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Experimental realization of straintronic nanomagnetic logic using strain-induced magnetization switching in magnetostrictive nanomagnets elastically coupled to PMN-PT[1] NOEL D'SOUZA, MOHAMMAD SALEHI-FASHAMI, SUPRIYO BANDYOPADHYAY, JAYASIMHA ATULASIMHA, Virginia Commonwealth University — Single-domain magnetostrictive Ni nanomagnets are grown on a bulk <001> PMN-PT substrate and their domain switching is studied through Magnetic Force Microscopy (MFM) and Scanning Electron Microscopy with Polarization Analysis (SEMPA) techniques. By applying a voltage across the length of the PMN-PT substrate (d_{33} coupling), a mechanical strain is applied along the nanomagnet's easy axis of magnetization resulting in domain switching and is investigated for several scenarios. First, the magnetization switching of single, isolated nanomagnets of various sizes is observed. This is followed by studying the dipole interactions through anti-ferromagnetic (AF) and ferromagnetic (F) coupling. The accurate, unidirectional propagation of the magnetization state is also investigated through an array of three AF-coupled nanomagnets. Finally, NAND logic operation using these nanomagnets is explored. Since SEMPA analysis involves no alteration of a sample's magnetic state, unlike in MFM imaging, we also analyze these scenarios using this technique at NIST, Gaithersburg.

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