Abstract Submitted
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Coupled ferromagnetism and ferroelectricity in superlattices of non-ferroelectric antiferromagnetic manganites[1] J.D. BURTON, 1, K. ROGDAKIS, 2, J.W. SEO, 3, Z. VISKADOURAKIS, 2, Y. WANG, 1, L. AH QUNE, 3, E. CHOI, 4, E. TSYMBAL, 1, J. LEE, 4, C. PANAGOPOULOS, 2,3 — Complex oxide heterostructures present a promising avenue for the design of multifunctional properties which may find application in a variety of technological systems. In heterostructures composed of transition metal oxides the disruption introduced by an interface can affect the balance of the competing interactions among spins, charges and orbitals. This has led to the emergence of properties absent in the original building blocks of a heterostructure. We will report on the discovery of magnetically tunable ferroelectricity in artificial tri-layer superlattices consisting of non-ferroelectric and non-ferromagnetic components: $NdMnO_3/SrMnO_3/LaMnO_3$.[1] Ferroelectricity was observed below 40 K exhibiting strong tunability by superlattice periodicity. Furthermore, magnetoelectric coupling resulted in 150% magnetic modulation of the polarization. First-principles calculations indicate that broken space inversion symmetry and mixed valency give rise to the observed behavior. This discovery highlights the importance of tri-layered systems for the engineering of emergent properties in oxide heterostructures. [1] K. Rogdakis et al, Nat Commun 3, 1064 (2012)

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