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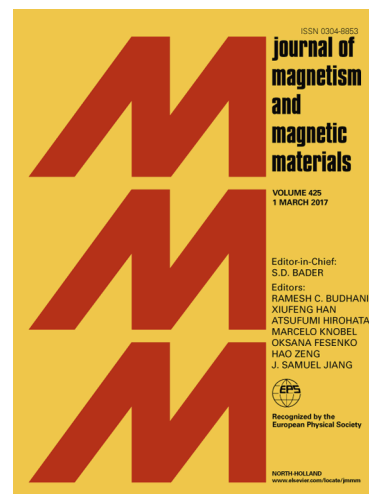
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Ethylenediaminetetraacetic acid capped superparamagnetic iron oxide (Fe_3O_4) nanoparticles: A novel preparation method and characterization

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Abstract

A novel and facile strategy is introduced for the preparation of ethylenediaminetetraacetic acid (EDTA) capped magnetite nanoparticles (MNPs). In this strategy, Fe_3O_4 nanoparticles were electrodeposited from a deposition bath containing 0.005 M $\text{Fe}^{2+}/\text{Fe}^{3+}$ nitrate and chlorides salts and 1 g/L EDTA. A simple deposition mode i.e. constant current and two-electrode set-up was used in the electro-synthesis procedure. The magnetite phase of the deposited nanoparticles was confirmed through XRD and FT-IR analyses. Morphological observations through FE-SEM and TEM confirmed the formation of spherical MNP particles with an average size of 10nm. The EDTA layer on the surface of the electro-synthesized magnetite nanoparticles was proved based on FT-IR, DLS and TG data. Vibrating sample magnetometer (VSM) measurements confirmed the EDTA capped iron oxide nanoparticles to have a super-paramagnetic nature, since they exhibit a high saturation magnetization ($M_s=51.9 \text{ emu g}^{-1}$), as well as, negligible remnant magnetization ($M_r=0.59 \text{ emu g}^{-1}$) and coercivity ($H_c=0.85 \text{ Oe}$). Based on the obtained results, the proposed platform can be considered as a fast, simple and efficient method for the preparation of the EDTA capped magnetite nanoparticles.

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