


(※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。)

 MLF Experimental Report	提出日 Date of Report
課題番号 Project No. 2013B0161 実験課題名 Title of experiment Study of Diffuse Reflection for the Characterization of Candidate Materials of Ultracold Neutron Storage Cell 実験責任者名 Name of principal investigator Masaaki Kitaguchi 所属 Affiliation Nagoya University	装置責任者 Name of responsible person 装置名 Name of Instrument/(BL No.) SOFIA (BL16) 実施日 Date of Experiment 13 Mar. 2014 – 14 Mar 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.
<p>For neutron electric dipole moment measurement, motion of ultra-cold neutrons in the storage cell must be understood precisely. The reflection properties with the inner surface are important to estimate the motion. In order to study the dependence of non-specular reflection for the surface roughness, silicon wafers which have different values of roughness, 10 nm, 3 nm, 1.0 nm, and 0.3 nm of rms, were prepared. Nickel-carbon (NiC) alloy thin layers deposited on the silicon substrates for high reflectivity. Diamond-like carbon (DLC) mirror was also prepared to demonstrate the case of smooth surface.</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>We measured the fraction of the diffuse reflection by observing the neutrons detected out of the specular region on the detector plane (Fig. 1). One-dimensional distribution on the detector plane was observed as a function of the neutron time-of-flight. Increasing the distribution for non-specular reflection region according to the surface roughness of the substrates was observed clearly (Fig. 2).</p> <p>Comparing the data with simulation using Distorted-wave Born approximation (DWBA) enables us to discuss about UCN reflection with finite diffusion. We have already observed that measured data were in good agreement with the simulations. Detail analysis is on going now.</p>

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

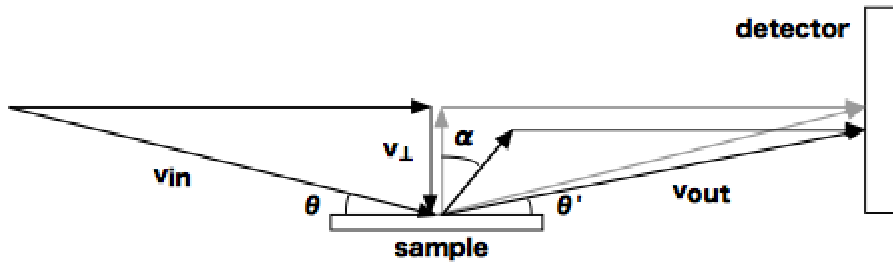


Fig. 1 : Measurement with non-specular reflection.

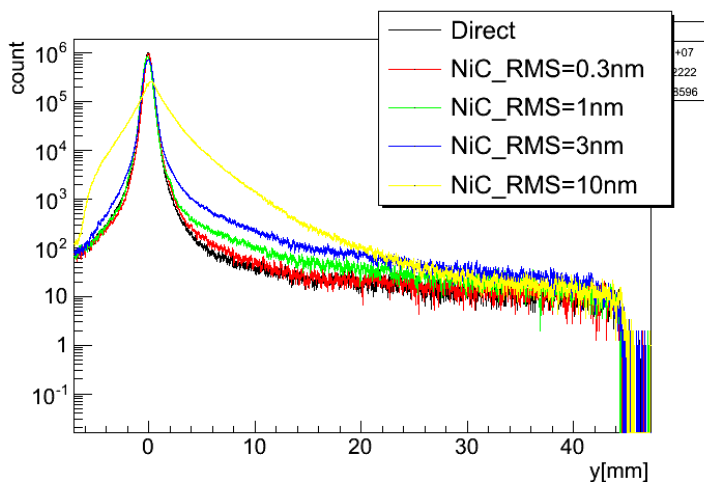


Fig. 2 : Spatial distribution of reflected beam on the detector. The peaks at $y = 0$ represent specular reflections. Non-specular reflections around the peaks were observed according to the surface roughness.