

(※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. 2012B0103 実験課題名 Title of experiment Atomic process after formation of muonic atom through muon transfer reaction for nitrogen oxide molecule 実験責任者名 Name of principal investigator Kazuhiko Ninomiya 所属 Affiliation Osaka University	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 2012/12/24-26, 2013/3/8

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>H₂ + CO₂ (1%) mixture, Ne, COS gases</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>When a negative muon approaches to an atom, the muon is captured on the Coulomb field of the nucleus and a muonic atom is formed. Characteristic muonic X-rays and Auger electrons are emitted after formation of the muonic atom following to muon deexcitation. It is known that muon capture process is strongly influenced by molecular structure of the muon capturing atom (molecular effect). In fact, muon capture probability of each atom (corresponds to total intensities of muonic X-rays of each atom) and structure of muonic X-rays (muon deexcitation path) are changed by molecules.</p> <p>We are planning to investigate muonic atom formation processes from muonic X-ray intensity pattern (muonic X-ray structure). For this purpose, we examined pressure dependence of muonic X-ray structure.</p>

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

Because muon cascading processes compete with the electron refilling processes by atomic collisions, muonic X-ray structure is influenced by sample density (pressure). To confirm sample density dependence on muonic X-ray structure is important for investigation of muonic atom formation process precisely.

In this study, we performed muon irradiation for 0.1 and 0.2 atm COS sample and measured muonic X-rays. Figure 1 shows the experimental muonic X-ray structure for muonic carbon with two pressure conditions. We firstly investigated that there are no pressure influences on muonic X-ray structure among these pressure conditions; electron refilling process is neglectable, that is, we can simplify muon capture process in this condition. The detail discussion of muon capture process for COS molecule is now in progress.

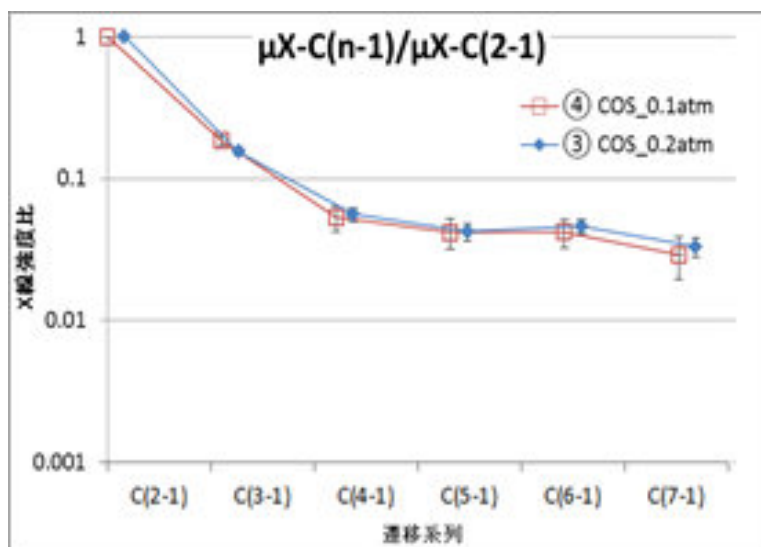


Figure 1. muonic carbon X-ray structure spectra for COS samples with different pressure condition.