Synthesis and Characterization of DLTA-Fe$_3$O$_4$ Nanocomposite

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DL-Thioctic acid coated magnetite (Fe$_3$O$_4$) NP’s have been prepared by the co-precipitation of iron oxide in the presence of DL-TA. The product identified as magnetite, which has an average crystallite size of 7±2 nm as estimated from X-ray line profile fitting. Particle size was estimated as 11 nm from TEM micrographs. FTIR analysis showed that the binding of DLTA on the surface of iron oxide is through carboxyl group is bidentate. VSM analysis explained the superparamagnetic nature of the nanocomposite. TG analysis showed that the 80 % of the nanocomposite was DLTA and 10 % was Fe$_3$O$_4$ respectively. The conductivity measurements displayed the magnetic transition at ~60 °C for DLTA-Fe$_3$O$_4$ NPs. Analysis of the conductivities reveal the fact that the a.c. conductivity shows a frequency-dependent behavior while d.c. electrical conductivity is strongly temperature dependent and is classified into two regions over a limited temperature range of up to 120 °C. Toxicity was tested measured by LDH assay.

REFERENCES