

## **Effect of sintering temperature on physical, structural and optical properties of wollastonite based glass-ceramic derived from waste soda lime silica glasses**

### **ABSTRACT**

The impact of different sintering temperatures on physical, optical and structural properties of wollastonite ( $\text{CaSiO}_3$ ) based glass-ceramics were investigated for its potential application as a building material. Wollastonite based glass-ceramics was provided by a conventional melt-quenching method and followed by a controlled sintering process. In this work, soda lime silica glass waste was utilized as a source of silicon. The chemical composition and physical properties of glass were characterized by using Energy Dispersive X-ray Fluorescence (EDXRF) and Archimedes principle. The Archimedes measurement results show that the density increased with the increasing of sintering temperature. The generation of  $\text{CaSiO}_3$ , morphology, size and crystal phase with increasing the heat-treatment temperature were examined by field emission scanning electron microscopy (FESEM), Fourier transforms infrared reflection spectroscopy (FTIR), and X-ray diffraction (XRD). The average calculated crystal size gained from XRD was found to be in the range 60 nm. The FESEM results show a uniform distribution of particles and the morphology of the wollastonite crystal is in relict shapes. The appearance of CaO,  $\text{SiO}_2$ , and Ca-O-Si bands disclosed from FTIR which showed the formation of  $\text{CaSiO}_3$  crystal phase. In addition to the calculation of the energy band gap which found to be increased with increasing sintering temperature.

**Keyword:** Soda lime silica glass; Wollastonite; Sintering; Structural properties; Optical properties