Straight magnetic nanowires composed of nickel and permalloy segments having different diameters are synthesized using a promising approach. This approach involves the controlled electrodeposition of each magnetic material into specially designed diameter-modulated porous alumina templates. Standard alumina templates are exposed to pore widening followed by a protective coating of the pore wall with ultrathin silica and further anodization. Micromagnetic simulations are employed to investigate the process of magnetization reversal in the fabricated nanowires when the magnetic materials exchange their places in the thick and thin segments. It is found that the magnetization reversal occurs by the propagation of transverse domain wall (DW) when the thick segment is composed of permalloy. However, the reversal process proceeds by the propagation of vortex DW when permalloy is located at the thin segment.

Keywords: Magnetic nanowires, Electrodeposition, Atomic Layer Deposition

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