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Effect of different synthesis methods on structure, morphology and magnetic properties of CoFe₂O₄ nanoparticles

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Abstract content
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Spinel structure of CoFe₂O₄ nanoparticles was synthesized via combustion, glycol-thermal and hydrothermal methods. The structure was studied by X-ray powder diffraction. High-resolution transmission electron microscope was used to investigate the effect of the synthesis methods on the morphology of the samples. The sample produced by combustion method show largest crystallite sizes of 22.98 nm. Smallest crystallite sizes of about 6.57 nm were obtained by hydrothermal method. Iron distribution and hyperfine interaction on the tetrahedral site and octahedral site for the samples were studied using ⁵⁷Fe Mössbauer measurements at room temperature. Investigation of the magnetic behavior for the samples was carried out using vibrating sample magnetometer (VSM) in external magnetic fields of up to 14 kOe. The coercive fields obtained were 1271.1 kOe, 198.15 kOe and 165.84 kOe for the samples produced by combustion, glycol-thermal and co-precipitation respectively.

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