Anomalous magnetic ground state associated with metal-insulator transition in Ru-pyrochlore oxide

K. H. Satoh[1], R. Kadono[1,2], M. Hiraishi[1], M. Miyazaki[1], S. Takeshita[2], A. Koda[1,2], A. Yamamoto[3] and H. Takagi[3]

[1]*Department of Materials Structure Science, The Graduate University for Advanced Studies (Sokendai), Tsukuba, Ibaraki 305-0801, Japan*
[2]*Institute of Materials Structure Science, High Energy Accelerator Research Organization (KEK), Tsukuba, Ibaraki 305-0801, Japan*
[3]*The Institute of Physical and Chemical Research (RIKEN), Wako, Saitama 351-0198, Japan*

Transition metal oxides crystalizing in the cubic pyrochlore structure ($A_2B_2O_7$) are characterized by a three dimensional network of regular tetrahedra with their corners occupied by B site ions, and they serve as a stage of strong electronic correlation in terms of geometrical flustration. Recently, we succeeded in obtaining a new pyrochlore oxide $Hg_2Ru_2O_7$ as a member of pentavalent (Ru^{5+}) family by high pressure synthesis [1]. Despite the absence of orbital degeneracy ($4d^3$), this compound exhibits a clear metal-insulator (MI) transition at T_{MI} ~107 K that is associated with only a slight structural distortion. As shown in Fig.1, our zero field-μSR measurements in $Hg_2Ru_2O_7$ reveals a complex signal consisting of multiple frequency components below T_{MI}, which implies that the magnetic order is different from that of simple collinear magnetic structure. The result suggests a competition between itineracy and magnetic order, where the geometrical frustration might be playing some role. The relation between MI transition and anomalous magnetic ground state will be discussed in relation to other cubic pyrochlore oxides.

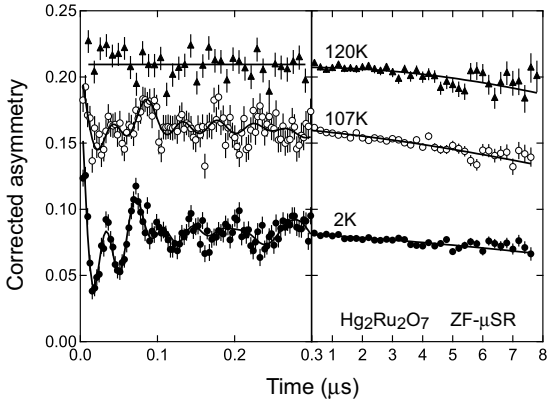

Fig. 1: Zero field-μSR time spectra of $Hg_2Ru_2O_7$.

[1] A. Yamamoto, *et al.*, J. Phys. Soc. Jpn 76 (2007) 043703.