

# GMR EFFECT IN QUANTUM NANO-SCALE WIRES

Piotr Chudzinski and S. Krompiewski

*Institute of Molecular Physics, Polish Academy of Sciences*

*ul. M.Smoluchowskiego 17, 60-179 Poznan*

We study transport properties of nano-scale wires connected to ferromagnetic semi-infinite electrodes in the ballistic regime. Systems with different geometries are considered. Our method is based on non-equilibrium Green's function (NEGF) formalism. We fully deal with atomistic structure of the whole system, treating both the nano-wire and the electrodes on equal footing. The results include the transmission and electron densities of states vs. energy with parallel and antiparallel magnetization in the electrodes. The influence of the magnetic polarization, coupling between the nano-wire and electrodes as well as the geometry of the device on transport properties are discussed. We emphasize the shape dependent effects and take into account also disordered structures with some atoms removed from the central region. In addition to evolution from conductance quantization to resonant tunneling regime (upon changing the hopping parameter), it has been found that with increasing polarization other features appear due to decreasing overlap between surface density of states in the leads for each transmission mode.

9.7 cm

13.4 cm

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## **Corresponding author :**

Piotr Chudzinski

## **Address for correspondence :**

Institute of Molecular Physics, Polish Academy of Sciences

ul. Smoluchowskiego 17

60-179 Poznan

## **Email address :**

pmch@op.pl