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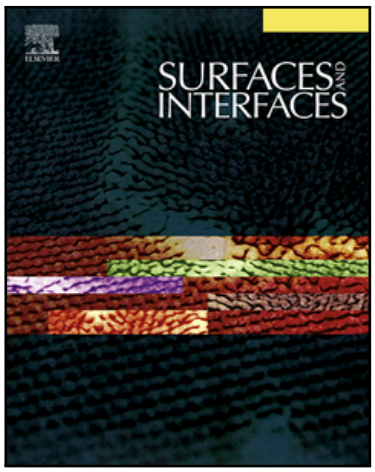

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Influence of Chromium on structural, non-linear optical constants and transport properties of CdO thin films

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Abstract:

Transparent and conducting CdO and Cr doped CdO (CdO:Cr) crystalline films were prepared on glass substrate at 350 ^{o}C by cost effective spray pyrolysis technique. Structural analysis indicates CdO:Cr films are polycrystalline cubic structure comprises with spherical or semi-spherical nano-scale particles. The direct band gap energy of CdO was found to change with Cr doping. The photoluminescence (PL) spectra of CdO show extended band edge emissions accompanied by red emission originated from different impurity states. The optical dispersion parameters calculated using Wemple–DiDomenico single-oscillator model were found to vary with Cr concentration in CdO. The dispersion energy of oscillator found to decrease with increasing Cr concentration. Simultaneously, the variation of third-order nonlinear susceptibility with photon energy was found to decrease with increasing Cr concentrations. Hall study confirms that CdO and CdO:Cr films are n-type semiconductor having carrier concentration of the order of ~10^{19} cm^{-3}. The obtained physical properties of CdO film were improved by Cr doping which make them suitable for optoelectronic applications.

Keywords: XRD, Band gap, Dispersion parameter, Photoluminescence, Transport properties.

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