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Near Room-Temperature Magnetism and Enhanced Magnetic Moments in Multiferroic $(LuFeO_3)_m/(LuFe_2O_4)_n$ Superlattices[1] JARRETT MOYER, University of Illinois at Urbana-Champaign, JULIA MUNDY, CHARLES BROOKS, MEGAN HOLTZ, DAVID MULLER, DARRELL SCHLOM, Cornell University, PETER SCHIFFER, University of Illinois at Urbana-Champaign — The development of room-temperature multiferroics is necessary to realize the potential of these materials in low-power energy, memory, and logic applications. Currently, there are only four potential single-phase multiferroics that exist at room-temperature, all of which have either antiferromagnetic or weakly ferromagnetic magnetic orderings. Here, we report on the magnetic properties of epitaxially grown superlattices composed of the ferroelectric, weakly ferromagnetic h-$LuFeO_3$ and the paraelectric, ferrimagnetic $LuFe_2O_4$. By inserting layers of h-$LuFeO_3$ (T_N =147 K) into $LuFe_2O_4$, we increase T_C from 219 K for single-phase $LuFe_2O_4$ to 270 K for $(LuFeO_3)_7/(LuFe_2O_4)_1$. Additionally, while the magnetic moment on the $LuFe_2O_4$ layers remains constant for $m/(m+2n)$ <0.5, it increases rapidly for $m/(m+2n)$ >0.5, resulting in magnetic moments orders of magnitude larger than the weak ferromagnetic room-temperature multiferroics. We will discuss the potential mechanisms for these enhanced transition temperatures and magnetic moments and the potential to increase T_C to above room temperature.

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