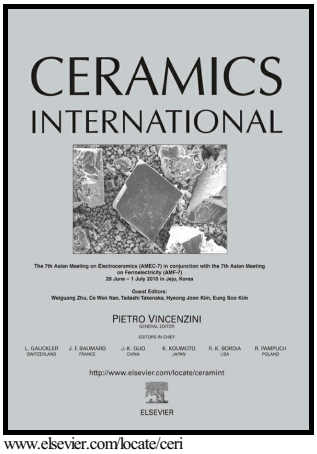

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The effect of particle size on structural, magnetic and transport properties of $La_{0.7}Sr_{0.3}MnO_3$ nanoparticles

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Abstract

This paper reports the synthesis of different particle size $La_{0.7}Sr_{0.3}MnO_3$ (LSMO) nanoparticles using non-aqueous sol gel synthesis route by calcination at temperatures 750°C, 850°C and 950°C. In the present work, the effect of particle size of LSMO nanoparticles on its structural, magnetic and transport properties has been studied in detail. The X-ray diffraction analysis confirms the formation of LSMO nanoparticles having rhombohedral ($R\bar{3}c$) structure with average particle size of 20 nm, 22.5 nm and 25.6 nm. An increase in magnetization and decrease in coercivity with increase in particle size is attributed to the magnetically disordered surface layer. The bifurcation in ZFC-FC magnetization indicates the possibility of spin glass like behavior of the LSMO nanoparticles. The effect of particle size on the resistivity and magnetoresistance were studied by using different conduction mechanism for different temperature regions. The upturn in the ρ-T curve at lower temperatures was explained by using Kondo-like transport mechanism. The maximum LFMR achieved was 32.3% at a field of 1T at 10K for 20 nm LSMO nanoparticle.