

## **Comprehensive study on structural and optical properties of Tm<sub>2</sub>O<sub>3</sub> doped zinc silicate based glass–ceramics**

### **ABSTRACT**

In this research, Tm<sub>2</sub>O<sub>3</sub> doped zinc silicate based glass–ceramics were prepared by using conventional melt-quenching method and has been successfully derived from ZnO-WRHA glasses with control heat treatment process. The formation of zinc silicate phase affected by heat treatment process was investigated using X-ray diffraction. Fourier transform infrared reflection spectroscopy (FTIR) analysis was used to determine the crystallization of Zn<sub>2</sub>SiO<sub>4</sub> in the glass matrix. FTIR analysis showed the appearance of Zn<sub>2</sub>SiO<sub>4</sub> and SiO<sub>2</sub> bands that supported the formation of Zn<sub>2</sub>SiO<sub>4</sub> crystal phase in the glass matrix. The optical absorption and energy band gap of the glass and glass–ceramics was investigated using UV–Vis spectroscopy. The absorption edge shows the movement towards longer wavelength with increasing heat treatment temperature. Besides, the energy band gap decreased with the progression of heat treatment. This ability to enhance optical properties in glass–ceramics was expected to have bright future in the opto-electronics devices.

**Keyword:** Tm<sub>2</sub>O<sub>3</sub>; Doped zinc silicate; Glass–ceramics