

ABSTRACT

In this study pure ZnO and (Cu, Ni) doped ZnO thin films were successfully deposited on preheated glass substrate at 400°C by home built spray pyrolysis as easy, available and low cost deposition technique. The influence of Cu and Ni content on various physical properties of ZnO thin films were inspected by using x-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), UV-VIS spectrophotometer. X-ray diffraction investigation reveals that Cu and Ni ions were successfully incorporated in ZnO lattice and all thin films possess hexagonal wurtzite structure with highly c –axis preferred orientation. X-ray diffraction intensity and crystallite size appertaining to (002) plane decreases with the increase of Ni dopant concentration. FTIR spectra portray characteristic absorption band centered at 902 767 and 563 cm^{-1} pertaining to metal oxygen bonds. The optical properties of thin films were studied by using UV VIS spectrophotometer. All thin films possess more than 90% transmittance in the visible region. When Cu and Ni are added, the optical band gap moves toward a longer wavelength (red shift), increasing its ability to absorb electromagnetic radiation in the visible spectrum The inverse relationship was found between Urbach Energy E_u and Band gap energy E_g . The low values of extinction coefficient in the visible range evidenced the incredible surface uniformity of Nickel oxide thin films. The values of optical conductivity of thin films was found to be in the range of about 10^{13} s^{-1} for all volume while the dielectric loss was rather extremely low which confirmed excellent photo response of prepared films. Under solar light irradiation, Cu and Ni doped ZnO films shown improved photocatalytic degradation efficiency for methylene blue (MB).