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Synthesis and Characterisation of Bi-Substituted Magnetite Nanoparticles by Mechanochemical Processing (MCP)

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Abstract : Single phase magnetite nanoparticles and Bi-substituted ones were prepared by mechanochemical processing (MCP). The effects of Bi-substitution on the structural and magnetic properties of the nanoparticles were studied by X-ray Diffraction (XRD) and magnetometry techniques, respectively. The XRD results showed that all samples have spinel phase and by increasing Bi content, the main diffraction peaks were shifted to higher angles, which means the lattice parameter decreases from 0.843 to 0.838 nm and then increases to 0.841 nm. Also, the results revealed that increasing Bi content lead to a decrease in saturation magnetization (Ms) from 74.9 to 48.8 emu/g and an increase in coercivity (Hc) from 96.8 to 137.1 Oe.

Keywords : bi-substituted magnetite nanoparticles, mechanochemical processing, X-ray diffraction, magnetism
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