Abstract

Samir Y Marzouk

Thermal, structure and morphological properties of lithium disilicate glasses doped with copper oxide and their glass–ceramic derivatives

This research aims to investigate and compare the structural and the morphological properties of both lithium disilicate glasses doped with copper oxide and their glass–ceramic derivatives. Density measurements were measured for all samples by Archimedes method at room temperature. Differential scanning calorimetric analysis was used to determine the glass transition temperature (Tg) and crystallization temperature (Tc) for all glasses. The glass transition temperature was observed to decrease with increasing CuO concentration indicating the formation of non-bridging oxygen bonds in the glass network. X-ray analysis patterns reveal the appearance of crystalline lithium metasilicate phase as the main phase within the glass–ceramic derivatives, and their crystallite sizes were observed to decrease as the CuO increased. Experimental infrared absorption data indicate the existence of characteristic vibrational bands due to structural building SiO4 units in resemblance to the same vibrations observed from traditional crystalline silicates. Scanning electron microscopic investigations show the vitreous nature for lithium disilicate glasses and the distinct crystalline morphological features for the corresponding glass–ceramic derivatives.