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| Title | Enhanced multiferroic, magnetodielectric and electrical properties of Sm doped Lanthanum ferrite nanoparticles | | |
| Author(s) Name | Shovan Kumar Kundu, Dhiraj Kumar Rana, Laxmikanta Karmakar, Debajyoti Das & Soumen Basu | | |
| Contact Email(s) | [soumen.basu@phy.nitdgp.ac.in](mailto:soumen.basu@phy.nitdgp.ac.in), [erdd@iacs.res.in](mailto:erdd@iacs.res.in) | | |
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| Abstract: In this work, we observe an enhancement of multiferroic property correlated with magnetic, magnetodielectric and ferroelectric properties in lanthanum ferrite (LaFeO3) nanoparticles by virtue of Samarium (Sm) doping in La site. The pure and doped lanthanum ferrite nanoparticle was synthesized by a simple solgel auto combustion route. We observe the positive magnetodielectric coupling in the samples and maximum 0.9% enhancement at the 1 T field in 10% Sm doped LaFeO3 nanoparticles. Highest value of saturation magnetization (1.84 emu/gm) is achieved in Sm doped LaFeO3 system. Particle size is decreased from 58 nm to 44 nm because of doping which is confirmed by transmission electron microscopy (TEM). The purity and nanocrystallinity nature of the prepared samples are confirmed by X-ray diffraction spectroscopy (XRD) pattern. DC and AC conduction mechanism and charge transport mechanism are illustrated in association with Mott’s variable range hopping (VRH) model and correlated barrier hopping (CBH) model respectively. The resistivity (DC & AC) is increased with a markable amount by virtue of Sm substitution. An improvement of dielectric properties is observed where dielectric loss is reduced due to the reduction of oxygen vacancies. The enhancement of magnetic properties is attributed to smaller crystallite size, inhomogeneous and disorder magnetic spin. The Sm doped LaFeO3 has been presented here which has promising applications in spintronic devices. |  |
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