NANO HIGHLIGHT
Single Particle Per Bit Magnetic Information Storage

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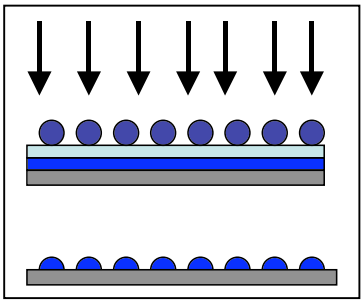
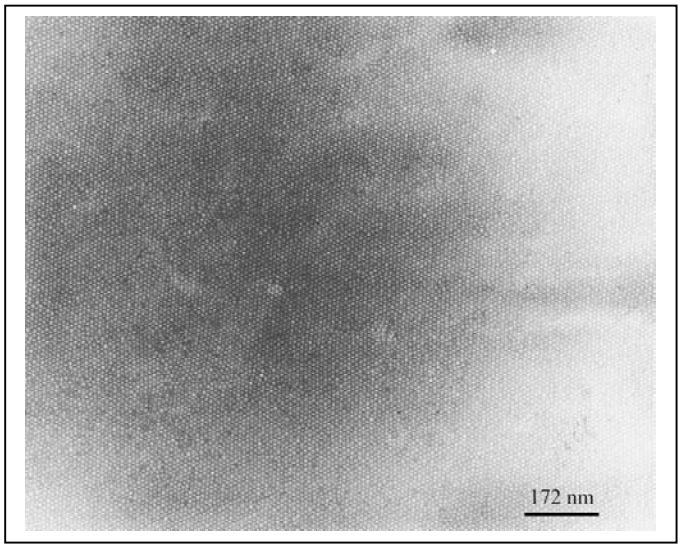
This project investigates a new paradigm for high density magnetic recording with three distinct changes, relative to the current state-of-the art. First, the storage layer is uniformly patterned so that a bit of information is stored within a singe nanoparticle rather than a 30 nm x 100 nm collection of nanograins. Second, the disk doesn't spin; bits are accessed using scanning probe tips. Third, electric fields rather than magnetic fields are used for reading and writing, since they can be more readily confined to localized regions.

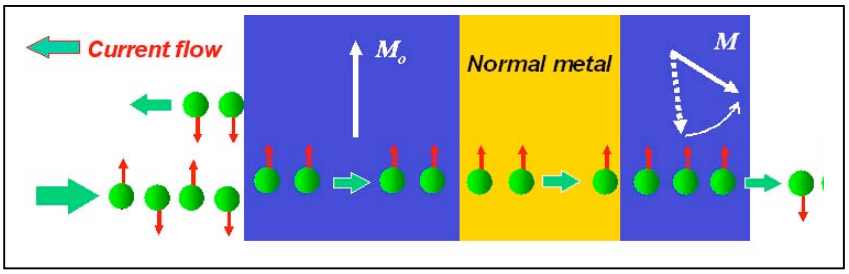
The patterned media will be formed by nanomasking of thin films. Here the storage layer is coated with a self-assembled array of either nanoparticles or a block co-polymer and dry etched to transfer the pattern into the magnetic film.





Top: Argon ions etch through nanomask deposited on magnetic thin film to transfer pattern. **Right:** Ordered monolayer of Co nanoparticles prepared for nanomasking

The bits will be written by passing spin-polarized currents through individual particles. The current becomes polarized by passing through a ferromagnet (which here favors spin up electrons). These electrons can then transfer some of their angular momentum to the nanomagnet, applying a spin torque that can change its magnetization direction.



For further information about this project link to
http://www.ece.cmu.edu/research/dssc/research/project_list/show/123 or email **sara@cmu.edu.**