MLF Experimental Report	提出日 Date of Report
課題番号 Project No. 2013B0202 実験課題名 Title of experiment μSR study of magnetic states in electron-doped $Pr_{1.3-x}La_{0.7}Ce_xCuO_{4+\delta}$ (x = 0.05 – 0.15) single crystals depending on the δ and x values 実験責任者名 Name of principal investigator Tadashi Adachi 所属 Affiliation Department of Engineering and Applied Sciences, Faculty of Science and Technology, Sophia University	装置責任者 Name of responsible person Yasuhiro Miyake 装置名 Name of Instrument/（BL No.） D1 実施日 Date of Experiment 2014. 3. 10 – 12

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.

Pr-based high-T_c superconducting cuprates
$Pr_{1.3-x}La_{0.7}Ce_xCu_{4+\delta}$ (x = 0)
Single crystals

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.

Zero-field and longitudinal-field μSR measurements have been performed at temperatures between 2.7 K and 270 K for non-superconducting as-grown and non-superconducting 800°C-reduced $Pr_{1.3-x}La_{0.7}Ce_xCuO_{4+\delta}$ (PLCCO) single crystals with x = 0. Measurements have been performed in the single- and double-pulsed modes depending on the temperature.

During the measurements, distortion of a spectrum has been observed, probably originating from double counting of the positron by the 'KALLIOPE' counter because of the strong muon beam. Moreover, the kicker noise has been observed in the spectrum in a wide time range. By changing the temperature, the spectrum has been shifted up and down irregularly even after calibrating the counting efficiency between the forward and backward counters. These problems prevent us from presenting and publishing the data.

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

For the as-grown crystals, at a high temperature of 270 K, the spectrum showed the Gaussian-like slow depolarization due to randomly oriented nuclear spins. With decreasing temperature, a fast depolarization of muon spins was observed. However, at the base temperature of 2.7 K, no muon-spin precession was observed, which is incompatible with the former results that the as-grown samples of $x = 0$ exhibit a long-range antiferromagnetic order. Moreover, for the 800^{o}C-reduced crystals, missing of the initial asymmetry and following slow depolarization was observed in the spectrum at 2.7 K, indicating that the Cu-spin correlation is more developed in the reduced crystals than that in the as-grown ones. This is an opposite tendency observed in PLCCO formerly reported.

The present results are hard to understand by the understanding of the electron-doped cuprates to date. Besides the spectra show problematic behaviors mentioned above. Accordingly, the present results cannot be presented and published. After checking the oxygen content of the as-grown and reduced crystals, we would like to perform μSR measurements in future. We hope the extrinsic problems of the spectra are solved as soon as possible.