NON-LINEAR THERMAL CURRENT THROUGH MULTILEVEL QUANTUM DOT COUPLED TO FERROMAGNETIC ELECTRODES

M. Wierzbicki[a] and R. Swirkowicz[a]
[a]Faculty of Physics, Warsaw University of Technology
ul. Koszykowa 75, 00-662 Warsaw, Poland

We present studies of spin-dependent phenomena in the non-linear transport through a multilevel QD/molecule in the Coulomb blockade regime. Calculations are performed within the framework of non-equilibrium Green function formalism.Thermal current flowing through the system due to temperature gradient, significantly varies with gate voltage. It can be suppressed in a wide temperature region for voltages corresponding to the Coulomb gap. The strongest effect can be observed for molecular junctions with one of the levels weakly coupled with electrodes. Heat transfer strongly depends on the relative orientation of magnetic moments in the electrodes and in analogy to TMR the magnetothermal conductance is introduced, which describes the effect. MTC ratio is positive indicating that, similarly to the charge transport, the energy transfer is suppressed in systems with antiparalell orientation of the moments. Spin asymmetry in junctions with one electrode being a half-metallic ferromagnet, while the second is non-magnetic, significantly influences both charge and energy transport. In such systems the charge current shows spin Pauli blockade. The energy current can be suppressed when the half-metallic electrode acts as energy source.

9.7 cm

13.4 cm

Subject category :
4. Spin Electronics and Magneto-Transport

Presentation mode :
poster

Corresponding author :
R. Swirkowicz

Address for correspondence :
Faculty of Physics
Warsaw University of Technology
Koszykowa 75
00-662 Warsaw, Poland

Email address :
renatas@if.pw.edu.pl