INTERPLAY OF THE KONDO EFFECT AND SPIN-POLARIZED TRANSPORT IN NANOSCOPIC SYSTEMS EXHIBITING UNIAXIAL MAGNETIC ANISOTROPY

M. Misiorny,[a] I. Weymann[a] and J. Barnaś[a,b]

[a] Faculty of Physics, Adam Mickiewicz University, 61-614 Poznań, Poland
[b] Institute of Molecular Physics, Polish Academy of Sciences, 60-179 Poznań, Poland

9.7 cm

Recently, it it has been experimentally shown that in systems with spin $S > 1/2$, such as magnetic adatoms (i.e. Fe, Co or Mn) or magnetic molecules, the Kondo effect can be tuned by modifying the systems magnetic anisotropy [1]. Hence, in this communication we address the problem of how spin-dependent tunneling through the local orbital of the system (orbital that takes part in transport through the magnetic molecule, adatom or quantum dot) and exchange coupling of conducting electrons to the localized spin of magnetic core affect the Kondo effect and tunnel magnetoresistance (TMR). Using numerical renormalization group we calculate the spectral functions and linear conductance in the Kondo regime. We show that the Kondo effect becomes suppressed due to exchange coupling between electrons tunneling through the conducting orbital and the magnetic core. The corresponding conductance also depends significantly on the uniaxial anisotropy, which in turn results in nontrivial behavior of TMR. Finally, we discuss the possibility of restoring the Kondo effect by application of an external magnetic field.

[1] A.F. Otte *et al.*, Nature Phys. **4**, 847 (2008); J.J. Parks *et al.*, Science **328**, 1370 (2010); A.S. Zyazin *et al.*, Nano Lett. **10**, 3307 (2010).
[2] M. Misiorny, I. Weymann and J. Barnaś, Phys. Rev. Lett. (in press); arXiv:1103.1128.

13.4 cm

Subject category :

4. Spin Electronics and Magneto-Transport

Presentation mode :
poster

Corresponding author :
M. Misiorny

Address for correspondence :
Mesoscopic Physics Division
Faculty of Physics
Adam Mickiewicz University
ul. Umultowska 85
61-614 Poznań
Poland

Email address :
misiorny@amu.edu.pl