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Lateral Domain Transfer In a Magnetic Nanowire With Perpendicular-to-Plane-Anisotropy For Three-Dimensional Memory Applications AISHA GOKCE, OZHAN OZATAY, BUGRA BULUT, Bogazici University, COLEMAN RAINEY, Colombia University, JORDAN A. KATINE, HGST, A Western Digital Company, THOMAS HAUET, Institut Jean Lamour, Nancy Université, ANNA GIORDANO, GIOVANNI FINOCCHIO, University of Messina — Spin torque driven magnetic domain transport has been of great interest with potential applications in three dimensional magnetic race track memory and also for domain wall logic. Here we report on experimental and micromagnetic modelling results of spin torque driven magnetic domain transport in CoNi/Pd multilayers with perpendicular-to-plane anisotropy patterned to form magnetic nanowires with double constrictions where domains can be moved with spin polarized current pulses in between constricted sites. The domain nucleation was triggered by joule heating in the presence of a magnetic tip a few nm above the surface which was otherwise in the remanent state. We show that with low or high amplitude nanosecond current pulses two different types of domain transfer behavior is possible: a replicated or partially displaced domain in the neighboring constriction, or an expansion of the domain into the spacer region and the neighboring pinning site. Micromagnetic modelling of the domain transport in such devices suggests that in addition to the experimentally observed behavior a third regime where the full transfer of a single domain is also attainable. Our study shows that CoNi/Pd nanowires can be of potential practical use in a three dimensional memory structure.

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