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Control of Domain Wall Structure and Pinning In Spin-Valve Nanowires J. SAMPAIO, L. THEVENARD, E. LEWIS, L. O'BRIEN, H.T. ZENG, D. PETIT, D. READ, R.P. COWBURN, Imperial College London — Domain walls (**DWs**) in magnetic nanowires are the basis for several proposed data storage devices [D Allwood et al. Science 309, 1688 (2005), SS Parkin, US Patent 6,834,005 (2004)]. Most schemes use artificial defects (**ADs**) to modify the potential landscape seen by the DW, and thereby control its propagation. This potential modification depends on the DW structure. Integrating the nanowire in a Spin-Valve (**SV**) stack allows the electrical probing of the magnetization as well as electronic integration in future devices. However, using SV systems introduces strong stray fields from the reference layer, especially on the ADs. These can significantly alter the internal structure and propagation of DWs. The study of their influence has been hindered so far by the difficulty of creating DWs of known internal structure and to propagate them at low fields. Here we demonstrate low field (20Oe) propagation of DWs and their pinning by ADs in L-shaped SV nanowires with dimensions for which only transverse DWs are stable (200nm width, free layer 8nm $Ni_{19}Fe_{81}$, pinned layer 2nm CoFe).This was verified with micromagnetic simulations. Moreover we show DW depinning at protrusions along the wire with fields lower than that required to nucleation (80/140Oe). These results contribute to furthering the electrical integration of DW based data storage devices.

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