

Unique electron transport via individual molecules with magnetic anisotropy

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Recently, single-molecule transistors based on single-molecule magnets have been experimentally realized and various interesting features unique to single-molecule magnets have been observed, such as nuclear spin resonance manipulated by electric field, giant magnetoresistance or spin filtering, and current-induced spin switching. In these studies, magnetic anisotropy induced by spin-orbit coupling and Jahn-Teller distortion plays a crucial role. For some anisotropic magnetic molecules, the magnetic anisotropy can be modified from easy axis to easy plane upon varying the oxidation state. Here we discuss how such a change in the magnetic anisotropy can induce a new type of spin blockade in electron transport via an $\text{Eu}_2(\text{C}_8\text{H}_8)_3$ molecule. In addition, we will show unique negative differential conductance features in electron transport via a $\text{Ni}_9\text{Te}_6(\text{PEt}_3)_8$ molecular cluster with cubic magnetic anisotropy. For both results, we solve the master equation based on model Hamiltonian with parameters obtained from density-functional theory.