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Magneto-electric effect in Thin Films of Ni-Mn-In¹ NABIL AL-AQTASH, Hasemite University, Jordan, ANDREJ SOKOLOV, University of Nebraska Lincoln, RENAT SABIRIANOV, University of Nebraska at Omaha — The magneto-electric effect in Ni-Mn-In thin films deposited on ferroelectric (FE) substrate is studied using DFT- based methods. The off-stoichiometric Ni₂Mn_{1.5}In_{0.5} alloy shows that the ferromagnetic (FM) cubic phase undergoes transformation to tetragonal ferromagnetic (FiM) martensite phase at low temperature. The presence of FE substrate SrZrO₃/PbZrO₃ alters the relative stability of FM austenite and FiM martensite phases. Furthermore, the polarization reversal in FE changes the energy difference between two phases as well, leading to the prospect of tuning the phase transition temperature by applied electric field. The structure of the interface affects the magnetoelectric coupling. We find that Ni-(Pb-O) interface is the energetically favorable in formation of FE/Ni₂Mn_{1.5}In_{0.5}. The energy difference (per NiMnIn f.u) between FM austenite and FiM martensite states of the film on FE substrate is $\Delta E = 0.22$ eV with polarization away from interface, upon polarization reversal $\Delta E = 0.75$ eV, compared to ($\Delta E = 0.24$ eV) in the bulk. These results clearly indicate the possibility of control of martensitic transition in Ni-Mn-In thin films by FE substrate.

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Renat Sabirianov
University of Nebraska at Omaha

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