Abstract Submitted
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Giant magnetoelectric effect in thin magnetic films utilizing inter-ferroelectric transitions.[1] PETER FINKEL, MARGO STARUCH, US Naval Research Laboratory — There has recently been much interest to multiferroic magnetoelectric composites based on relaxor ferroelectric single crystals as potential candidates for devices such as magnetic field sensors, energy harvesters, or transducers. Large magnetoelectric coupling coefficient is prerequisite for superior device performance in a broad range of frequencies and functioning conditions. In magnetoelectric heterostructures based on ternary relaxors $Pb(In_{1/2}Nb_{1/2})O_3$-$Pb(Mg_{1/3}Nb_{2/3})O_3$-$PbTiO_3$ (PIN-PMN-PT) crystal better operational range and temperature stability as compared to binary relaxors can be achieved. Giant linear converse magnetoelectric coupling up to 2 x 10^{-6} s m^{-1} were observed in heterostructural composites with multilayered FeCo/Ag deposited on (011) PIN-PMN-PT crystals. Further enhancement of magnetoelectric coupling is demonstrated by utilizing inter-ferroelctric rhombohedral – orthorhombic phase transitions in PIN-PMN-PT Mechanical clamping was a precondition to utilize this inter-ferroelectric transition mode to bring the crystal to a point just below its transformation threshold when very small perturbations at the input will cause large swings at the output generating a sharp uniaxial increase in strain (˜0.5 %) and polarization change, giving rise to nonlinear effects. Details of these results and their implications will be presented.

[1]Giant magnetoelectric effect in thin magnetic fillms utilizing inter-ferroelectric transitions

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