OPTIMIZING QUALITY OF La:SrSnO3 FILMS VIA OXYGEN CONCENTRATION AND STOICHIOMETRIC CONTROL

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Lanthanum-doped strontium stannate (LSSO) is a promising material for transparent electronics due to its high electron mobility and thermal stability. Consequently, LSSO films are highly relevant in the development of high-performance power semiconductors and optoelectronic devices. A fundamental challenge in investigating lanthanum-doped SrSnO3 is the complex relationship between the doping level and intrinsic structural defects. Even minor deviations in oxygen stoichiometry or crystal lattice dislocations become dominant carrier scattering centers, hindering the achievement of high electron mobility. In this work, the influence of cation stoichiometry and oxygen partial pressure on the properties of LSSO films, grown via Metal-Organic Chemical Vapor Deposition, is investigated.

To evaluate the microstructure, morphology, and electron mobility of the films, scanning electron microscopy, X-ray diffraction, atomic force microscopy, and Hall effect measurement methods were employed. The study analyzes how varying precursor stoichiometric ratios and oxygen partial pressure affect surface roughness, structure, and carrier mobility. The results obtained allow for the determination of optimal values for cation stoichiometry and reactor oxygen partial pressure, providing new insights into how these parameters govern the final quality and electronic characteristics of LSSO films.