Photopyroelectric spectroscopy of Sb2O3 - ZnO ceramics

Abstract

Photopyroelectric spectroscopy is used to study the band-gap energy of the ceramic (ZnO + xSb2O3), x = 0.1−1.5mol% and the ceramic (ZnO + 0.4mol%Bi2O3 + xSb2O3), x = 0−1.5mol% sintered at isothermal temperature,1280◦C, for 1 and 2 hours. The wavelength of incident light, modulated at 9Hz, is kept in the visible range and the photopyroelectric spectrum with reference to doping level is discussed. The band-gap energy is reduced from 3.2 eV, for pure ZnO, to 2.86, 2.83 eV for the samples without Bi2O3at 0.1mol% of Sb2O3 for 1 and 2 hours of sintering time, respectively. It is reduced to 2.83, 2.80 eV for the samples with Bi2O3 at 0 mol% of Sb2O3 for 1 and 2 hours of sintering time, respectively. The steepness factor σA which characterizes the slop of exponential optical absorption is discussed with reference to the doping level. The phase constitution is determined by XRD analysis; microstructure and compositional analysis of the selected areas are analyzed using SEM and EDX.

Keyword: Photopyroelectric spectroscopy, ceramics