

Structural and Magnetic Properties of Bi_{0.82}La_{0.2}Fe_{1-x}Cr_xO₃ Nanoparticles

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Abstract : Bi_{0.82}La_{0.2}Fe_{1-x}Cr_xO₃ (BLFC_xO, x = 0.0, 0.02, 0.05 and 0.08) nanoparticles were successfully synthesized by a sol-gel method. The X-ray diffraction (XRD) patterns indicate that the lattice parameters decrease for x ≤ 0.05, firstly, and then they increase for x > 0.05. A transformation from rhombohedral structure to orthorhombic structure occurs at x = 0.08. The transmission electron microscopy (TEM) analysis shows that the average nanoparticle size is about 60-70 nm. The remnant magnetisation (Mr) increases gradually with x to 0.02, then decreases with further increasing x up to 0.05, and finally enches abruptly in x = 0.08. The coercivity (HC) increases gradually with x to 0.05, and then significantly reduced with increasing Cr substitution. The magnetic ordering temperature (TN) decreases with Cr doping concentration. The M-H curves of all samples exhibit a wasp-waist hysteresis loop in low magnetic region. This property can play an important role for the applications of some multiferroic nano-device.

Keywords : BiFeO₃, sol-gel preparation, nanoparticles, magnetic materials, thermal analysis

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