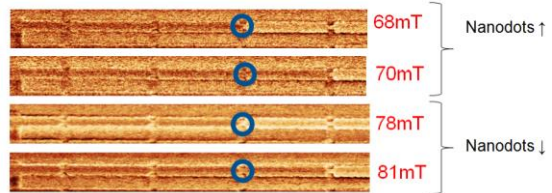


Field-coupled Domain Wall Logic

Abstract

A new type of nanomagnetic logic is presented, named "field coupled domain wall logic", which uses magnetic domains instead of antiferromagnetically coupled nanodots to carry information.



The principle of this new type of logic is to control the propagation of a magnetic domain in a nanowire with the stray field of a second magnetic layer above it. This second magnetic layer operates as a "gate" because it allows the propagating domain to go through only if they both have the same magnetization.

However the stray field of the "gate" alone is too weak to stop a domain wall by itself, which is why a pinning site has to be introduced in the nanowire to build an energy barrier that can only be overcome if the stray field of the gate reduces it. This is why two topics are successively investigated: The pinning methods and the implementation of logic functions in two layers structures. Pinning is characterized in term of variability and strength using MFM and SEM measurements. Then the two layers structure is experimented, and the requirements on pinning and coupling field are derived. Finally, a logic architecture similar to CMOS is introduced.

Number One Result

The propagation of a domain wall was successfully controlled with the combination of a gate and a pinning center.

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