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Ferroelectric domain formation and reversal by cation substitution in magnetoelectric gallium ferrite epitaxial thin films R. H. SHIN, Ewha Womans University, CNRS-EWHA International Research Center, S. H. OH, W. JO[1], Ewha Womans University, C. LEFEVRE, Ewha Womans University, CNRS-EWHA International Research Center, Institute of Physics and Chemistry of Materials of Strasbourg, F. ROULLAND, A. THOMASSON, C. MENY, N. VIART, Institute of Physics and Chemistry of Materials of Strasbourg — Linear magnetoelectric $Ga_{2-x}Fe_xO_3$ (GFO) is ferrimagnet at room temperature (RT) (T_C =370 K at x=1.4) from Fe spin of d orbitals in octahedral Fe1(opposite direction), Fe2, and Ga2 sites along c-axis. According space group as $Pc2_1n$, ferroelectric ordering should be here along b-axis but have not observed, experimentally. Several scenarios of ferroelectricity in GFO have been suggested such as displacement of Fe ions, structural change, and so on. In the scenarios, it is very difficult to obtain their polarization because of tiny quantity and high domain wall (DW) formation energy. In this talk, we suggest the cation substituted GFO can be promising RT multiferroic showing ferroelectric ordering. We tried two kinds of direction: 1. Obtain polarization reversal under high magnetic and electric field to overcome high DW formation energy. 2. Apply chemical strain to make DW formation energy low. Though, when we applied chemical strain by substituting divalent cations, leakage current that overshadow polarization reversal was strongly reduced, ferromagnetic ordering was lost at RT owing to magnetic dilution by nonmagnetic cation like Mg^{2+}. Therefore, we discuss how to obtain ferroelectric polarization in the GFO thin films conserving RT ferrimagnet.

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