

実験報告書様式(一般利用課題・成果公開利用)

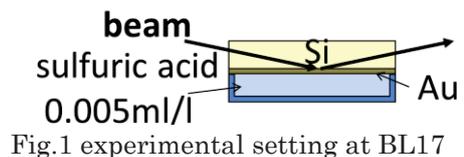
(※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。)

	承認日 Date of Approval 2015/06/08 承認者 Approver Dai Yamazaki 提出日 Date of Report 2015/03/18
課題番号 Project No.2014A0137  実験課題名 Title of experiment Neutron reflectivity analysis of electric double layer of Au electrode 実験責任者名 Name of principal investigator Tazuko Mizusawsa 所属 Affiliation CROSS Tokai	装置責任者 Name of Instrument scientist Masayasu Takeda 装置名 Name of Instrument/(BL No.) BL-17 実施日 Date of Experiment Dec.6-Dec.8, 2014

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.  - Gold thin film on silicon substrate (Furuuchi, 3 inch in diameter, 2mmt) is prepared by DC sputtering with Ar $8 \times 10^{-2}$ mbar, 6mA, 120sec. - 0.005mol/l H <sub>2</sub> SO <sub>4</sub> (Kanto kagaku).
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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.  The measurement was performed in two kind of condition, Au thin film in air (i.e. the cell is not filled with sulfuric acid) and contacted with the solution. Neutron beam irradiated the gold/solution interface from Si substrate as shown in Fig.1. The wavelength range was 0.22-0.88nm, 2θ angle was selected 0.3,0.9, and 2.7°. The total measuring time is about 2.5hours for each measurement. Fig. 2 shows the reflectivity of Au thin film on Si subatraste without the solution. The solid line shows the calculation using the stacking model from the X-ray reflectivity measurement. The reflectivity was derived 7 orders of intensity, the oscillation is not clear. it would be explained that the neutron beam went through the silicon substrate or reflected with some offset angle rather than illuminate at the interface. It need to be confirmed next experiments.
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## 2. 実験方法及び結果(つづき) Experimental method and results (continued)

Fig.3 shows the reflectivity Au thin film contact with the sulfuric acid solution. The calculation (solid line) accounts for background of  $10^{-5}$ . high scattering intensity around  $qz=0.06\sim 0.2\text{\AA}^{-1}$  is assumed to come from the solution. the oscillation period of thereflectivity would be almost the same as the calculation. It can be said that the thickness of the film is not affected by the acid solution.

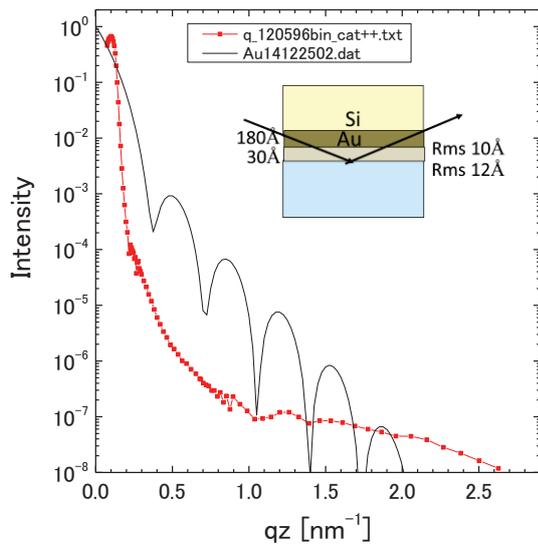


Fig.2 Reflectivity of Au thin film in the air(red). Calculation (solid line) is based on the model derived from the X-ray reflectometry, not considering the background.

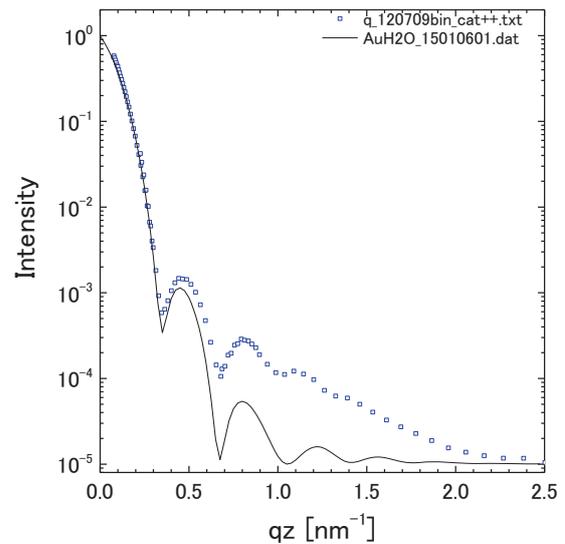


Fig.3 Reflectivity of Au thin film contacting to sulfuric acid(blue). Calculation (solid line) is based on the model derived from the X-ray reflectometry, considering the background of  $10^{-5}$ .