

Nanocomposites and nanomaterials
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Synthesis and characterization of Fe₃O₄ nanoparticles in stable aqueous suspensions

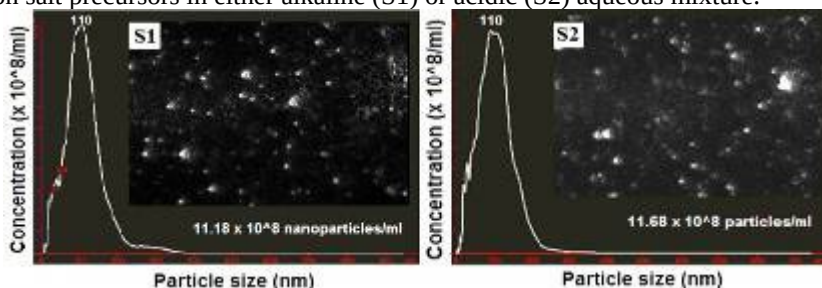
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The purpose of our study was to investigate the effect of preparation steps on the size distribution of Fe₃O₄ nanoparticles in stable aqueous suspension; two batches of nanosized magnetite particles sterically stabilized with sodium oleate in aqueous medium were synthesized via Massart's co-precipitation method [1] from iron salt precursors in either alkaline (S1) or acidic (S2) aqueous mixture.



Microstructural analysis techniques - X-ray diffraction (XRD), nanoparticle tracking analysis (NTA) and dynamic light scattering (DLS) - were employed to characterize the prepared samples. The XRD data confirmed the presence of magnetite crystallites with inverse spinel structure in both samples, while NTA and DLS results revealed a relatively narrow size distribution of the nanoparticles with hydrodynamic diameters up to 110 nm. Moreover, DLS measurements provided useful information on the stability of the samples, each sample exhibiting a high (absolute) value of the measured Zeta potential.

1. Massart R. Preparation of aqueous magnetic liquids in alkaline and acidic media // IEEE Trans Mag.-1981.-MAG-17, N 2.-P. 1247-1248.