Nanopatterned Graded Media For High Density Record

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As storage density requirements increase towards a goal of 10 Tbpsi, requirements for high density media becomes ever more stringent. One of the most promising approaches to nanopatterned media is to grade the anisotropy of the media, allowing relatively small fields to switch relatively hard materials. We report on the patterning of CoPt alloy films using nanosphere lithigraphy. The 100 nm polystyrene spheres are spun onto a CoPt-coated wafer, plasma ashed to reduce the size of the spheres, and then the reduced spheres are used as masks for ion milling the underlying CoPt. Scanning electron microscopy and magnetometry was carried out on these films. It is difficult to achieve features smaller than 40-50 nm, because the spheres do not survive the ion milling when shrunk to smaller sizes. Magnetometry shows the M-H loops becoming squarer and increasing in coercivity with the size reduction, but it is still far from Stoner-Wohlfarth single domain switching. Future patterning efforts will focus on directed self assembly, using e-beam lithography and block copolymer templating.