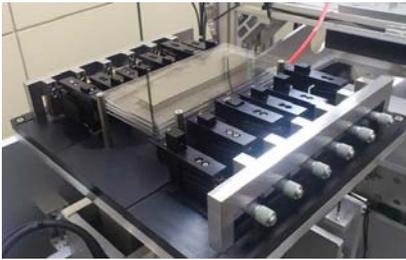


Figure1

Stacked focusing supermirrors installed on a goniometer for optical devices at 14175mm from the moderator. Size of mirror coating is  $15 \times 105 \text{ mm}^2$  and thickness of substrate is 1.0mm.

determine which mirror deteriorated the peak shape, we observed the focused beam with a single mirror by removing other mirrors. Panels “Mirror#1”, “Mirror#3” and “Mirror#4” show the focused beam profiles with each mirror. The “Mirror#1”, which was placed bottom, produced blurred peak of 1.4mm in FWHM. Widths of the focused peaks produced by the “Mirror#3” and “Mirror#4” were 0.44mm and 0.37mm in FWHM, respectively. The blur might be attributed to a subtle distortion or misalignment of the bottom mirror.

In the experiment, observation of vertically-focused and transversally-collimated beam could not be carried out.

In conclusion, we performed vertical focusing experiments with a stacked supermirror and found that focused beam size was much larger than our expectation. The blur of the focused beam is attributed to a single mirror in the stack which might be subtly distorted.

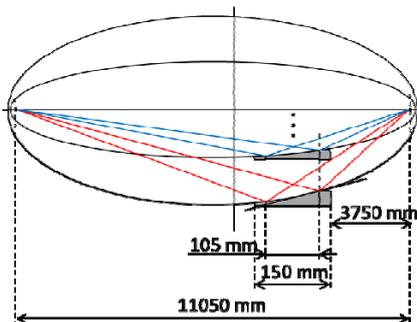


Figure2

Focusing geometry of the stacked focusing mirror is based on four ellipsoids which share the two focal points. Each ellipsoid prescribes the geometry of each focusing mirror. The first focal point is located at the slit S1 (6950 mm from the moderator) and the second one at the detector position (18000 mm from the moderator). The mirror is installed at 14175 mm.

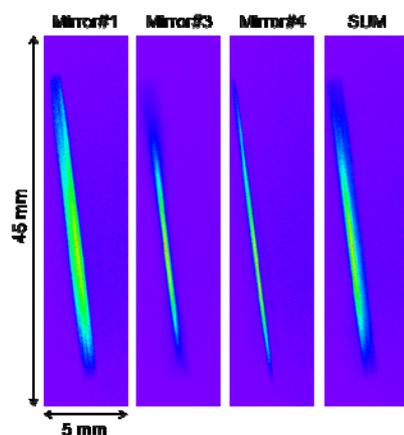


Figure3

Beam profiles obtained with an imaging plate. The panel “SUM” shows the beam focused with the stacked mirror while the panels “Mirror#1”, “Mirror#3” and “Mirror#4” show the results obtained with single mirrors.