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Strong interaction of ultra thin cuprate superconductor and ferromagnetic manganites XIAOFANG ZHAI, JAMES ECKSTEIN, University of Illinois, Urbana — We have made bi-layer films with thick manganite layers on top of thin layers of the cuprate superconductor $Bi_2Sr_2CaCu_2O_{7+\delta}$ (BSCCO). The samples were grown using ozone assisted atomic layer by layer molecular beam epitaxy. For samples in which the manganite is the ferromagnet $La_{2/3}Sr_{1/3}MnO_3$(LSMO), the normal and superconducting properties of the BSCCO can be strongly affected by the LSMO when the BSCCO layer is sufficiently thin. In particular, samples with ten molecular layers of BSCCO were largely unaffected by the LSMO. On the other hand, when the number of BSCCO molecular layers was reduced to 5 and then to 4, the normal state above 80K became much more resistive and the superconducting Tc was reduced. However, a sample with four molecular layers of BSCCO capped with insulating and presumably antiferromagnetic SrMnO3 showed no effect of the manganite of BSCCO transport. This indicates that the reduced conductivity of the 4-layer sample capped with LSMO is due to the interaction of mobile carriers from the two systems at the interface. This interaction extends about 4 unit cells into the BSCCO.

Xiaofang Zhai
University of Illinois, Urbana

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