9.7 cm

Current-induced conductance jumps in $La_{0.7}Sr_{0.3}MnO_3$ manganese point-contacts

J. Baszyński[a], W. Kowalski[a], M.R.B. Andreeta[b], A.C. Hernandes[b]
[a]Institute of Molecular Physics, PAS, Smoluchowskiego 17, 60-179 Poznań, Poland
[b]MCDCM, IFSC - USP, São Carlos, Brazil

The conductance switching processes are studied as a function of the DC current (up to 10^8 A/cm^2) passing through nanoconstruction of a mechanically controllable junction (MCJ). The current-voltage ($I-V$) curves of the MCJ are non-ohmic with a parabolic form of the differential conductance (dI/dV) versus the voltage, typical of an electron tunnelling process. By fitting of the $I-V$ curves to the Simmons theory the barrier width (1-1.6) nm and height (0.4-0.7) eV as well as the effective tunnelling area (1-10)$\times 10^{-9}$cm^2 were estimated for the junctions. We interpret the jumps in conductance of MCJ about integer multiples of e^2/h as due to the configuration reorientation of the magnetization of the Mn-ions' clusters at the surface of the devices. This switching can be understood in terms of the exchange of angular momentum between the spin-polarized current and magnetic moments of the cluster situated between the electrodes or on their surfaces. Since the electron transmission through the barrier varies exponentially with thickness, most of the tunnel current flows through the thinnest part of the nanoconstruction.

13.4 cm

Subject category :

2. Magnetic Films, Surfaces, Multilayers and Nanostructures

Presentation mode :
poster

Corresponding author :
J. Baszyński

Address for correspondence :
Institute of Molecular Physics
Polish Academy of Sciences
Smoluchowskiego 17
60-179 Poznań
Poland

Email address :
jbasz@ifmpan.poznan.pl