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Correlation between magnetocapacitance effect and polarization flop direction in a slanted magnetic field in  $Tb_{1-x}Dy_{x}MnO_{3}$  NOBUYUKI ABE, HAJIME SAGAYAMA, HIROSHI UMETSU, TAKA-HISA ARIMA, IMRAM, Tohoku University, KOUJI TANIGUCHI, Department of Advanced Materials Science, The University of Tokyo — Recent extensive studies show that the cycloidal spin system can possess electric polarization through the spin-orbit coupling. The magnetoelectric coupling in multiferroics is enhanced by the clamping of helimagnetic and ferroelectric domain walls. For example, DyMnO<sub>3</sub> shows a gigantic magnetocapacitance effect caused by the microscopic motion of multiferroic domain walls at a magnetic field induced P-flop transition. In contrast, the enhancement of capacitance at the P-flop transition is much smaller in TbMnO<sub>3</sub>. Here, we show the systematic control of magnetocapacitance effect in helimagetic ferroelectric  $\text{Tb}_{1-x}\text{Dy}_x\text{MnO}_3$  as a function of the composition ratio x and the intensity of the applied magnetic field. It has been also found that the rotation direction of Pin a slanted magnetic field changes with x and H. The crossover between small and large enhancement in magnetocapacitance corresponds to the switch in the P-flop direction. The correlation can be explained by assuming the mobility of domain wall would be dominated by the thickness of domain walls in a helical magnet.

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