

## Use of a reflectance spectroscopy accessory for optical characterization of ZnO-Bi<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub> ceramics.

### ABSTRACT

The optical band-gap energy ( $E_g$ ) is an important feature of semiconductors which determines their applications in optoelectronics. Therefore, it is necessary to investigate the electronic states of ceramic ZnO and the effect of doped impurities under different processing conditions.  $E_g$  of the ceramic ZnO + xBi<sub>2</sub>O<sub>3</sub> + xTiO<sub>2</sub>, where x = 0.5 mol%, was determined using a UV-Vis spectrophotometer attached to a Reflectance Spectroscopy Accessory for powdered samples. The samples were prepared using the solid-state route and sintered at temperatures from 1140 to 1260 °C for 45 and 90 minutes.  $E_g$  was observed to decrease with an increase of sintering temperature. XRD analysis indicated hexagonal ZnO and few small peaks of intergranular layers of secondary phases. The relative density of the sintered ceramics decreased and the average grain size increased with the increase of sintering temperature.

**Keyword:** UV-Vis spectrophotometer; Reflectance Spectroscopy Accessory; optical band-gap; ZnO; Bi<sub>2</sub>O<sub>3</sub>; TiO<sub>2</sub>.