CHARACTERIZATION AND SYNTHESIS OF NANO MAGNETIC PARTICLES

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ABSTRACT

Magnetic particlesfind wide applications and specifically memory device.The emerging new devices are due to large memory capacity of the nano magnetic particles.The super paramagnetism is the basic reason for the large storage of data.The synthesis of nano magnetic particles is by sol gel technique in the laboratory.The particle size distribuyion and the shape are determined by TEM ,the samples are characterized by XRD.The high resolving TEM,SEM,AFM shows the confirmation presence of nano magnetic particles.These nano magnetic particles are fit for magnetic storage of data.Our study shows the present memory devices can be replaced by these new storage devices using nano magneticmaterials.

Keywords .Data storage,super para magnetism

When the size of ferro/ferri magnetic materials is comparable or less than the single domain size, these particles essentially behave like paramagnetic materials with a notable exception of large susceptibility .The transform in the property of a materia from ferromagnetism to superparamagnetism.
■ The reason for this dissimilar behavior is enormous surface energy which originates due to the large fraction of exposed atoms at surface**.** ■ The surface energy is responsible for variation of property in the Nanoscale. The clear understanding of surface area to volume ratio is inevitably facilitate understanding surface energy.
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Types of Magnetism
Dia magnetism
■ Para maganetism
■ Ferro magnetism
■ Antiferro magnetism and
■ Ferrimagnetism..

Super paramagnetism
A superparamagnet is an assembly of giant magnetic moment which are not interacting and the magnetic moment can fluctuate when the thermal energy, kBT, is larger than the anisotropy energy. superparamagnetic particles exhibit no remanence no coercivity ie., there is no

hysteresis in the magnetization
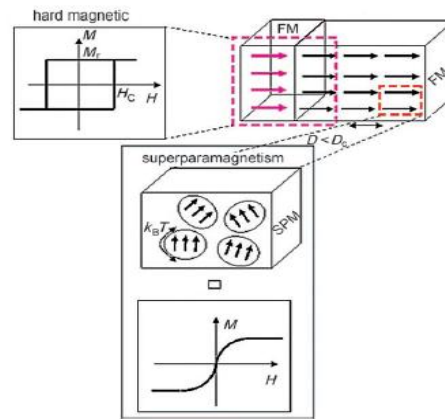
1 METHODOLOGY
FeCo−SiO2 nanocomposite films on silica glass substrates were prepared by the
sol−gel method and characterized by X-ray diffraction, transmission electron
microscopy, Rutherford backscattering spectrometry, extended X-ray absorption
fine structure spectroscopy, and magnetic susceptibility measurements. FeCo
alloy nanoparticles with average sizes around 10 nm were obtained which are
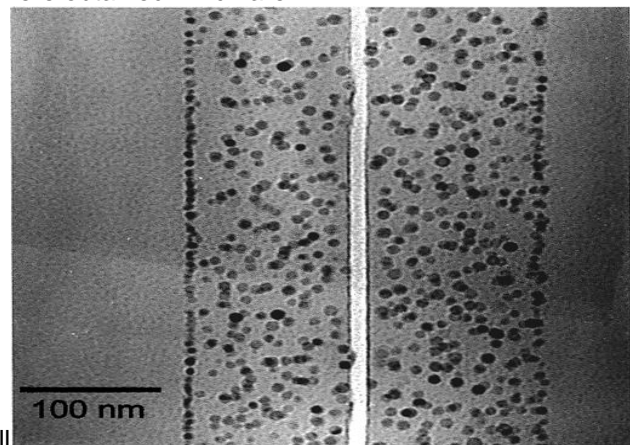
dispersed in the silica matrix and show superparamagnetic behavior. The experimental conditions of the sol−gel preparation influence the thickness and homogeneity of the films. The magnetic properties are also affected by preparation conditions.

Magnetic anisotropy

- The term magnetic anisotropy is used to describe the dependence of the internal energy on the direction of the spontaneous magnetization, creating easy and hard directions of magnetization.
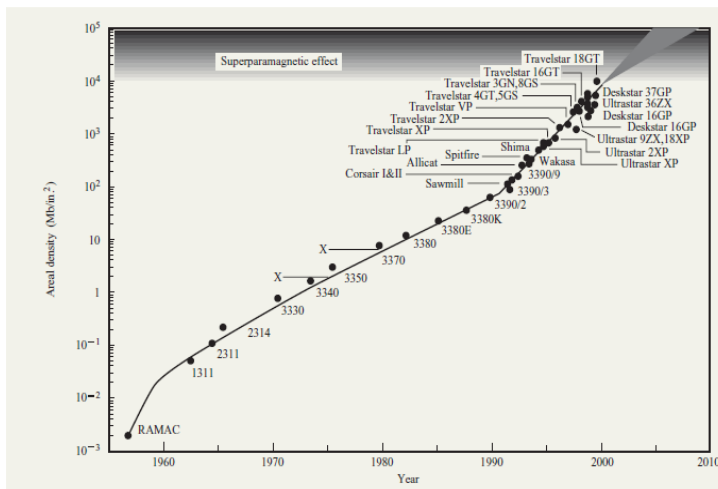
The total magnetization of a system will prefer to lie along the easy axis. Magnetocrystalline anisotropy ,Shape anisotropy,Strain anisotropy Surface anisotropy.

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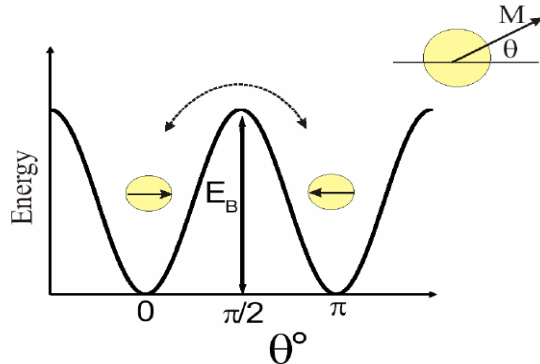
Applications of Nano Magnetic Particles

Nanomagnetic materials find many applications out of which a few are listed here relevant to the   current scenario.

Ultra High Density Data Storage

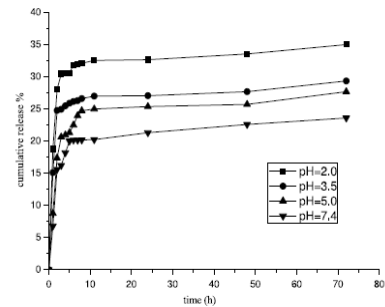Ferro liquids

Drug delivery

Ferro Fluids

Dampers in stepper motors

Shock absorbers

Heat transfer in loud speakers

Almost every computer disk drive uses a magnetic fluid rotary seal for contaminant exclusion

DRUG DELIVERY SYSTEM.

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