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Spin-torque effects due to pure spin currents in lateral geometries

YOSHICHIKA OTANI, ISSP University of Tokyo

Spin injection into the ferromagnetic materials induces a spin torque due to the spin angular momentum transfer between the conduction electron spin and the localized magnetic moment. The magnetization reversal of a nano-scale ferromagnet thereby takes place when the spin polarized current is injected into it. This has been demonstrated using metallic nanopillar devices consisting of magnetic multilayered systems with the spin polarized current flowing perpendicular to the plane. The spin torque mentioned above is known to be proportional to the spin current density. Therefore not the charge current causing the Joule heat but the spin current is essential to realize efficient magnetization reversal due to the spin torque. Thus non-local spin injection technique is employed to realize such a reversal. Here we discuss our resent results on the magnetization reversal due to non-local spin injection into a nano-scale ferromagnetic particle in a lateral ferromagnetic/nonmagnetic hybrid device [1].

[1] T. Kimura and Y. Otani cond-mat/0508559 submitted to PRL.