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Switching Energy Barrier and Current Reduction in MTJs with Composite Free Layer[1] VIKTOR SVERDLOV, ALEXANDER MAKAROV, SIEGFRIED SELBERHERR, Institute for Microelectronics, TU Wien — We investigate the properties of a pentalayer magnetic tunnel junction (MTJ) with a composite soft layer by exhaustive micromagnetic simulations. The structure CoFe/spacer (1nm)/Py (4nm)/spacer (1nm)/ CoFe (Py is $Ni_{81}Fe_{19}$) with an elliptical cross-section (major axes 90nm and 35nm, correspondingly) is considered. The system with the composite soft layer is obtained by removing a central stripe of 5nm width from the monolithic free layer. The MTJ with a composite free layer switches two to three times faster than the one with a monolithic layer [1]. We have found that in the MTJ structure with the composite layer the switching energy barrier is decreased and becomes equal to the shape anisotropy energy barrier responsible for thermal stability. This results in a switching current density reduction. The physical reasons for the switching energy barrier reduction are discussed.

[1] A. Makarov *et al., Phys. Status Solidi RRL* **5**, No. 12, 420-422 (2011).

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