

Influence of substrate on inelastic electron transport through adsorbed magnetic structures

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Scanning tunneling microscopy and tunnel contact investigations of magnetic atomic structures demonstrate both the importance of inelastic many-particle effects and the influence of substrate which manifest themselves in the transport characteristics [1]. We studied transport properties of a single magnetic adatom and two exchange-coupled adatoms within the framework of the nonequilibrium Green functions. An expression for electron current was received with the multiple scattering processes taken into account in all orders of perturbation theory for coupling between the structure and contacts by using Keldysh diagram technique and atomic representation. It's shown that negative differential conductance regions appear in the current-voltage characteristic of a single adatom in a different crystalline environment. This effect is caused by nonequilibrium excitation of the structure and can be increased if the coupling between the structure and contacts is asymmetric.

References:

[1] A.F. Otte, M. Ternes, K. von Bergmann, et al., Nature Physics 4, 847 (2008).