Current-induced magnetic switching in spin valves based on molecular magnets

Anna Plominska,[1] Maciej Misiorny,[1] and Ireneusz Weymann[1]

[1] *Faculty of Physics, Adam Mickiewicz University, Umultowska 85, 61-614 Poznań, Poland*

Time-dependent transport through molecular spin valves based on single molecular magnets is considered theoretically by using the real-time diagrammatic technique. First, we show that it is possible to switch the magnetic moment of a molecule by applying spin-polarized current, and the switching process depends on the magnetic configuration of the device. Then, we analyze magnetic switching in a device consisting of two coupled molecular magnets. We demonstrate that the switching depends on the direction of the current flowing through the system; for one bias polarization magnetic moment is stabilized, while for the opposite bias magnetic switching occurs. This gives rise to a hysteresis loop of spins of molecules as a function of applied bias voltage, the size of which is determined by the switching time. We propose optimal parameters, for which the two molecules rotate their magnetic moments at different bias voltages.

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