


(※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。)

 <b>MLF Experimental Report</b>	提出日 Date of Report 2011/07/03
課題番号 Project No. 2010A0067 実験課題名 Title of experiment Structural study on novel pyrochlore-type oxides showing metal-insulator transition 実験責任者名 Name of principal investigator Ayako Yamamoto 所属 Affiliation RIKEN	装置責任者 Name of responsible person Takashi KAMIYAMA 装置名 Name of Instrument/(BL No.) BL-08 実施日 Date of Experiment 2010/6/6-6/7

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.
$Tl_2Rh_2O_7$ (firstly synthesized by the principal investigator at high pressure, showing metal-insulator transition at 95K associated with pyrochlore lattice)

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>Sample: <math>Tl_2Rh_2O_7</math> Polycrystalline form prepared under high pressure of 4 GPa. Characterized by XRD and DC susceptibility.</p> <p>Firstly we loaded the powder sample (c.a. 700mg) in the vanadium cell, but sample amount is not enough to incident the beam into the sample. Then we wrap the sample powder with vanadium foil to make it thinner and put it in the vanadium cell.</p> <p>We collected the diffraction data at 300 K and 70 K (using refrigerator) for 1 day each. We are interested in the structural change across the temperature (<math>\sim 90K</math>, Fig.1) from metal to insulator.</p> <div data-bbox="798 1433 1340 1904" data-label="Figure"> </div> <p style="text-align: center;">Fig. 1 Resistivity vs temperature of <math>Tl_2Rh_2O_7</math></p>

