Current-induced switching of a single-molecule magnet with arbitrarily oriented easy axis

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The key objective of the work is to investigate theoretically processes of magnetic switching in single-molecule magnets (SMMs) due to spin-polarized current. More precisely, we investigate how tilting of an easy axis of the molecule from the orientation collinear with magnetic moments of the leads affects the switching process and current flowing through the system. For these reasons, we consider the model system that consists of a SMM embedded in the nonmagnetic barrier of a magnetic tunnel junction. The global quantization axis is established by the anisotropy axis of the SMM, which can form an arbitrary angle with magnetic moments of the leads. Furthermore, it is assumed that the latter ones are collinear relative to each other. The reversal of the SMM's spin takes place due to exchange interaction between the molecule and tunneling electrons. The mechanism is described by a modified Appelbaum Hamiltonian. The current flowing through the system as well as the average z-component of the SMM's spin are calculated within the perturbative approach (Fermi golden rule). The results are discussed in terms of potential applications of SMMs in information storage and as elements of spintronics devices.

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[2] M. Misiorny, J. Barnaś, cond-mat/0610556 (accepted for publication in Phys. Rev. B)

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