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Magnetoelectricity at The Antiperovskite/Perovskite Interface DING-FU SHAO, TULA PAUDEL, EVGENY TSYMBAL, Univ of Nebraska - Lincoln — Complex perovskite oxide materials (ABO_3) are known for their interesting macroscopic physical properties. Much less explored are the antiperovskite compounds (AXM_3) where the atomic positions of cations and anions are inverted creating unique, wide-ranging properties different from perovskites. Due to the structural similarity, interfaces combining perovskite and antiperovskite compounds can be fabricated to create unexplored fundamental opportunities for materials design. Here, based on first-principles density-functional calculations, we explore the magnetoelectric effect at the (001) interface between antiperovskite $GaNMn_3$ and perovskite $ATiO_3$ (A=Sr, Ba). Unlike the Γ^{5g} non-collinear magnetism of the bulk $GaNMn_3$, strong magnetic moment variation and reorientation emerge at the interface of $GaNMn_3/ATiO_3$ (A=Sr,Ba), resulting in the sizable net magnetization pointing along the [110] direction. Moreover, the switching of the ferroelectric polarization of $BaTiO_3$ drives the reversal of the net magnetization of $GaNMn_3$. The present phenomenon occurs due to the effect of ferroelectric polarization on the interfacial antiferromagnetic coupling, which paves a new route to achieve voltage-controlled spintronics.

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