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Investigation of the Morphology and Optical Properties of $CuAlO_2$ Thin Film

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Abstract : Thin films of CuAlO2 were deposited on clean glass substrate using the chemical solution deposition (sol-gel) method of deposition with CuCl and AlCl3 taken as the starting materials. CuCl was dissolved in HCl while $AlCl_3$ in distilled water, pH value of the mixture was controlled by addition of NaOH. The samples were annealed at different temperatures in order to determine the effect of annealing temperatures on the morphological and optical properties of the deposited $CuAlO_2$ thin film. The surface morphology reveals an improved crystalline as annealing temperature increases. The results of the UV-vis and FT-IR spectrophotometry indicate that the absorbance for all the samples decreases sharply from a common value of about 89% at about 329 nm to a range of values of 56.2%-35.2% and the absorption / extinction coefficients of the films decrease with increase in annealing temperature from 1.58 x 10^{-6} to1.08 x 10^{-6} at about 1.14eV in the infrared region to about 1.93 x 10^{-6} to 1.29 x 10^{-6} at about 3.62eV in the visible region, the transmittance, reflectance and band gaps vary directly with annealing temperature, the deposited films were found to be suitable in optoelectronic applications.

Keywords : copper aluminium-oxide (CuAlO2), absorbance, transmittance, reflectance, band gaps
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