

(※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。)

	承認日 Date of Approval 承認者 Approver 提出日 Date of Report
課題番号 Project No. 2013B0267 実験課題名 Title of experiment Elucidation of mechanism of a direct bonding technique between two different materials in MEMS 実験責任者名 Name of principal investigator Wataru Yashiro 所属 Affiliation Institute of Multidisciplinary Research for Advanced Materials (IMRAM), Tohoku University	装置責任者 Name of Instrument scientist Masayasu Takeda 装置名 Name of Instrument/(BL No.) Vertical axis polarized neutron reflectometer "SHARAKU" (BL17) 実施日 Date of Experiment 2014/3/21-23

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.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.
SU8 (epoxy resin) (100 nm)/Si wafer Cu (100 nm)/SU8 (100 nm)/Si wafer (without Ar ion irradiation to the SU8 surface) Cu (100 nm)/SU8 (100 nm)/Si wafer (with Ar ion irradiation to the SU8 surface)

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.
Time-of-flight neutron reflectometry experiment was performed using the vertical-axis neutron reflectometer "SHARAKU" at BL17 in MLF of J-PARC. Neutron reflectivities for two of the three samples were measured at two glancing angles (0.3 and 0.9 degrees). Figure 1 shows the neutron reflectivities obtained. The upper and lower figures show the neutron reflectivities of a Cu (100 nm)/SU8 (epoxy resin) (100 nm)/Si sample without Ar ion irradiation and a SU8 (100 nm)/Si sample. Our experimental plan was not completed (neutron reflectivities of only the two samples were measured, and we were not able to compare those with and without Ar ion irradiation), but we confirmed that neutron reflectivity for up to $q = 2.7 \text{ nm}^{-1}$ can be obtained for these samples.

