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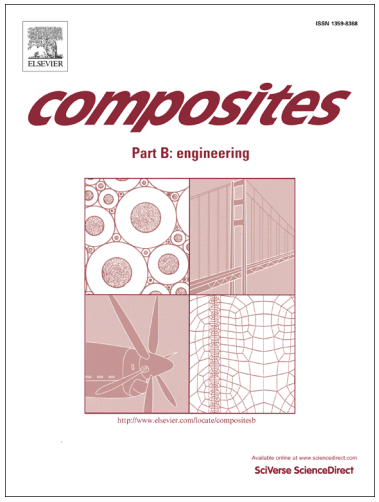

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Magnetization Enhancement in Magnetite Nanoparticles Capped with Alginic Acid

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ABSTRACT

We report on the effect of alginic acid capping on the behavior of magnetite nanoparticles. The capped nanoparticles exhibit improved crystalline structure of the surface which leads to an enhanced magnetization. The improved structure facilitates quantization of spin-wave spectrum in the finite size nanoparticles and this in turn is responsible for unconventional behavior at low temperatures. In electron magnetic resonance these anomalies are manifested as an unusual increase in the resonant field $H_r(T)$ and as a maximum of the spectroscopic splitting g_{eff} parameter at low temperatures. This unconventional behavior leads also to pronounced upturn of magnetization at low temperatures and a deviation from the Bloch law $M(T) \sim T^{3/2}$.

Keywords: A. Nano-structures, B. Magnetic properties, D. Electron microscopy, E. Powder processing

1. Introduction

Magnetite Fe_3O_4 is one of the most preferred materials to combine with various polymers because of unique physical properties, like ferrimagnetic ordering, large magnetic moment, relatively high conductivity and high ratio of spin polarization. These features make magnetite a highly desired material for future applications in medicine, spintronics, sensors and optoelectronic devices [1-3].