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First-principles study of multiferroic properties of $Fe_3O_4/SrTiO_3$ and $Fe_3O_4/BaTiO_3$ [001] superlattices[1] MIN SIK PARK, A.J. FREEMAN, Northwestern University — Multiferroic superlattices are good candidates for the study of the interplay between magnetism and ferroelectricity, and important for multifunctional device applications operating at room temperature. Recently, it was found that the magnetoresistance arising at the $Fe_3O_4/BaTiO_3$ barrier is strongly bias dependent. [2] We calculated the physical properties for multiferroic superlattices of spinel Fe_3O_4 (as a ferrimagnet) and perovskite $SrTiO_3$, and $BaTiO_3$ (as ferroelectric materials) by using first-principles density functional calculations with the highly precise full-potential linearized augmented plane wave (FLAPW) method. [3] At the interface, the half-metallicity of bulk Fe_3O_4 is destroyed, and magnetic moments that are different from bulk Fe are obtained. The ferroelectric instability of $BaTiO_3$ near the interface is also discussed.

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[2]M. Ziese, A. Bollero, I. Panagiotopoulos, and N. Moutis, Appl. Phys. Lett., **88**, 212502 (2006).
[3]Wimmer, Krakauer, Weinert, Freeman, Phys.Rev.B, **24**, 864 (1981).

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