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Influence of Carrier Gas Pressure on the Physical Properties of CdO Thin Films(Article)

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Abstract

Conducting cadmium oxide (CdO) thin film samples were deposited on amorphous glass substrates at the optimized substrate temperature (200 °C) as a function of carrier gas pressure (10.8, 12.7, 14.7, 16.7 and 18.6 × 10^4 N m^{-2} respectively) by spray pyrolysis technique using nebulizer. XRD results showed that all the CdO thin films were polycrystalline in nature along with cubic structure. The scanning electron microscopy (SEM) images revealed that all the thin films had a sphere like grains without any cracks. The elemental composition of the film is analyzed with EDAX spectrum formed in stochiometric range. Direct energy gap values were found to be had decreased from 2.46 to 2.42 eV as the function of carrier gas pressure had increased from 10.8 to 14.7 × 10^4 (N m^{-2}) and the energy gap increased further. All the as deposited samples of Cd-O vibration bond (690 cm^{-1}) were confirmed by FTIR spectrum. PL emission spectra revealed that all the CdO thin films exhibit a strong emission (green) peak at 520 nm. High carrier concentration (2.88 × 10^{19} cm^{-3}), low resistivity (4.76 × 10^{-3} ω cm) and high figure of merit (25.0 × 10^{-3}) were observed for 14.7 × 10^4 (N m^{-2}) carrier gas pressure of CdO thin film.

Author keywords

CdO | electrical properties | nebulized spray pyrolysis | optical properties | thin film

Indexed keywords

Engineering controlled terms: Carrier concentration | Electric properties | Emission spectroscopy | Energy gap | Fourier transform infrared spectroscopy | Optical properties | Scanning electron microscopy | Spray pyrolysis | Substrates | Thin films

Engineering uncontrolled terms: Direct energy gaps | Elemental compositions | Figure of merits | Low resistivity | Nebulized spray pyrolysis | Scanning electron microscopy image | Spray-pyrolysis techniques | Substrate temperature

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