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عنوان مقاله:

X-ray peak broadening analysis in LaMnO۳+δ nano-particles with rhombohedral crystal structure

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خلاصه مقاله:

In this work, structural and magnetic properties of LaMnO۳+δ compound prepared by citrate precursor method and annealed in presence of oxygen are investigated. The structural characterization of LaMnO۳+δ by X-ray powder diffraction and using X'pert package and Fullprof program is evidence for a rhombohedral structure (R-۳c space group) confirmed by FTIR measurement. The magnetic measurements show a super-paramagnetic behavior of LaMnO۳+δ due to low values of coercive field and romance magnetization and also high value of saturation magnetization. In addition, a comparative study of the crystallite size of the compounds obtained from powder XRD is reported. The Williamson-Hall analysis, size-strain plot and Halder-Wagner methods were used to study the individual contributions of crystallite sizes and lattice micro-strain on isotropic line broadening of all the reflection peaks of the LaMnO۳+δ compound. The results show the Halder-Wagner method is more accurate, with all data points touching the fitting line better than the other methods. The crystallite sizes estimated from XRD (۳۰.۸۶ nm) and particle size estimated from TEM method (۳۶ nm) and also the magnetic core size (۳۳.۶ nm) estimated from magnetic measurement agree well, while a little difference reflects a spherical shape of the nanoparticles.

کلمات کلیدی:

Manganite, Nano- Perovskite, Hexagonal to Rhombohedral Lattice Conversion, Peak Broadening

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