Charge transport through symmetric and antisymmetric chains of ionic blocks

A. Lehmann-Szweykowska[a], R.J. Wojciechowski[a] and R. Micnas[a]
[a]A.Mickiewicz University, Faculty of Physics, Poznań, Poland

9.7 cm

A new approach to spin-polarised charge transport through short chains, consisting of different ionic blocks, in serial configuration is presented. The ionic blocks with different point symmetry consisiting of central cations surrended by anions, are natural building units of certain semiconducting magnetic oxides. The three-band Hubbard Hamiltonian is used for description of the single ionic block and, subsequently, diagonalised in an exact manner. A minimal, but sufficient set of the single-block four eigen-states, which are linear combinations of the cation and anion atomic states, serves as a good basis for further analysis. The charge transport is mediated by the overlap and resulting hybridisation of wave functions of the nn blocks [1]. A second novel feature of the model lies in working out suitable different adaptations of the non-equilibrium contour Green function technique, employed in a derivation of the electric current, for symmetric and anti-symmetric chains. Symmetric chains have the same outer ionic blocks at their both ends, whereas the outer ionic blocks of the anti-symmetric chains are different from each other [2,3].

1. R.J. Wojciechowski, A.Lehmann-Szweykowska, R. Micnas, G.A. Gehring, and P.E.Wigen Phys.Rev.B**69**,114434(2004).
2. A.Lehmann-Szweykowska, R.J. Wojciechowski, and R. Micnas, Journal of Physics: Conference Series (in press).
3. T.Kostyrko and B.Bulka, Phys.Rev.B**71**, 235306 (2005).

13.4 cm

Subject category :

4. Spin Electronics and Magneto-Transport

Presentation mode :
oral

Corresponding author :
A. Lehmann-Szweykowska

Address for correspondence :
Wydział Fizyki UAM, ul. Umultowska 85, 61-614 Poznań, Poland

Email address :
als@amu.edu.pl