

**PHOTOTHERMAL STUDY OF ZnO CERAMIC DOPED WITH TiO<sub>2</sub>**

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**ABSTRACT**

Photopyroelectric spectroscopy (PPES) is a useful tool for examining non-radiative de-excitation in semiconductor materials. The ceramic (ZnO-x, x = 0.4 - 2.7 mol % of TiO<sub>2</sub>) was sintered at isothermal temperature, 1270 for 1, and 2 hours to investigate its optical properties. The PPES is used to study the energy band gap of this ZnO system with reference to TiOCo<sub>2</sub> doping level. The energy band-gap obtained from photopyroelectric spectrum is about constant at 2.82 eV for the samples sintered for 2 hour at all TiO<sub>2</sub> doping levels except at 0.4 mol % which is 2.78 eV. The energy band gap decreases with the decrease of sintering time from 2 to 1 hour at all doping levels and is about constant at 2.79 eV for the sintering time of 1 hour except that at 0.6 mol % level which is 2.84 eV. The steepness factors  $\sigma_A$  and  $\sigma_B$  which characterize the slop of exponential optical absorption are discussed with reference to the TiO<sub>2</sub> doping level. The X-ray diffractometry shows that the crystal structure of ZnO doped with different TiO<sub>2</sub> mol% remains to be of hexagonal type. Microstructure and compositional analysis of the selected areas are analyzed using SEM and EDAX. The maximum relative density 95.16 % is obtained for the ceramic. The grain size is about constant at 26.8 – 311.6  $\mu\text{m}$  up to 1 mol % of TiO<sub>2</sub> and then decreases with the increase of TiO<sub>2</sub> mol % indicating the excess TiO<sub>2</sub> suppresses the grain growth.

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