

Tailoring optical, magnetic and electric behavior of lanthanum strontium manganite $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$ (LSM) nanopowders prepared via co-precipitation method with different Sr^{2+} ion contents

Ali Omar Turkey^{a,c}, Mohamed Mohamed Rashad^a, Ali Mostafa Hassan^b, Elsayed M. Elnaggar^b, Mikhael Bechelany^c

SI1. The integrated sphere unit of Optical band gap measurements



Figure SI1. The Integrated sphere unit in the UV-Vis-NIR-scanning spectrophotometer (JASCO V-570 spectrophotometer, Japan)

SI2. . The DLS histogram of LSM nanopowders

This technique is one of the most popular methods in nanotechnology used to determine the size of particles in suspension. Particles suspended in liquids show Brownian motion due to random collisions with solvent molecules. It causes the particles to diffuse through the medium. The diffusion coefficient D is inversely proportional to the particle size. According to the Stokes-Einstein equation:

$$D = k_B T / 6 \pi \eta a$$

Where, a is the radius of the beads, k_B is the Boltzmann constant, T is the temperature in Kelvin degrees (in this experiment it will be considered as if it is taking place at room temperature) and η is the viscosity of the solvent. [1-2]

In working principle, radiating a monochromatic light beam, such as a laser, onto a suspension with particles in Brownian motion causes a Doppler Shift when the light falls the moving particle, changing the wavelength of the incoming light. This change is associated to the size of the particle. It is probable to calculate the size distribution of particles and give a description of the particle's motion in the suspension medium, measuring the diffusion coefficient of the particle and using the autocorrelation function. In present case, DLS of the LSM NPs were measured using a Dynamic light scattering (DLS), HORIBA LB-500 Particle Size Distribution Analyzer in the range from 3 to 6000 nm in a fixed angle 90° quartz cell.

The hydrodynamic diameter of LSM nanopowders prepared by co-precipitation method with different Sr ion molar ratios is presented in figure SI2. The main peaks were centered on 850-6000 nm for all samples prepared. By increasing the Sr²⁺ ion content the diameter of prepared samples were increasing. The obtained results from the DLS are consistent with FESEM. The same tendency has been observed by Lim *et al.* for LSMO coated with dextran.[3]

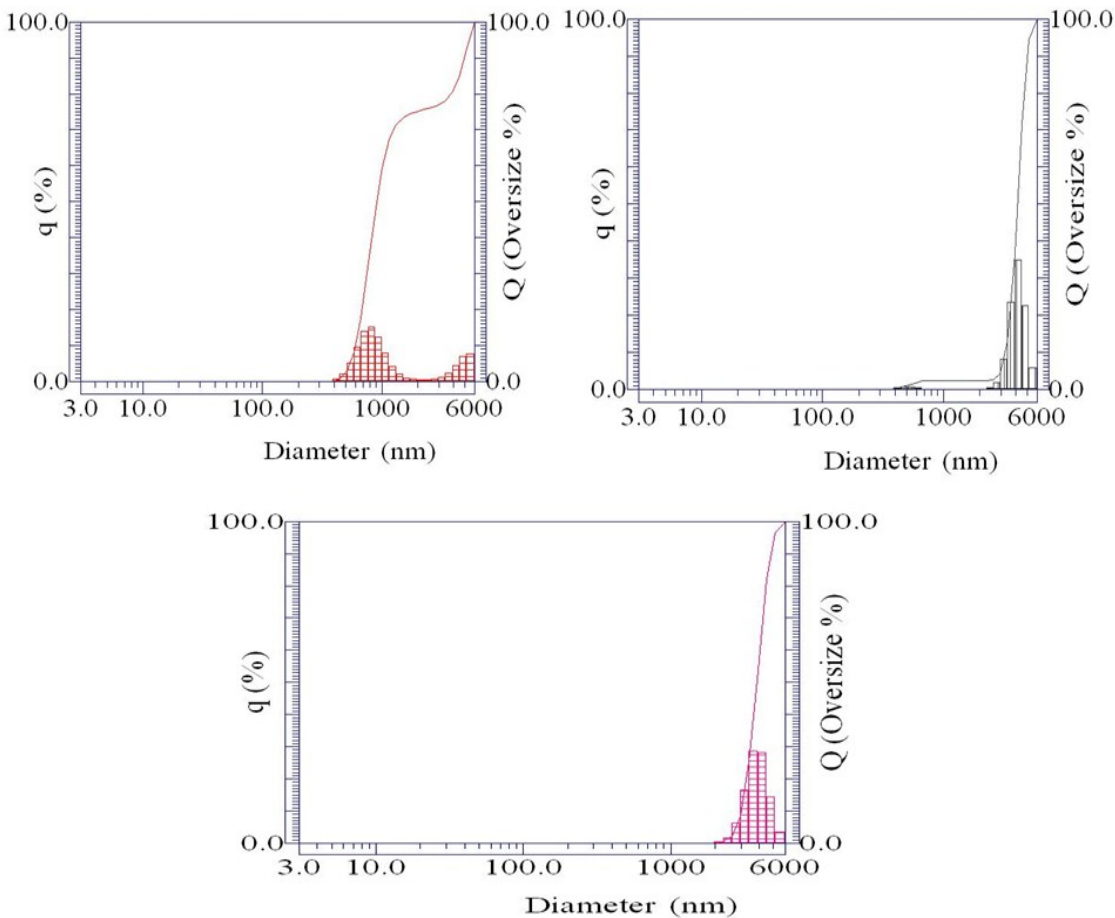


Figure SI 2. The DLS histogram of LSM nanopowders prepared by co-precipitation method using methylamine as a base with different Sr^{2+} ion contents annealed at 1000 °C for 2 h.

References

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