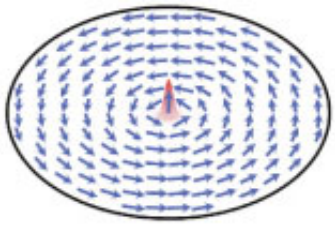
Highlight: Biofunctionalized magnetic-vortex microdiscs

December 9 2009



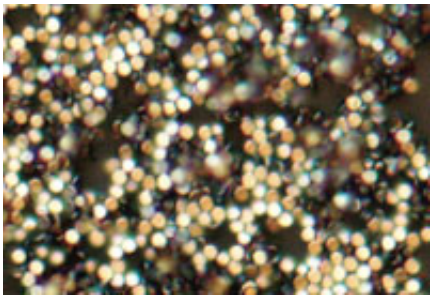
Model of magnetic-vortex spin distribution in a disc.

Users from Argonne's Materials Science Division and University of Chicago's Pritzker School of Medicine, working collaboratively on a user science project with CNM's Nanobio Interfaces Group, have discovered that nanostructured magnetic materials offer exciting avenues for probing cell mechanics, activating mechanosensitive ion channels, and advancing potential cancer therapies.

Their new report describes an approach based on interfacing cells with lithographically defined microdiscs (1-micron diameter, 60 nm thick) that possess a spin-vortex ground state. When an alternating magnetic field is applied, the iron-nickel (permalloy) disc vortices shift, creating an oscillation, which transmits a mechanical force to the cell.

They show that the spin-vortex-mediated stimulus creates two dramatic effects: compromised integrity of the cellular membrane and initiation

of programmed cell death. While promising results for cancer cell destruction were observed in the laboratory, animal studies and preclinical trials would be several years in the future.



Reflection optical microscope image of a dried suspension of the discs prepared via magnetron sputtering and optical lithography.

More information: "Biofunctionalized magnetic-vortex microdiscs for targeted cancer-cell destruction," D.-H. Kim, E. A. Rozhkova, I. V. Ulasov, S. D. Bader, T. Rajh, M. S. Lesniak,and V. Novosad, *Nature Materials*, November 29, 2009 (News & Views Highlight)

Nanobio Interfaces Group: nano.anl.gov/research/nano_bio.html

Provided by Argonne National Laboratory (news : web)

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