

**Grain size effect on electrical and magnetotransport properties of  
La<sub>0.67</sub>Ca<sub>0.33</sub>MnO<sub>3</sub> synthesized via sol-gel method**

**ABSTRACT**

The effect of grain size on electrical resistivity and magnetoresistance (MR) effect on La<sub>0.67</sub>Ca<sub>0.33</sub>MnO<sub>3</sub> prepared via sol-gel method was reported with different sintering temperature starting from 600°C to 1200°C. X-ray diffraction (XRD) patterns show that La<sub>0.67</sub>Ca<sub>0.33</sub>MnO<sub>3</sub> was in single phase and had orthorhombic structure with space group Pbnm (62). The crystallite size as well as particle size show strong dependence on sintering temperature (T<sub>s</sub>). The metal-insulator transition (TMI) and the magnitude of magnetoresistance are significantly influenced by the effective grain boundaries in LCMO polycrystalline. The TMI and its resistivity increases as the grain size and crystallite size increases (T<sub>s</sub> increase). The highest low-field magnetoresistance (LFMR), which extrinsic percentage of MR is more dominant, observed in LC-SG8 (-12.89%) with nano-sized distribution that showing double crystallite structure. However, the highest CMR is found in LC-SG10 (-23.48%) at 80 K with 1 Tesla. These percentage variations of MR for all samples were influenced by the grain size and crystallite size variations which consequently affect the spin polarized-tunneling scattering at the grain boundary layer.

**Keyword:** Grain size; Electrical; Magnetotransport properties; Sol-gel method

