Elucidation and application of current-induced domain wall motion

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Current-induced magentic domain wall motion has been attracted much attention both from scientific and technological points of view[1]. When a magnetic DW is driven by electric current via adiabatic spin torque, theory predicts a finite threshold current even for a perfect wire without any extrinsic pinning[2]. We have shown that this intrinsic pinning determines the threshold current, and thus that the adiabatic spin torque dominates the DW motion resulting in DW motion along electron flow direction, in a perpendicularly magnetized Co/Ni system sandwiched by a symmetric capping and seed layers[3-7]. On the other hand, current-induced DW motion against electron flow direction has been observed in ultrathin magnetic films in which the structural inversion symmetry (SIA) was broken[8, 9]. Recently, this DW motion against electron flow direction has been explained by the combination of a chiral DW stabilized by Dzyaloshinskii–Moriya interaction (DMI) and spin Hall torque[10-12]. Effect of DMI on the field-induced DW motion is also discussed[13].

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