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

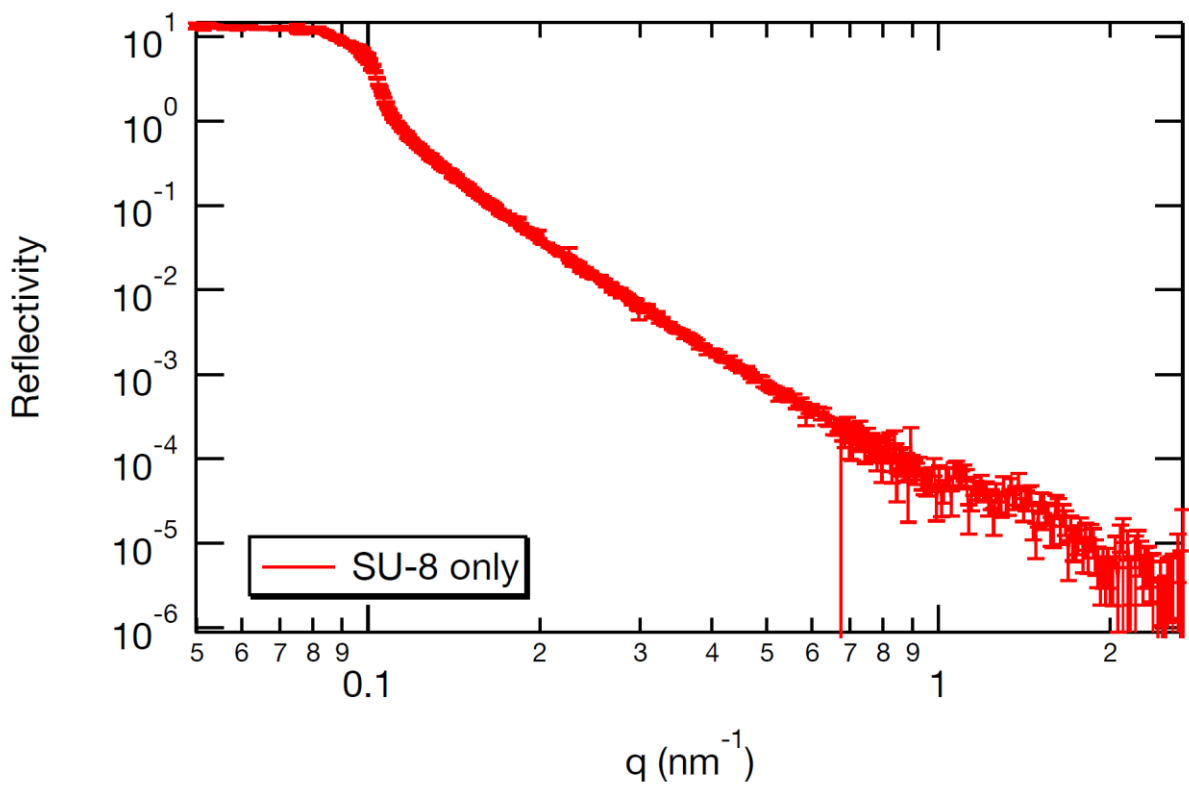
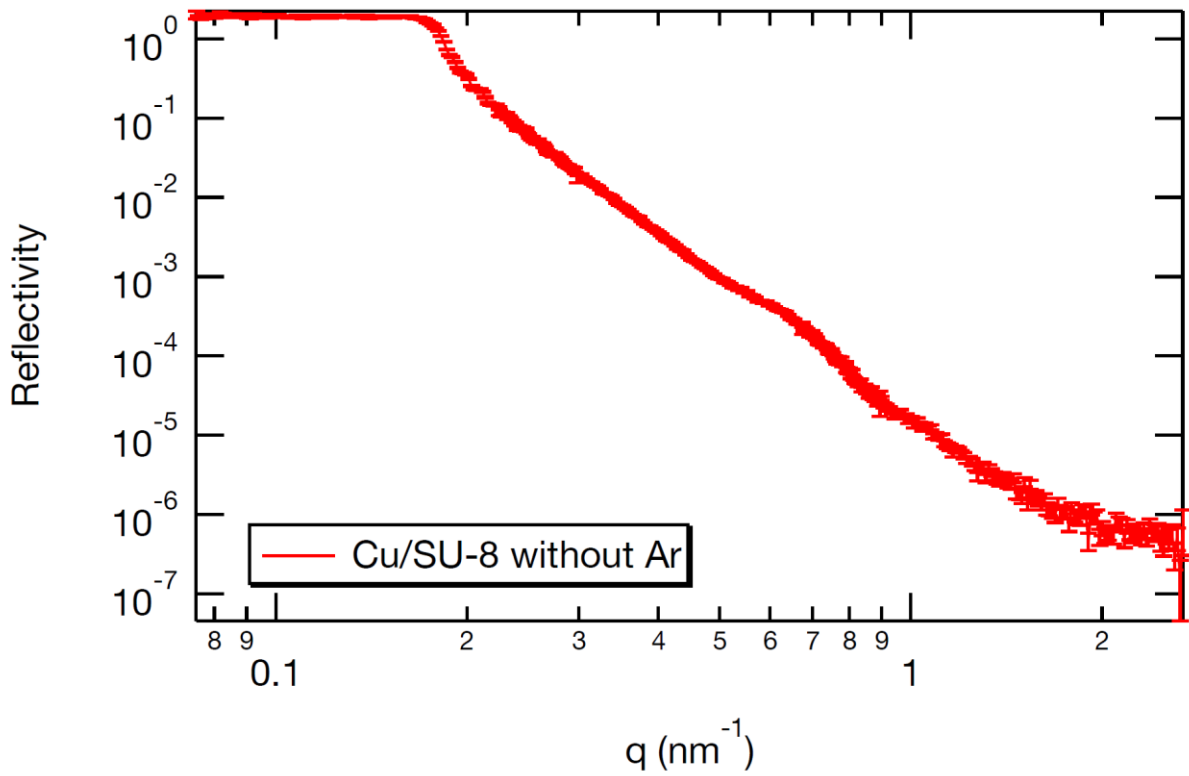


Fig. 1: Neutron reflectivities of a Cu (100 nm)/SU8 (epoxy resin) (100 nm)/Si sample without Ar ion irradiation (upper) and a SU8 (100 nm)/Si sample (lower).