TECHNOLOGY

# Controlled Room Temperature Synthesis of Magnetic CoFe2O4 Nanoclusters Through a Block Copolymer Nanoreactor Route

## OVERVIEW

Magnetic nanoparticles are of great interest because they can be used in improved high-density information storage devices, in ferrofluids for biomedical applications and in magnetic sensors.

Researchers at the University of Maryland have developed a new technology that allows self assembled magnetic CoFe2O4 nanoparticles within a diblock copolymer matrix at room temperature.
The CoFe2O4 nanostructures exhibit a uniformly dispersed spherical morphology within the polymer matrix having an average radius of 5 nm. Using this technology, it is possible to obtain an almost complete inverse spinel structure for the mixed metal oxide without using any high temperature annealing treatment, which is a substantial advantage. At room temperature this material is perfectly superparamagnetic and has an equivalent maximum magnetization of 18.04 emu/g. At 5o K the nanocomposite films become ferromagnetic with coercivity of 5.3 kOe, equivalent remanence of 11,93 emu/g and equivalent maximum magnetization of 57.1 emu/g.

This invention has applicability in magnetic sensor technology; high data storage devices (a ultra high-density magnetic recording media with a capacity of 110 GB/cm can be fabricated) or everywhere a magnetic thick, thin film is needed.

The polymer film can eventually be used as an invisible magnetic watermark in security papers. Due to flexibility of the material a thin layer of pattern can be easily deposited on the security papers. This signature will be either ferromagnetic or superparamagnetic. If the signature is superparamagnetic, applying a magnetic field can retrieve the stored information. This property will give this type of superparamagnetic watermark a distinct advantage over the magnetic stripes on credit cards which, when exposed to a powerful magnet, lose their signature and therefore the information they store.

The University of Maryland is looking for commercial partners to assist in the transfer of this invention to the private sector. For additional information please contact the Technology Manager for Physical Sciences at University of Maryland, College Park, MD 20742. Phone (301) 405-3947. Ext 18, Email: otc@umd.edu

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## Additional Information

### INSTITUTION

University of Maryland, College Park

### PATENT STATUS

Patent(s) pending

### CATEGORIES

- Nanotechnology + Nanoparticles + Nanomaterials

### EXTERNAL RESOURCES

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