

## **A study on optical properties of zinc silicate glass-ceramics as a host for green phosphor**

### **ABSTRACT**

For the very first time, a study on the crystallization growth of zinc silicate glass and glass-ceramics was done, in which white rice husk ash (WRHA) was used as the silicon source. In this study, zinc silicate glass was fabricated by using melt–quenching methods based on the composition  $(\text{ZnO})_{0.55}(\text{WRHA})_{0.45}$ , where zinc oxide (ZnO) and white rice husk ash were used as the raw materials. The control crystallization technique was used in which the sample was sintered at 700–950 °C; then, the physical, structural, and optical properties of the glass and glass-ceramics were investigated by using a densitometer, linear shrinkage, X-ray diffraction (XRD), Fourier transform infrared radiation (FTIR), field-emission scanning electron microscopy (FESEM), and photoluminescence spectroscopy (PL). The density and linear shrinkage increased as the crystallinity increased and the XRD results showed the progression of the crystal formation, in which the sample was still in an amorphous state at 27 °C and 700 °C; the crystalline phase started at 750 °C. Based on the FTIR spectra, all samples showed sharpened absorption bands as the sintering temperature was increased, and the FESEM image showed the progression of crystal growth, indicating the formation of zinc silicate glass-ceramics. Lastly, the PL spectra emitted three emission peaks, at 529, 570, and 682 nm for the green, yellow, and red emission, respectively.

**Keyword:** Glass; Glass-ceramics; Sintering; Crystallinity; Crystal growth; Luminescence