



# Exchange Coupled Composite Media for Heat Assisted Magnetic Recording

## Less Jitter

Heat-assisted magnetic recording (HAMR) is considered to be the most promising candidate for future information storage. HAMR uses a heating source to reduce the magnetic coercivity of the material during the write operation. This HAMR disk structure features an exchange coupling composite (ECC) comprised of a coupling layer (ECL) that separates a storage layer and a superparamagnetic write layer. The storage layer has a lower Curie temperature ( $T_c$ ) and a higher anisotropy than the respective ECL and write layers. The composite structure is optimized to reduce jitter for high density data storage by tuning the exchange coupling between the higher  $T_c$  write layer and the storage layer. As a result, this new structure has small jitter (approaching the grain size limit) and good tolerance of noise from  $T_c$  variance.

## Reduces Curie Temperature Dependence

HAMR information storage technology can be greatly affected by the  $T_c$  variance, as writing usually occurs at temperatures around  $T_c$  of the media. To control the noise caused by  $T_c$  variance and offer lower writing temperature, this new design introduces a superparamagnetic writing layer that decouples the recording process from long term storage. Advantages of this new composite media include a small transition jitter, insensitivity to the  $T_c$  variance of the storage layer, tunability and low writing temperature.

### BENEFITS AND FEATURES:

- Increased reliability and reduction of media noise in heat-assisted magnetic recording
- Thermal exchange coupled composite storage media
- Exchange coupling layer separates storage layer and write layer
- Tunable: can be optimized to reduce jitter by tuning exchange coupling between write layer and storage layer
- Small jitter (approaching the grain size limit)
- Good tolerance of / insensitivity to noise from  $T_c$  variance
- Superparamagnetic write layer with higher Curie temperature
- Low write temperature

### APPLICATIONS:

- Magnetic disk drives
- Heat-assisted magnetic recording

**Phase of Development** - Prototype development

### Researchers

Randall Victora, PhD

*Professor and Department Head, Electrical and Computer Engineering; Director, Center for Micromagnetics and Information Technologies (MINT)*

[External Link](http://ece.umn.edu) (ece.umn.edu)

### Technology ID

20170074

### Category

Engineering & Physical Sciences/Design Specifications  
Engineering & Physical Sciences/Materials

### Learn more



### Interested in a Non-exclusive License?

The University relies on industry partners to scale up technologies to large enough production capacity for commercial purposes. A non-exclusive license is available for this technology and would be for the sale, manufacture or use of products claimed by the issued patents. Please contact us to share your business needs and technical interest in this magnetic storage technology and if you are interested in licensing the technology for further research and development.