Temperature dependence resistance of a manganite perovskite nanoconstrictions

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We have investigated a significant temperature dependence of the resistance at the perovskite nanoconstrictions obtained by break technique. The electrical transport of the perovskite point-contact (PC) was measured, using a specially built computer home-made electrical circuit, with a two-point contact method. This implies that the conductance measurement probes in the narrowest region of the point-contact, which is changed mechanically by the piezodevice, with a resolution of a few picometers. The temperature dependence of the zero-bias resistance of the PC has been evaluated from the collection of the current-voltage characteristics measured at several temperatures, between LN and 370 K. The temperature dependence resistance, below 0.9 T_C , can be described by two-term formula: aT^2 term explains the contribution of electron-electron scattering process to the resistance and $bT^{4.5}$ term may be attributed to two-magnon scattering process in the ferromagnetic region. The appearance of both contributions evidences that the metallic transport is the predominant mechanism of the conductance between the neighbouring Mn-ions at different zones of PC. In our experiments, however, the structure of the point-contact and the crystallographic orientation of the "apexes" cannot be controlled, therefore, each conductance measurement corresponds to a new magnetic arrangement.

9.7 cm

13.4 cm

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