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Non-Magnetic Suppression of Superconductivity in Heteroepitaxial Perovskite/YBCO/Perovskite Thin Films[1] C. ZHANG, H. ZHANG, University of Toronto, J. Y.T. WEI, University of Toronto & Canadian Institute for Advanced Research — To distinguish between the effects of strain and magnetism on superconductivity in epitaxial thin-film heterostructures comprising $YBa_2Cu_3O_{7-\delta}$ (YBCO) and half-metallic manganites, we study perovskite/YBCO/perovskite trilayer films, using either ferromagnetic $La_{2/3}Ca_{1/3}MnO_3$ (LCMO) or paramagnetic $LaNiO_3$ (LNO) as the buffer and capping layers. For comparison with trilayers that are lattice-symmetry matched, orthorhombic $PrBa_2Cu_3O_{7-\delta}$ (PBCO) was also used instead of the perovskites. LCMO/YBCO/LCMO and LNO/YBCO/LNO trilayers show similar reduction in superconducting transition temperature (T_c) vs. decreasing YBCO thickness, from 50 and 12.5 nm, but PBCO/YBCO/PBCO trilayers show no such T_c reduction. The tetragonal $La_2 - xSr_xCuO_4$ (LSCO) is also used in place of the orthorhombic YBCO, to further elucidate the effect of lattice-symmetry mismatch. Our results suggest that heteroepitaxial strain plays a stronger role than the proximity to ferromagnetism, for the suppression of superconductivity observed in manganite/YBCO heterostructures.

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