

 <b>MLF Experimental Report</b>	提出日 Date of Report 22, Jun, 2011
課題番号 Project No. 2010A0054 実験課題名 Title of experiment HRPD Characterization of two rare earth fluorite-related compounds: La(Sb <sub>0.5</sub> Co <sub>0.5</sub> ) <sub>3</sub> O <sub>x</sub> (1) and La <sub>12</sub> CaCr <sub>4</sub> O <sub>30</sub> (2) 実験責任者名 Name of principal investigator Ying-Xia Wang 所属 Affiliation Peking University, China	装置責任者 Name of responsible person Takashi, Kamiyama 装置名 Name of Instrument/(BL No.) BL08 実施日 Date of Experiment 10:00 am, 16 <sup>th</sup> , Jun, 2010 – 10:00 am 17 <sup>th</sup> , Jun, 2010

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.
$\text{La}_3\text{Sb}_3\text{Co}_2\text{O}_{14}$ $\text{La}_{12}\text{CaCr}_4\text{O}_{30}$

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>The diffraction patterns of <math>\text{La}_3\text{Sb}_3\text{Co}_2\text{O}_{14}</math> and <math>\text{La}_{12}\text{CaCr}_4\text{O}_{30}</math> were measured at room temperature (~298K). Vanadium containers were used for the experiment.</p> <p>1. <math>\text{La}_3\text{Sb}_3\text{Co}_2\text{O}_{14}</math> The data from BL08 J-PARC is helpful in the structure study. <math>\text{La}_3\text{Sb}_3\text{Co}_2\text{O}_{14}</math> is a new compound, which was revealed from a systematic study of the phase diagram <math>\text{La}_2\text{O}_3\text{-Sb}_2\text{O}_5\text{-CoO}</math> by solid state reaction. Since no single crystal is available, its structure was solved by powder X-ray data. The XRD profile can be readily indexed in a rhombohedral cell with <math>a = 7.52954(2) \text{ \AA}</math> and <math>c = 17.59983(6) \text{ \AA}</math>. The initial model obtained ab initio from XRD data was a fluorite-related structure. Only when the high resolution neutron diffraction data was applied, could the cations be differentiated, which resulted in an ordered pyrochlore structure in the space group R-3m. The structure of <math>\text{La}_3\text{Sb}_3\text{Co}_2\text{O}_{14}</math> was then refined by the combination of powder X-ray and neutron diffraction data. The completely ordered distribution of cations in <math>\text{La}_3\text{Sb}_3\text{Co}_2\text{O}_{14}</math> provide a nice example for extracting 2D Kagome lattice from 3D pyrochlore structure.</p> <p>2. <math>\text{La}_{12}\text{CaCr}_4\text{O}_{30}</math> Since low density of the sample and the limited beamtime, the signal-to-noise ratio of the data from BL08 is poor and cannot be used for structure study. The details of the structure are not very clear.</p>