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Effect of molar concentration on physical properties of spraydeposited SnO_2 thin films using nebulizer(Article)

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Abstract

In the present paper, tin dioxide (SnO_2) thin films had been fabricated with different precursor concentration in the range of 0.01–0.09 M onto amorphous glass substrates utilizing nebulizer spray method. The effect of precursor concentration on electrical, morphological, structural, optical, and photoluminescence properties has been investigated. XRD spectrum revealed that the polycrystalline nature of SnO_2 thin films with tetragonal structure in the range of precursor concentration 0.03–0.09 M, which are having a favorable growth orientation along (110) direction. The estimated average crystallite size varied between 22 and 53 nm. UV-Visible spectrum exposes the transmittance of SnO_2 thin films lies between 90 and 78% in the visible range. The direct band gap energy reduced from 3.83 to 3.71 eV on increasing precursor concentration upto 0.07 M and then it was further increased. Photoluminescence spectra at room temperature exhibited a strong peak at 362 nm with shoulder peak at 376 nm and two broad peaks are 493 nm and 518 nm. SEM analysis illustrated that the polyhedron-like grains were homogeneously arranged over the film surface. The film prepared at 0.07 M precursor concentration shows the least resistivity 2.41×10^{-3} Ω-cm and good figure of merit 16.41×10^{-3} $(\Omega/sq)^{-1}$. [Figure not available: see fulltext.]

Author keywords

Electrical measurements | NSP | Optical | Tin dioxide

Indexed keywords

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