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

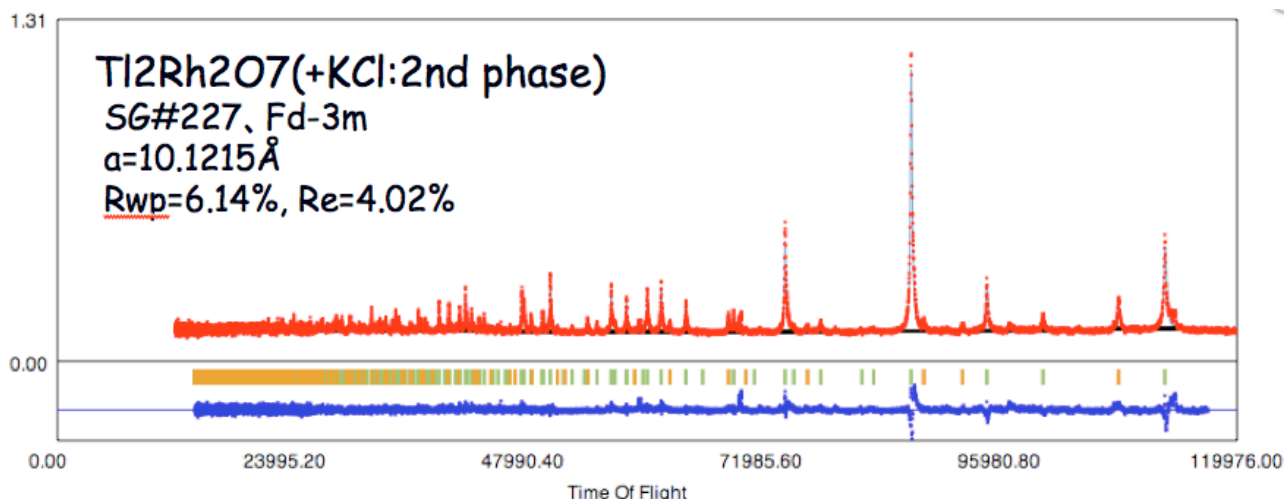


Fig. 2 Diffraction data and fitting pattern of  $Tl_2Rh_2O_7$  at 300K

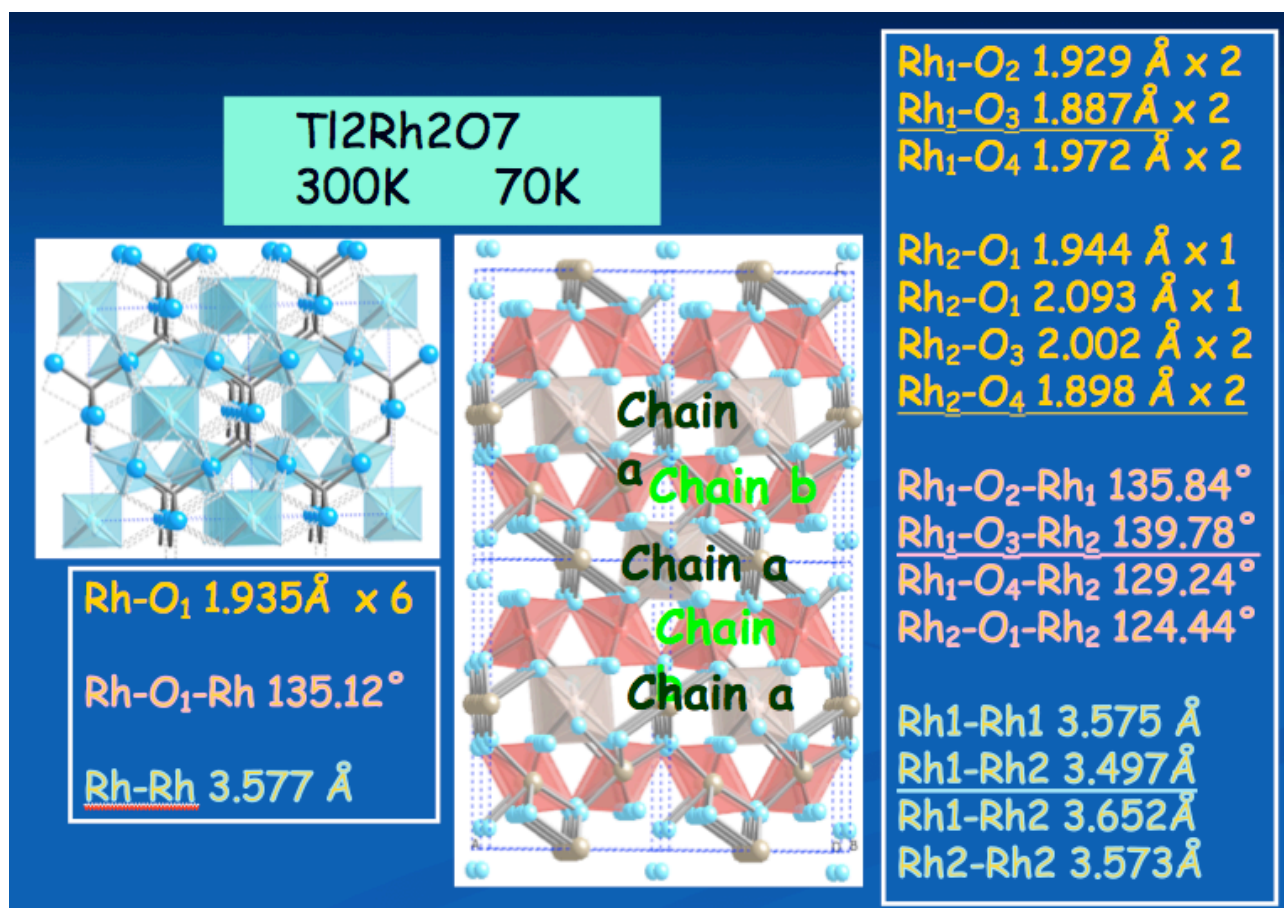


Fig. 3 Structure models and selected bond distances of  $Tl_2Rh_2O_7$  at 300 K and 70 K

Refinement of diffraction data revealed that the structure changes from Fd-3m (#227) to Pnam (#62). Structural change corresponds to physical properties. Detailed analysis is in progress.