

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 2015/11/30 承認者Approver Yamazaki Dai 提出日Date of Report 2015/7/25
課題番号 Project No 2014B0179 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 Mizusawa 所属 Affiliation CROSS Tokai	装置責任者 Name of responsible person Dr. Dai Yamazaki 装置名 Name of Instrument/(BL No.) BL17 実施日 Date of Experiment March 24,2015- March 26, 2015

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.

<p>1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.</p> <ul style="list-style-type: none"> - Au thin film coated on the Cr sputtered layer on the Si substrate(30 x30 x2mmt). The designed film thickness is 300A for Cr, and 200A for Au. - 0.005mol/l H₂SO₄ (Kanto Kagaku) was used as electrolyte. - Pt wire and Ag/AgCl as counter electrode and reference electrode, respectively.
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<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。)</p> <p>Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.</p> <p>The sample is set in the electrolytic cell made with PTFE. 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 Au/solution interface from Si substrate as shown in the inset of Fig.1. The irradiated area is 12 x12 mm. The wavelength range was 0.22-0.88nm, 2θ angle was selected 0.4,0.6,1.8, and 5.4°. The total measuring time is 1,1,2,4 hours for for each θ/2θ geometry. In addition, background intensity was also measured to examine the influence of scatter from cell and other components.</p>
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2. 実験方法及び結果(つづき) Experimental method and results (continued)

Fig.1 shows the reflectivity of Au thin film contact with and without the sulfuric acid solution. The background is subtracted in these cases. The reflectivity was derived 6 orders of intensity. The total reflection is not clear though the measurements were performed at low q area, under 0.1 nm^{-1} . The oscillation arising from total film thickness is observed in both cases. The frequency of the oscillation does not change after inducing the H_2SO_4 solution, so it is confirmed that the film thickness is not affected by the electrolyte. The relatively high scattering intensity around $qz=0.5\sim 1.5 \text{ nm}^{-1}$ is observed in presence of electrolyte. It is assumed to come from the solution. Such scattering was observed in previous experiment which used single Au layer sample in borosilicate glass cell.

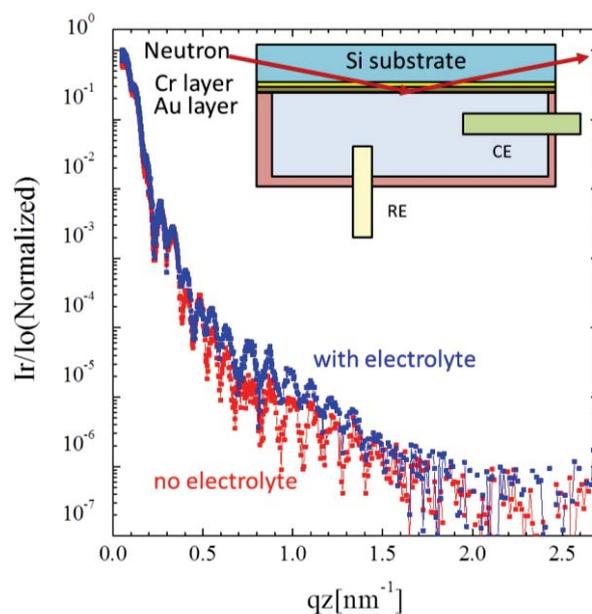


Fig.1 Neutron reflectivity of Au /Cr thin film on the Si. Experimental setting is shown inset