

EA01

### Now and Future of HDD Technology

Sang Lee

Head/HDI Group, Storage System Division, Semiconductor Business, Samsung Electronics Co.  
416, Maetan-3dong, Yeongtong-gu, Suwon-Si, Gyeonggi-do, Korea 443-742

\*Corresponding author: sang.lee@samsung.com, Phone: +82.31.200.8158, Fax: +82.31.200.3536

Magnetic recording technology of ultra high density enables new applications of hard disk drives for consumer electronics such as MP3 players, digital cameras, cell phones and other handheld device along with digital video recorders. With continuous demands of higher areal density from market, it has been projected that conventional technology will achieve 1 Tb/in<sup>2</sup>. This ultimate higher areal density requires both higher linear and track densities. Head-disk interface (HDI) design and tracking accuracy are the key technologies to support the requirement. This talk reviews the HDD industry and market trend along with the application area. The technology progress in Samsung and HDD industry is presented, up to recent perpendicular magnetic recording (PMR) and dynamic flying height control. The density of 1 Tb/in<sup>2</sup> require that very sharp transitions be written on well-defined extremely narrow track in very finely grained thermally stable media. Along with advanced head and media concept, DTR (discrete track recording) technology for 50nm track width is presented with experimental results. Exquisite track following capability and 3nm clearance design are also discussed.

EA02

### Current Status and Future of Magnetic Heads for HDD

K. Terunuma

HDD Head Business Group, TDK Co., 543 Orai Saku-shi, Nagano, Japan

\*Corresponding author: kterunum@mb1.tdk.co.jp, Phone: +81.267.68.5111, Fax: +81.267.68.4570

The rapid growth in consumer electronics need higher capacity data storage. Many new technologies, such as on media, heads, HDI, pre-amp. and so on, have been introduced in order to increase the areal density. The presentation will focuses on magnetic heads technology, such as materials, structures, fabrication process and head performances.

For read heads, conventional GMR heads is reaching to the end of life time due to the performance limitation in both longitudinal and perpendicular recording mode. Now TMR heads have come successively to replace GMR heads. Barrier materials have been studied to obtain higher MR ratio with lower RA. AIOx or other amorphous oxide materials have been used as barrier for 100-120Gbps TMR heads. Polycrystalline MgO barrier shows significantly large MR ratio of over 50% with acceptable RA[1] and it was reported that MgO barrier is also workable as TMR heads same as AIOx barrier[2]. MgO is being applied to next generation TMR heads over 120Gbps. CPP heads which are expected to be applicable next to TMR heads still need further improvement and will be waited entry by MgO TMR heads to be improved continuously.

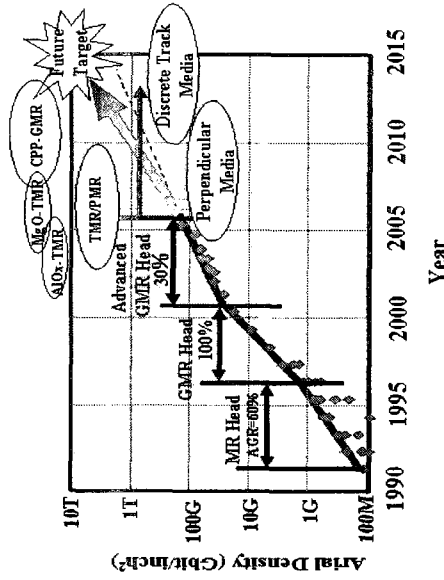


Fig. 1. Areal density evolution, history and future

#### REFERENCES

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- [2] T. Kagami *et al.*, IEEE Trans. Magn., 42, 93(2006)