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Influence of fluorine doped CdO thin films by an simplified spray pyrolysis technique using nebulizer(Article)

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Abstract

Abstract: The Cadmium oxide (CdO) and Fluorine (F) doped CdO thin films were effectively synthesized on glass substrates for different F doping concentrations (2, 4, 6, 8 at.%) using nebulized spray pyrolysis technique. The XRD analysis showed that all the films were polycrystalline having cubic structure with (111) preferential orientation. It was seen from the SEM photographs that the doping causes remarkable changes in the surface morphology. EDAX analysis clearly confirmed that the presence of expected elements cadmium, oxygen and fluorine in the final product, in appropriate proportions. The electrical study showed that the minimum resistivity value of 1.9×10^{-4} Ω cm with notable higher values of carrier concentration and mobility was achieved for 6 at.% of CdO:F film. Optical study exhibited that the band gap value of CdO film increases gradually with the increase in F-doping concentration, reaching maximum band gap value of 2.61 eV at 6 at.% and starts decreasing thereafter. Photoluminescence spectra depicted that the intensity of the emission peaks was significantly varied with doping concentrations. The high transparency, wide band gap energy, enhanced electrical properties and light sensitivity had been obtained infer that F-doped CdO thin films which find application in optoelectronic applications. Graphical abstract: [Figure not available: see fulltext.]. © 2019, Springer Science+Business Media, LLC, part of Springer Nature.

Author keywords

Cadmium oxide | Electrical properties | Optical properties | Semiconductor | Thin films

Indexed keywords

Engineering controlled terms: Cadmium compounds | Carrier concentration | Electric properties | Energy gap | Fluorine | Morphology | Optical films | Optical properties | Oxide films | Photoluminescence | Semiconductor doping | Semiconductor materials | Spray pyrolysis | Substrates | Surface morphology | Thin films | Wide band gap semiconductors

Engineering uncontrolled terms: Cadmium oxide | Doping concentration | Nebulized spray pyrolysis | Optoelectronic applications | Photoluminescence spectrum | Preferential orientation | Resistivity values | Spray-pyrolysis techniques

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