

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。)

 MLF Experimental Report	提出日 Date of Report
課題番号 Project No. 2012B0043 実験課題名 Title of experiment Muonium emission from alkali-metal coated tungsten surfaces 実験責任者名 Name of principal investigator Yasuyuki Nagashima 所属 Affiliation Tokyo University of Science	装置責任者 Name of responsible person Yasuhiro Miyake 装置名 Name of Instrument/(BL No.) D2 実施日 Date of Experiment 15 Dec. – 17 Dec. (3days)

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> <p>The sample was a polycrystalline tungsten foil. It was heated up to 2300K in ultra-high vacuum. After cooling down to room temperature, Na was deposited on the surface.</p>

<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> <p>We have guided muon beams from D2 to the tungsten target and monitored the positrons emitted from muons which decayed in the downstream side of the target using two scintillator arrays. The signals detected by the arrays were traced back to determine the position of the muon decay. The muon lifetime spectra for several regions from the target were accumulated and the time-of-flight spectra were obtained. By comparing the spectra measured at high temperatures and room temperature, the excess of the counts were obtained (figure 1). This indicates that muonium atoms were emitted from the hot tungsten surface as shown by Mills et al in 1986 (Phys. Rev. Lett. 56 (1986) 1463).</p> <p>We have also studied the muonium emission from the target after Na coating at room temperature. Figure 2 shows the subtracted counts of the Na coated surface and the uncoated surface at room temperature. Unfortunately, excess counts were not observed.</p>

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

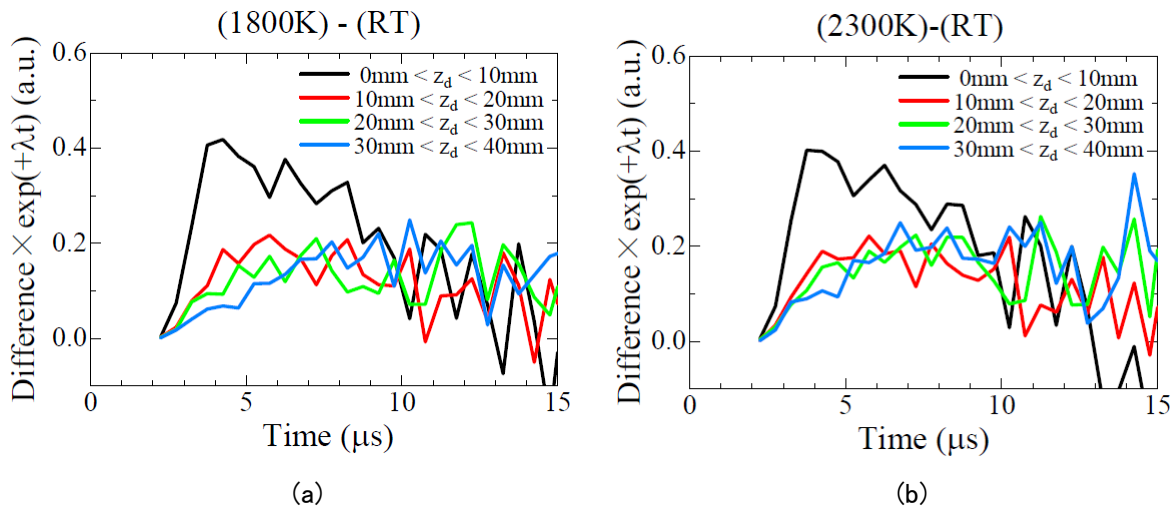


Figure 1 Time-of-Flight spectra for muons emitted from hot tungsten surfaces. The spectrum for the target at room temperature was subtracted and the effect of decay with the lifetime of $2.2 \mu\text{s}$ has been corrected. These data show that muonium atoms were emitted from hot tungsten surfaces.

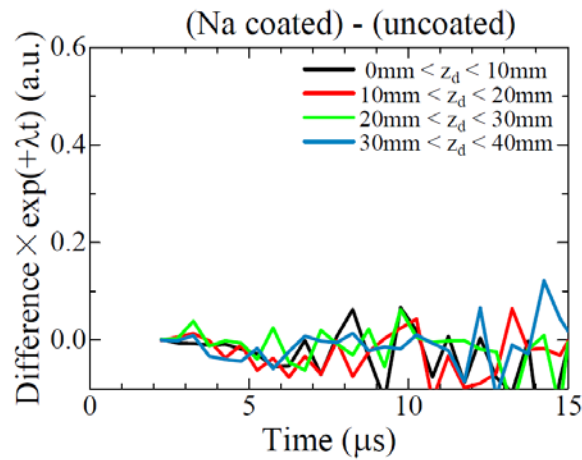


Figure 2 The spectra after Na coating. The thickness was about 0.3nm . The measurements were performed at room temperature. The spectra obtained for uncoated target at room temperature have been subtracted and the effect of decay with the lifetime of $2.2 \mu\text{s}$ has been corrected. The emission of muonium from Na coated surface was not observed.