

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 2011/6/17
課題番号 Project No. 2010B0070 実験課題名 Title of experiment Competition/coexistence between magnetism and superconductivity in iron-based superconductors 実験責任者名 Name of principal investigator Ryosuke Kadono 所属 Affiliation KEK-IMSS	装置責任者 Name of responsible person Y. Miyake 装置名 Name of Instrument/(BL No.) Muon D1 実施日 Date of Experiment 2010/12/10 – 2010/12/13

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.
Iron arsenide, powder, $\text{LaFeAsO}_{1-x}\text{F}_x$, $x=0.04, 0.06$ (two samples with different T_c), 0.065, 0.07

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 made muon spin relaxation measurements in the above mentioned samples under zero external field over a temperature range of 5–300 K to investigate magnetic their ground state. The samples were prepared with varying F substitution for O near the range of $x=0.06$ where a sharp variation from magnetic to superconducting phase was reported. As summarized in Fig.1, it turned out that the observed trend of magnetic property did not necessarily show systematic variation with fluorine content. Under this circumstance, we made SIMS analysis of these samples to obtain the true value of x, and found that the actual fluorine content showed deviation from the initially loaded values. This casted some doubt on the oxygen content which might be also subject to such uncertainty.</p> <p>Thus for the present purpose of experiment, it became clear that we need to find out way to control the actual fluorine (and oxygen) content in La1111 samples with precision of 1% or less.</p>

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

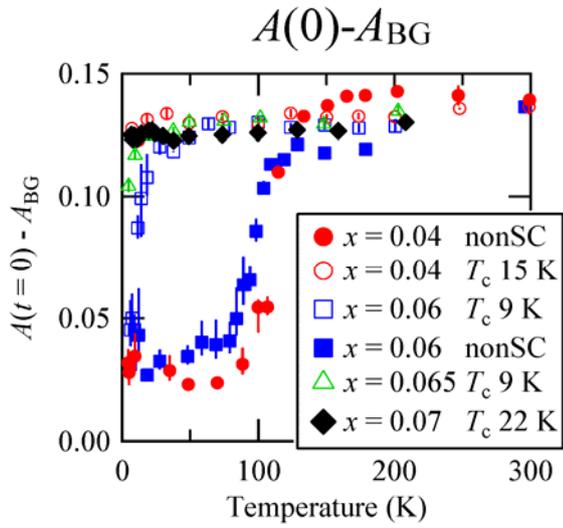


Fig.1 Initial μ -e decay asymmetry $A(0)-A_{BG}$ of zero-field muon spin relaxation spectra (after subtracting background) vs temperature. While $A(0)-A_{BG}$ has correlation with T_c , it has no systematic trend along x .