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Ferroelectric control of spin injection across the ferromagnet/ferroelectric interface XIAOHUI LIU, J.D. BURTON, EVGENY TSYMBAL, University of Nebraska-Lincoln — Magnetoelectric coupling has become one of the most attractive fields in modern materials research due their promise to electrically control spintronics-based devices. Previous investigations have shown that at the ferromagnet/ferroelectric interface, magnetization could be tuned by the reversal of ferroelectric polarization. We had previously predicted that ferroelectric polarization reversal can control the nature of the resistive contact at the SrRuO3/n-BaTiO3 heterojunction interface, going from the Ohmic to Schottky regimes with reversal of ferroelectric polarization [1]. It is known, however, that SrRuO3 displays robust ferromagnetism below the Curie temperature of about 160K. In this work, using first-principles density functional calculations, we explore the effect of ferroelectric polarization of spin-polarized transmission across the SrRuO3/n-BaTiO3 interface. Our study reveals that the interface transmission is negatively spin-polarized, and that ferroelectric polarization reversal leads to a change in spin polarization from -65% for the Ohmic contact to -98% for the Schottky contact. This sizeable change in the spin polarization could provide an interesting non-volatile mechanism to electrically control spin injection into semiconductor-based spintronics devices.

[1] X. Liu, et al., Phys. Rev. B 88, 165139 (2013).

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