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Magnetic nanocap arrays with tilted magnetization[1]

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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. In this regard, patterned media [1], where two-dimensional arrays of nanostructures are used, is one of the concepts that might provide the required areal density in future magnetic recording devices. However, also nanostructure arrays will ultimately need high anisotropy material such as L10-FePt to provid enough thermal stability and thus much higher writing fields than currently obtainable from perpendicular magnetic recording heads. One proposed solution to this problem is the use of tilted magnetic recording media [2]. The basic idea is to tilt the easy axis of the magnetic medium from the perpendicular direction to 45 degree. In this case, the switching field will be reduced by a foctor of two in the Stoner-Wohlfarth limit. Recently, this approach was realized by oblique film deposition onto arrays of self-assembled spherical particles [3-5]. In this presentation, recent results on different film systems including Co/Pt multilayers, FePt and CoPtCr-SiO_2 alloys which have been deposited onto SiO_2 particle monolayers will be presented. It turned out that by tuning the growth conditions single domain nanocaps with enhanced magnetic coercivity and tilted anisostropy axis can be achieved even for particle sizes below 50 nm.

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