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

ABSTRACT

Photopyroelectric (PPE) spectroscopy was used to study the optical band-gap energy (Eg) of the ceramic ZnO doped with 0.5MnO2. xBi2O3 and xTiO2 sintered at 1270oC 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 (Eg) was determined from the plot (phv)2 vs and found that the Eg 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 Eg. 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.