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Influence of annealing temperature on physical properties of Sn-doped CdO thin films by nebulized spray pyrolysis technique(Article)

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Abstract

Tin (Sn) doped cadmium oxide (CdO) thin films deposited onto the glass substrates by nebulized spray pyrolysis technique (NSP) were annealed for 20 min at different temperatures of 473–548 K in steps of 25 K. X-ray diffraction study showed that all these thin films were polycrystalline with major reflection along (1 1 1) plane and the crystallite size had increased at elevated annealing temperatures. From SEM images, it was found that annealing causes notable changes in the surface morphology. The oxidation states of Cd^{2+}, O^{2-} and Sn^{4+} were confirmed by X-ray photoelectron spectroscopy analysis. These films were found to have direct band gap energy lying in the range of 2.55–2.42 eV and the average transmittance varies from 73 to 87% with various annealing temperatures. The CdO thin films annealed at 523 K exhibited the lowest resistivity (1.03×10^{-4} Ω cm). © 2019 Elsevier B.V.

Author keywords

CdO | Crystal structure | Electrical properties | Luminescence | Optical properties | Solar cell | Thin films

Indexed keywords

Engineering controlled terms: Annealing | Cadmium compounds | Crystallite size | Energy gap | Glass substrates | Luminescence | Morphology | Optical properties | Oxide films | Solar cells | Spray pyrolysis | Surface morphology | Thin films | Tin oxides | X ray photoelectron spectroscopy

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