

# Physical investigations on perovskite $\text{LaMnO}_{3-x}$ sprayed thin films for spintronic applications

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**Abstract:** Oxygen deficient  $\text{LaMnO}_3$  thin films were successfully grown on glass substrate by spray pyrolysis at 460 °C. XRD studies show oxygen vacancies corresponding to the orthorhombic  $\text{La}_4\text{Mn}_4\text{O}_{11}$  with (040) preferential orientation. Optical properties were investigated through optical band gap and Urbach energy. The dispersion of the refractive index was discussed in terms of both Cauchy and Wemple & Di-domenico models. Raman spectroscopy shows the band positions corresponding to  $\text{LaMnO}_3$  with a shift related to oxygen deficiency. Electrical properties were quantified using impedance spectroscopy technique within frequency range of 5 Hz–13 MHz at various temperatures. Both the DC conductivity and relaxation frequency were thermally activated with activation energy around 0.9 eV. Also, AC conductivity was investigated through Jonscher law. Finally, magnetic measurements at room temperature using vibrating sample magnetometer (VSM) technique show ferromagnetic behavior of these ternary sprayed thin films.

**Keywords :** Thin films, Magnetic Properties, Raman spectroscopy, Impedance spectroscopy, X-ray diffraction, Dielectric properties