Abstract for an Invited Paper
for the MAR09 Meeting of
The American Physical Society

Multiferroic domain wall and its relevance to magnetoelectric phenomena in ferroelectric helimagnets[1]

YOSHINORI ONOSE, University of Tokyo

Recently, magnetically induced ferroelectricity and the giant magnetoelectric (ME) effect in helimagnets (HMs) have attracted much attention. In the ferroelectric HMs, the ferroelectric domain walls (DWs) may be clamped with the DWs of the magnetization, the helical plane direction, and/or the wave vector k of HM. In this talk, we show the role of the multiferroic domain wall motion in the giant magnetoelectric effect. We have observed the P under H unparallel to k in a proper screw HM $ZnCr_2Se_4$. The origin of the P can be ascribed to the rotation of the conical spin structure. In the high H region, we observe the discontinuous change of the P due to the k-flop in this material. The k-flop is driven by the DW of k. There are two types of the k-DW. The stability of the DWs determines the sign of the spin helicity after the k-flop. Another example of the ME phenomena related to DW is P-flop in $DyMnO_3$. In $DyMnO_3$, the magnetic field along b-axis induces the P-flop from $P||c$ to $P||a$. The dielectric constant shows a large enhancement in the course of the P-flop. We have investigated the dielectric dispersion of the giant magnetocapacitance (GMC) effect and found that the GMC is attributable to the motion of the DW between bc plane spin cycloid ($P||c$) and ab plane spin cycloid ($P||a$) domains.

[1]In collaboration with H. Murakawa, F. Kagawa, S. Ishiwata, Y. Kaneko, K. Ohgushi, M. Mochizuki, N. Furukawa, and Y. Tokura