

 MLF Experimental Report	提出日 Date of Report 22, Jun, 2011
課題番号 Project No. 2010B0061 実験課題名 Title of experiment Characterization of magnetic structure of LaSbCo ₂ O ₆ and La(Sb,Co)O ₃ 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 15 th , Feb, 2011 – 17 th , Feb, 2011

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. Yb ₃ Sb ₃ Zn ₂ O ₁₄ Ho ₃ Sb ₃ Zn ₂ O ₁₄ Dy ₃ Sb ₃ Zn ₂ O ₁₄ Tb ₃ Sb ₃ Zn ₂ O ₁₄ Ho ₃ Sb ₃ Mg ₂ O ₁₄ Nd ₃ Sb ₃ Zn ₂ O ₁₄ BiFeO ₃
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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. The diffraction pattern of Ho ₃ Sb ₃ Mg ₂ O ₁₄ was measured at ~5K firstly, which was the lowest temperature that can be reached. All the samples were measured at room temperature (~298K). Ho ₃ Sb ₃ Zn ₂ O ₁₄ was not measured at 5K as planned since it would cost too much time for the cooling, and all of the samples are tested at room temperature. The Rietveld refinements using the neutron data reveals firstly an order-disorder structure transformation with the change of rare earth cations in the series of compounds Ln ₃ Sb ₃ Zn ₂ O ₁₄ (Ln = Nd, Tb, Ho, Yb), which helps us to understand the composition-structure relation. However, there are still some suspending questions: 1) the refinement of Tb ₃ Sb ₃ Zn ₂ O ₁₄ and Ho ₃ Sb ₃ Mg ₂ O ₁₄ converged to the results with several negative temperature factors, especially at the peak of ~145300 μs, the difference between the experimental and calculated value is large. If this peak was excluded, the refinement would go smoothly and converge to a normal result. We are not sure which problem with the data – samples themselves or the contribution of fast neutrons? It needs to be checked carefully.
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2. 実験方法及び結果(つづき) Experimental method and results (continued)

2) For $\text{Dy}_3\text{Sb}_3\text{Zn}_2\text{O}_{14}$, the data are not very satisfactory due to the strong absorption of Dy. There are obvious differences between the observed and calculated patterns. The absorption correction need to be improved.

3) The disordered structures of $\text{Yb}_3\text{Sb}_3\text{Zn}_2\text{O}_{14}$ and $\text{Ho}_3\text{Sb}_3\text{Zn}_2\text{O}_{14}$. Some diffused peaks in the profiles of $\text{Yb}_3\text{Sb}_3\text{Zn}_2\text{O}_{14}$ and $\text{Ho}_3\text{Sb}_3\text{Zn}_2\text{O}_{14}$ are observed, which generally imply that disordering take places in the structure. Since the diffused peaks cannot be covered by the indexation using the same cell parameters from X-ray data, the unit cells and space groups need to be re-determined.

We shall continue working on the structure refinement in collaboration with Prof. Kamiyama to solve the problem.