MAGNETIC FILMS ON SELF-ASSEMBLED NANOPARTICLES

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In modern magnetic recording materials the 'superparamagnetic effect' has become increasingly important as new magnetic hard disk drive products are designed for higher storage densities [1]. In this regard, nanoparticle media, where two-dimensional arrays of monodisperse nanoparticles with high magnetic anisotropy are used, is assumed to be the ideal future magnetic recording material.

In this presentation a novel magnetic gradient nanomaterial, which has been created by magnetic film deposition (i.e Co/Pd, FePt) onto two-dimensional arrays of self-assembled nanoparticles [2-4] will be introduced. The magnetic nanostructures formed on top of the particles are in a magnetically exchange-isolated quasi-single-domain state. This nanoscale system is quite distinct from the classical geometries: Neither extrinsic properties nor the intrinsic properties are uniform in space. The film is extended over a wide region of the sphere and thus shows substantial curvature. The film thickness varies and so do the intrinsic magnetic properties most notable the magneto-crystalline anisotropy, which is a key factor affecting the fundamental nature of the reversal process. The specific magnetic characteristics of such a gradient nanomaterial and in particular its impact on the reversal mechanism will be discussed and interpreted using micro-magnetic simulations offering new opportunities in the functionalization of magnetic nanostructures for storage applications.

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