The variation of optical absorption edge with sintering time for the ceramic ZnO + xMnO2-Bi2O3-TiO2

ABSTRACT

Photopyroelectric spectroscopy is used to study the variation of optical absorption of the ceramic xMn02 - 0.4 Bi2O3 - 0.4 TiO2 - ZnO, x = 0, 0.4 mol% sintered for 1-4 hours at the isothermal temperature, 1220°C. The wavelength of incident light, modulated at 12 Hz, is kept in the range 310 to 810 nm. The band-gap energy is reduced from 3.2 eV (for pure ZnO) to 2.83 eV for 0 mol% MnO2 for 1 hour sintering time and decreases further with the further increase of sintering time. Eg is decreased to 2.39 eV for 1 hour sintering time after the addition of 0.4 mol% of MnO2 in the ceramic combination. It is reduced to a value 1.9 eV with the further increase of sintering time. The variation of steepness factor ůA and ůB which characterizes the slop of exponential optical absorption, is correlated with the variation of Eg, sintering time and doping of MnO2. Microstructure and compositional analysis of the selected areas are analyzed using SEM and EDAX.