

## **Effect of sintering temperature on the crystal growth, microstructure and mechanical strength of foam glass-ceramic from waste materials**

### **ABSTRACT**

This study was conducted to synthesize foam glass-ceramic using SLS glass as a precursor; eggshell (ES) as a foaming agent and investigated the effect of sintering temperature on the crystal growth, microstructure and mechanical properties of the final product. The samples undergo the sintering process at different temperatures such as 700, 800 and 900 °C for 60 min with the heating rate of 10 °C/min. The structural properties were studied by XRD, FTIR and FESEM measurement. The cristobalite (SiO<sub>2</sub>) and wollastonite (CaSiO<sub>3</sub>) phases were identified after the sintering process and their microstructure was recorded by the FESEM micrograph. The physical properties of the samples were measured by average density measurement, linear expansion and compressive strength. The lowest density measurement using the Archimedes principle was achieved by 0.421 g/cm<sup>3</sup> with the highest volumetric expansion at 92% after the sample sintered at 800 °C. Good correlations between porosity, mechanical strength and crystal phase were observed. The invention of foam glass-ceramics from waste materials can be applied as a potential building insulation material that gives benefit to the environment and energy usage.

**Keyword:** Glass-ceramic; Sintering; Foam agent; Crystal phase; Mechanical properties