Nanomagnetic logic (NML) has attracted substantial attention during the last decade due to its promise of high energy efficiency combined with non-volatility. Information is transferred through antiferromagnetic dipole coupling in the chain of nanomagnetic dots [1]. To date, external magnetic field [2] and spin Hall effect [3] have been used for clocking, however, both methods have high energy dissipation (at least 100fJ per flipping). Here we demonstrate a new Bennett clocking scheme where the nanomagnetic dot with perpendicular anisotropy can be individually controlled by applying voltage to patterned electrodes. We build the fully coupled model for strain-mediated perpendicular Bennett clocking based on Ni and CoFeB system respectively and analytically show a four order of magnitude reduction in energy dissipation can be achieved using our system.

Keywords: Nanomagnetic Logic, Perpendicular Magnetic Anisotropy, Multiferroic

References:


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