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Study of the Switching Current Density Reduction in Spin Transfer Torque Magnetic Tunneling Junction by Using Micromagnetic Simulations CHUN-YEOL YOU, Department of Physics, Inha University, Korea, MYUNG-HWA JUNG, Department of Physics, Sogang University, Korea — We investigate the reduction of switching current density of the spin transfer torque magnetic tunneling junction (STT-MTJ) with micromagnetic simulations for the various parameters and structures. We introduce a non-collinear magnetization polarizer layer and find noticeable switching current density reduction. The physical origin of the reduction ascribe to the enhanced coherent spin rotation due to the asymmetry breaking. Furthermore, when we cut the one edge of the MTJ ellipse structure, conspicuous reduction of switching current density is also found. In contrast to the normal MTJ structure where the switching process is accompanied with non-coherent spin dynamics, enhanced coherent spin rotations play an important role in both new structures. In addition, we find that the switching current density is sensitively varied with the exchange stiffness and junction size due to the weakly quantized spin wave vector. Based on our micromagnetic simulations, we open new path to reduce the switching current density with new MTJ structures.

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