

Information technology | Technology offer

New magnetic “nanospheres” data storage media

Current technologies

Present day high density magnetic information storage media contain small magnetically decoupled grains, usually in a thin film. An information storage bit will be stored in a region of the film which contains a large number of magnetic grains and which is magnetized coherently in one of two preferred directions.

Difficulties

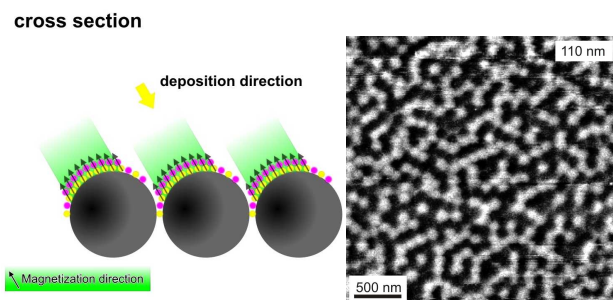
In order to increase stored information density it is required that all design parameters of the recording media and head will be scaled to smaller dimensions, especially the grain size needs to be reduced. A major problem is that with reduction of grain size the magnetic anisotropy of the media has to be increased. However, higher magnetic anisotropy makes also higher switching fields necessary. Another problem is that with reduction of grain size the grain size distribution and therefore signal-to-noise ratio of stored information gets worse. An approach to solve this problems which is heavily investigated worldwide is to store one data bit in a single nanostructure assembled in an ordered array, however the mass fabrication of such a patterned recording media is quite challenging.

Secure your innovation advantage

At the University of Konstanz (Germany) a novel magnetic information storage media based on self-assembly was developed. The media consists of an uniform and regular array of nanostructures with improved magnetic properties and allows to increase information density up to several Terabit / inch².

Patent situation

Patent applications in the USA and Japan are pending.



Left: cross section of schematic operating principle of the new storage media. Right: MFM image of an exemplary sample presenting an array of 110 nm particles covered with a perpendicular magnetic film.

Innovation

The invention describes a new magnetic information storage media. It is built out of magnetic layers formed over a substrate having a surface patterned with concave or convex spherically shaped structures. Combination of optimized coating techniques and surface structure lead to an uniform and regular array of magnetic nanostructures (<10 nm). These structures are magnetically exchange isolated simply due to their geometry and lattice structure without any further processing of the storage media. It is possible to generate high perpendicular magnetic anisotropy and simply control direction of easy axes relative to substrate. With a 45° inclination of easy axes switching fields can be minimized (“concept of tilted media”). Production of the substrate is not limited to a single method but can be made by standard techniques e.g. by spin coating, evaporative drying or nanoimprint technology.

Your advantages at a glance:

- monodisperse magnetic structures
- reduction of magnetic bit size (< 10 nm)
- high magnetic anisotropy
- direction of easy axes relative to substrate adjustable for optimizing switching fields necessary
- intrinsic magnetic exchange decoupling of bits
- high signal-to-noise ratio
- production of substrate and magnetic layers with standard methods at average cost

Technology transfer

The Technologie-Lizenz-Büro GmbH (Germany) on behalf of the Universität Konstanz (Germany) offers interested companies the opportunity to acquire an appropriate licence for this innovative technology. Furthermore, the research group offers cooperation for further joint developments.

For further information on „Nanospheres data storage“, please contact Michael Ott at ott@tlb.de

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