

Rectifying properties of magnetic ZnO/La_{0.7}Sr_{0.3}MnO₃ bilayers

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Recently, the manipulation of carrier concentration through the modulation of interfacial electronic band can be accomplished by the fabrication of heterostructure using two dissimilar semiconductors with a significant lattice mismatch. Especially, because of the strong coupling between spin, charge and orbital degrees of freedom, colossal magnetoresistive (CMR) perovskite manganites typically exhibit a rich variety of electronic and magnetic properties, such as ferromagnetism with metallic conduction, and charge/orbital ordering, depending on the carrier concentration. In this study, polycrystalline ZnO / La_{0.7}Sr_{0.3}MnO₃ (LSMO) heterostructures were fabricated onto Si (100) by magnetron sputtering. We present that the rectifying behaviour as well as the enhanced MRratio (~ 12%) were obtained in the heterostructure compared to that of LSMO single layer (~ 6%). The degradation of the rectifying behaviour for a LSMO thickness of less than 20nm is mainly due to the change in hole doping concentration. It is suggested that the possibility that the magneto-transport and the magneto-optical properties of manganites could be modulated by the formation of heterostructure.