Perpendicular Magnetic Recording Beyond 1 Tbit/in^2

April 27 2004

After fierce struggles to extend the life of longitudinal magnetic recording as the main technology for another couple of years, the data storage industry is finally coming to terms with reality. Reality says that the areal density in cutting-edge laboratory demonstration systems is limited by thermal instabilities in the longitudinal magnetic media. Recent high areal density demonstrations of perpendicular recording clearly demonstrate the strong interest of the data storage industry in this alternative technology today. S. Khizroev and D. Litvinov publish a review article in the last Journal of Applied Physics issue.

Compared to the conventional longitudinal recording mode, it is believed that perpendicular recording is capable of deferring the superparamagnetic limit to a substantially higher areal density due to the thicker recording layer and/or the use of a soft underlayer (SUL). Although perpendicular recording is certainly the closest alternative to conventional technology, its novelty also brings up new issues, not ever encountered in longitudinal recording. These issues have to be well understood before the technology can be fully and most efficiently implemented. Major questions related to perpendicular media and perpendicular playback and writing heads have been previously considered. However, relatively little attention has been given to the writing process at areal densities beyond 100 Gbit/in^2. For example, the role of soft magnetic shields in the writing process is still unresolved. Another fundamental question is the role of the soft underlayer in the writing process. These and many other questions associated with the writing process need to be considered altogether for the most efficient

design of the write head.

S. Khizroev and D. Litvinov give a detailed overview of the methodology to design a write transducer for recording on perpendicular media at areal densities beyond 1 Tbit/in^2.