

Optical characterization of the Bi₂O₃, TiO₂ and MnO₂ doped ZnO ceramics.

ABSTRACT

Photopyroelectric (PPE) spectroscopy was used to study the optical band-gap energy (E_g) of the ceramic ZnO doped with 0.5MnO₂. x Bi₂O₃ and x TiO₂ sintered at 1270°C for one to four hours. The wavelength of incident light from 300 to 800 nm, modulated at 9 Hz, was used and PPE spectrum with reference to the doping level and sintering time was discussed. The optical band-gap energy (E_g) was determined from the plot $(\rho h\nu)^2$ vs $\rho h\nu$ and found that the E_g decreased to the lowest value of 2.13 eV with $x = 1.8$ mol% at four hour sintering time. Steepness factor (in region-A) and steepness factor (in region-B) which characterizes the slope of exponential optical absorption was discussed with reference to the variation in the value of E_g . XRD, SEM and EDAX were used for the characterization of the ceramic. Relative density and grain size is also discussed.

Keyword: Bi₂O₃; Ti₂O₃; Mn₂O₃; ZnO; Varistor.