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Proximity effect in $YBa_2Cu_3O_{7-\delta}$ and $La_{0.67}Ca_{0.33}MnO_3$ bilayers on $SrTiO_3$(110) JIE LI, LIMIN CUI, LU ZHAO, KEQIANG HUANG, YIRONG JIN, HUI DENG, DONGNING ZHENG, the Institute of Physics, Chinese Academy of Sciences — Long-range proximity effect has been reported in heterostructures of ferromagnetic half-metal $La_{0.7}Ca_{0.3}MnO_3$ (LCMO) and *d*-wave superconductor $YBa_2Cu_3O_{7-\delta}$ (YBCO), which tends to be explained in terms of an induced spin-triplet state at the interfaces. However, in most of the theoretical models the interface is often normal to CuO_2 planes, whereas in most of the experiments transport properties along *c*-axis are studied. Bilayers of YBCO (20 nm) and LCMO (20 nm) were prepared by PLD technique on (110) oriented substrates, with the bottom layer either LCMO or YBCO. *In situ* RHEED observations reveal that in the former the interface between LCMO and YBCO is flat. Accordingly superconductivity is completely suppressed due to the effective injection of spin-polarized electrons along the nodal direction. Whereas in the later the interface is rather rough so that superconductivity survives, although Tc is reduced and a very large transition width manifests. It was therefore suspected that in the later there exists a thin layer of LCMO at the interface with spin nonlinear configuration, which causes spin-flip leading to the triplet pairing. We nevertheless recognized a positive magnetoresistance at the vicinity of Tc in either an in-plane or an out-of-plane magnetic field. It is noted Hc_2 is remarkably higher either along the [1-10] or the [001] direction, when the field is along the CuO_2 plane and normal to the interface. This is, however, still compatible with the ordinary behavior of YBCO, although an anomaly in the anisotropic ratio is noticed.

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