# MA 53: Magnetic Storage Media, Applications - Invited Talks

Time: Thursday 14:00–15:00 Location: HSZ 04

**Invited Talk** MA 53.1 Thu 14:00 HSZ 04

**From nanolithography to energy assisted writing - what is the limit to magnetic recording?** — •Bruce Terris — Hitachi GST, San Jose, CA USA

As magnetic recording technology extends to ever higher areal density, it is possible that the often predicted, and constantly increasing, density limit for conventional magnetic recording will be reached. This limit will likely be in the range of 1 to 1.5 Tb/in2. However, new technologies are being explored which may extend this limit toward 10 Tb/in2 or beyond. These new technologies still have substantial unresolved questions on the underlying fundamental physics, will present manufacturing challenges, and will require significant changes to the hard disk drive. In this talk we will discuss the physical underpinnings and technology challenges of the technologies which are being pursued to push the density limit at least another factor of 10. These technologies include lithographically patterned single domain nm-scale islands, novel forms of energy assisted recording including near-field optical sources and spin torque oscillator microwave sources, and novel data encoding and architecture schemes.

**Invited Talk** MA 53.2 Thu 14:30 HSZ 04

**29.5 Gb/in^2 Recording Areal Density on Barium Ferrite Tape** — •Mark Lantz — IBM Research-Zurich, 8803 Rüschlikon, Switzerland

We investigated the performance of a barium ferrite tape medium in linear tape recording, using a giant-magnetoresistive read head with a 200 nm reader width. A linear density of 518 kbpi with an error rate of $< 10^{-4}$ was demonstrated based on measured recording data and a simulated channel that used an advanced data dependent noise predictive maximum likelihood detection scheme. Three advances in media technology relative to previous generations of BaFe were key to this achievement: (i) a reduction in particle volume to 1800 nm^3; (ii) an increase in the perpendicular squareness ratio to 0.7; and (iii) a reduction in surface roughness to 0.8 nm.

In order to facilitate the aggressive scaling of track density, we have made several advances in the area of track follow performance. First, we have developed a new timing-based servo format that enables the generation of high-bandwidth nm-scale position information. Second, we developed a new method for detecting the position information that reduces the noise floor of the position error signal (PES). Combining these technologies with a track follow servo controller based on advanced state-space-based control concepts and an ultra quite tape transport, we achieved a PES with a 1-sigma standard deviation of less than 24nm. This magnitude of PES allows the writing and reading of 446 nm tracks at 518 kbpi, for an equivalent areal density of 29.5 Gb/in^2.