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Synthesis and characterization of nanosized ZnFe2O4 powders obtained by sonochemistry

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Zink ferrite powders are widely studied due to their application in many fields, such as anode materials for lithium-ion batteries, gas sensors, magnetic materials, catalytic materials, and antibacterial materials in water treatment. We present the structural and magnetic properties of nanosized $ZnFe_2O_4$ powders synthesized by sonochemistry and discuss their dependence on the synthesis conditions. The XRD spectra of the as-prepared samples reveal the presence of both an amorphous and a crystalline $ZnFe_2O_4$ phase. In the spectrum of the sample annealed at 500 ^oC, the peaks are considerably narrower and of higher intensity, proving the sample' s higher degree of crystallinity. The room temperature Mössbauer spectra of the as-prepared and annealed $ZnFe_2O_4$ samples showed a superparamagnetic doublet spectrum. Both kinds of samples exhibited paramagnetic behavior at room temperature, which is typical of the normal spinel structure. A very narrow hysteresis curve at 4.2 K was recorded, which could be expected for superparamagnetic particles in the ferrimagnetic state at low temperatures.

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