

Nanofabrication for Tb/in² and beyond magnetic recording media

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One strategy to delaying the onset of superamagnetism and achieving magnetic storage densities approaching 1 Tb/in² is the use of lithographically patterned magnetic media. Several different types of disk patterning are possible, each requiring a different length scale of patterning. Patterning for the purpose of servo mark writing, fabrication of discrete tracks, and fabrication of discrete bits have all been proposed and will be discussed. After introducing these concepts, the talk will focus on the most challenging approach to patterning magnetic media, that of discrete bit patterning. In this talk I will present an overview of a number of aspects of discrete bit media, including fabrication techniques, recording properties, and fundamental magnetic switching studies. The use of focused ion beam patterning will be described as a means to fabricate 50nm CoPtCr single domain islands. Recording results on such arrays using a quasi-static tester will be presented and head synchronization requirements, jitter and SNR data will be discussed. The importance of island switching field distribution as well as write head field gradient will be shown. In the last part of the talk, a more manufacturable approach to patterning using nanoimprinting and substrate etching will be introduced. Fundamental studies of the reversal properties of Co/Pd multilayers deposited onto etched pillars will be briefly discussed. Finally, an outlook for densities approaching 1 Tb/in² will be discussed.