Spin Dynamics in Multiferroic Rare-Earth Manganites Probed by Muon Spin Relaxation

A. Koda[a], M. Miyazaki[b], M. Hiraishi[b], T. Masuda[a], K.M. Kojima[a], R. Kadono[a], N. Abe[c], and T. Arima[d]

[a]Institute of Materials Structure Science, High Energy Accelerator Research Organization (KEK), Tokai, Naka, Ibaraki, Japan
[b]The Graduate University for Advanced Studies (Sokendai), Tsukuba, Ibaraki, Japan
[c]Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Sendai, Japan
[d]Graduate School of Frontier Sciences, University of Tokyo, Kashiwa, Chiba, Japan

We have conducted μSR experiment on polycrystalline samples of $TbMnO_3$ and $GdMnO_3$ under longitudinal fields up to 5 T, in order to clarify the spin dynamics in multiferroics. In the case of $TbMnO_3$, quite fast spin fluctuation ($\sim 10^{12}$ s^{-1}) was seen at ambient temperature. Moreover, the fluctuation rate drastically decreases with lowering temperature down to 10 K, without showing no signature of magnetic transition both at 27 K and 42 K. In contrast, it was turned out that spin fluctuation in $GdMnO_3$ shows almost temperature independent behavior ($\sim 10^9$ s^{-1}). Furthermore, remarkable reduction of the intial asymmetry was seen at 43 K, below which the ordering of Mn magnetic moment was reported. In spite of the quantitative difference of the spin fluctuation rate among these compounds, the dynamic magnetic nature was observed in both samples over the investigated temperature, which may relate to the frustrated magnetism due to the distorted perovskite structure.