

**Effect of sintering temperatures on structural and optical properties of ZnO-
Zn₂SiO₄ composite prepared by using amorphous SiO₂ nanoparticles**

ABSTRACT

The effect of different sintering temperatures on structural and optical properties of ZnO-Zn₂SiO₄ composite was investigated. In this study, a ZnO-Zn₂SiO₄ composite was prepared by encapsulated zinc nitrate hexahydrate with amorphous silica nanoparticles in deionized water. The amorphous silica nanoparticles were prepared by reacting sodium silicate with ethanol. Zinc nitrate was mixed with the obtained amorphous silica nanoparticles with the ratio of 2:1 and 1.25:1 for Zn:Si and subjected to the different sintering temperatures from 600 to 1000 °C. Field emission scanning electron microscope (FESEM) microstructure showed that samples exhibit spherical morphology up to 700 °C and dumbbell morphology above 800 °C sintering temperature. The formation of Zn₂SiO₄ crystal phase appears from 700 °C and onwards together with ZnO crystal phase. The gaining of sintering temperature has also raised the amount of Zn₂SiO₄ phase and band gap values of the ZnO-Zn₂SiO₄ composite.

Keyword: ZnO nanoparticles; SiO₂; Zinc silicate; Optical band gap; Composites