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Synthesis and Characterization of NiFe₂O₄ Nano-Octahedrons by EDTA-Assisted Hydrothermal Method

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Abstract: Octahedral-like NiFe₂O₄ ferrite nanocrystals were synthesized using EDTA-assisted hydrothermal method under mild conditions. XRD and FTIR analysis were used for composition and structure investigation. XRD analysis revealed a pure ferrite phase with high crystallinity. Morphological investigation by SEM showed octahedral nanocrystals with an average particle size of ~ 40 nm. Crystallite size calculated from XRD peak broadening resulted in an average crystallite size of 39 nm, matching well with the SEM observations. TEM analysis and corresponding electron diffraction confirmed the octahedral morphology and single crystallinity of octahedral nanoparticles. Magnetic measurements showed that NiFe₂O₄ octahedrons have smaller coercivity than bulk ferrite due to the low shape anisotropy.

Key Words: Octahedral nanocrystals, ferrites, magnetic nanoparticles, hydrothermal synthesis, coercivity, EDTA, NiFe₂O₄

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