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Non-destructive generation of nano-scale periodic pinning potentials for magnetic domain walls: a way to bias domain wall propagation PETER METAXAS, School of Physics, University of Western Australia, PIERRE-JEAN ZERMATTEN, Spintec, Grenoble, France, RAFAEL NOVAK, JEAN-PIERRE JAMET, RAPHAEL WEIL, STANISLAS ROHART, JACQUES FERRE, ALEXANDRA MOUGIN, Labo. de Phys. des Solides, CNRS/Universite Paris-Sud 11, France, ROBERT STAMPS, School of Physics, University of Western Australia and SUPA - School of Physics and Astronomy, Uni. Glasgow, UK., VINCENT BALTZ, BERNARD RODMACQ, GILLES GAUDIN, Spintec, Grenoble, France — The stray magnetic field of an array of ferromagnetic nanodots is used to generate a spatially periodic pinning potential for domain walls moving through a physically separate, weakly disordered, magnetic layer lying beneath the array. This technique represents a non-destructive method to create tunable and localised pinning sites for domain walls which are consequently subject to co-existing (but independent) periodic and disordered pinning potentials. Beyond the fundamentally attractive application of creating a model experimental system to study interface motion through multiple co-existing pinning potentials, our system interestingly exhibits many characteristics that are normally associated with exchange bias. This is a direct result of the fact that pinning effects induced by the periodic pinning potential depend upon the polarity of the applied magnetic field which drives the domain wall motion, a phenomenon which manifests itself in field-polarity-dependent domain wall mobilities and profiles.

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