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## Effect of Zn doping on structural, morphological, optical and electrical properties of nebulized spray-deposited CdO thin films(Article)

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### Abstract

Transparent and conducting pure and Zn-doped CdO thin films (0, 1, 2, 3 and 4 at.% Zn) have been successfully deposited on glass substrates at optimized substrate temperature of 200 °C by spray pyrolysis technique using nebulizer. Structural, morphological, optical and electrical properties of pure and Zn-doped CdO thin films are studied in detail. X-ray diffraction study confirms that all the CdO thin films were polycrystalline in nature with major reflection along (111) plane having a cubic structure. The high average grain size (345 nm—SEM) and low RMS (6.46 nm—AFM) values are obtained for 3 at.% Zn-doped CdO thin films. The optical band gap energy had increased from 2.49 to 2.57 eV as the function of doping concentration had increased from 1 to 3 at.% Zn and thereafter decreased for higher doping concentration. A strong green emission and slightly shifted for Zn-doping concentration of CdO thin films exhibited by photoluminescence spectra. The CdO bond vibration confirmed by FTIR and Raman analyzes. The resistivity value of undoped CdO thin film is  $1.06 \times 10^{-3} \Omega \text{ cm}$  and adding Zn-doped concentration, the resistivity consequently decreased to  $6.2 \times 10^{-4} \Omega \text{ cm}$  for 3 at.% Zn-doped CdO thin films and then furthermore increased. A high-quality factor ( $7.07 \times 10^{-2}$ ) was obtained for 3 at.% Zn-doped CdO thin films. © 2018, Springer-Verlag GmbH Germany, part of Springer Nature.

### Indexed keywords

Engineering controlled terms:

Conductive films Energy gap Fourier transform infrared spectroscopy Optical films  
Photoluminescence Semiconductor doping Spray pyrolysis Substrates Thin films  
Vibration analysis Zinc Zinc compounds

Engineering uncontrolled terms

Doping concentration High quality factors Optical and electrical properties  
Optical band gap energy Photoluminescence spectrum Spray-pyrolysis techniques  
Substrate temperature X-ray diffraction studies

Engineering main heading:

Cadmium compounds

Cited by 32 documents

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