

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。)

 Experimental Report 	承認日 Date of Approval 承認者 Approver 提出日 Date of Report
課題番号 Project No. 2017A0062 実験課題名 Title of experiment Development of spin contrast variation neutron reflectometry system at BL17 実験責任者名 Name of principal investigator Takayuki Kumada 所属 Affiliation Materials sciences research center, Japan Atomic Energy Agency	装置責任者 Name of Instrument scientist Kazuhiko Soyama 装置名 Name of Instrument/(BL No.) BL17 実施日 Date of Experiment June 23-26, 2017

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.
<p>Poly(styrene-block-isoprene)/Si, $(C_8H_8)_n-(C_5H_8)_n/Si$, thin layer sample.</p>

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>Combination of polarized neutrons and proton-polarized sample, we successfully carried out spin contrast variation neutron reflectometry of thin-film poly(styrene-block-isoprene) (PSPI) that has microphase-separated lamellae stacked along a silicon substrate.</p> <p>The reflection profiles mostly vary with the proton polarization as expected theoretically. However, some discrepancy remains between the experimental and theoretical results (Fig. 1). It is probably due to inhomogeneity of the proton polarization and structure of the thin-film sample. The NMR coil on the sample (Fig. 1(b)) causes inhomogeneous distribution of microwave intensity that induce the proton polarization. As shown in Fig. 1 (c), thin-film structure of the edge part of the sample looks different from that at the center. In order to avoid the inhomogeneity that is caused by distribution of microwave, we have to focus the neutron beam tightly at the center of the PSPI sample.</p> <p>Based on the analysis, we are making a new sample cell. Unlike the present cell (Fig. 1 (d)), we will introduce the neutron beam to the thin-film sample from the front surface (vacuum side) not from the back (Si side) to</p>

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

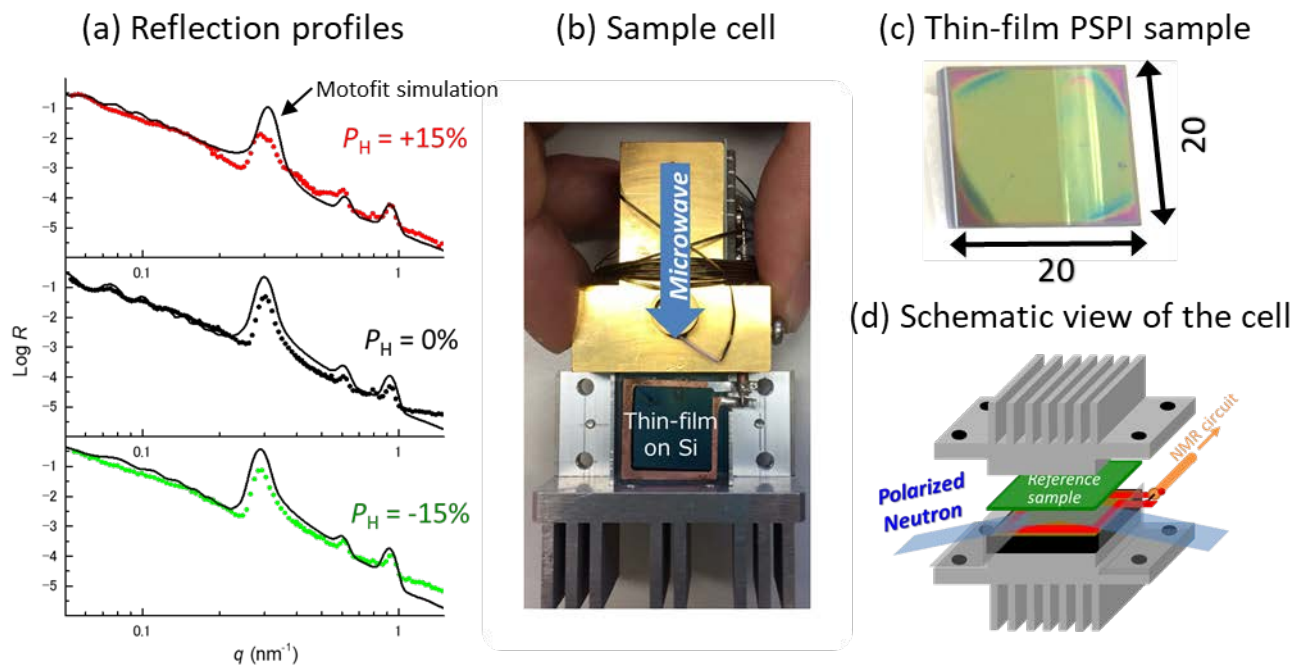


Fig. 1 (a) Polarized neutron reflection profiles of proton-polarized PSPI. (b) Sample cell. (c) Thin-film PSPI sample spin-coated on Si. (d) Schematic view of the cell.

see total reflection. We suffered from very small neutron counting rate of the neutron reflected from the back surface when neutron beams are aligned in the last experiment. By monitoring the intense total reflection using the new cell, we can precisely align the neutron beam at the center in the next experiment.