

Photoluminescence studies of cobalt (II) doped zinc silicate nanophosphors prepared via sol-gel method

ABSTRACT

In this study, cobalt(II) doped zinc silicate nanophosphors were prepared via a sol-gel route which the solution mixed, stirred and dried in the oven at 100 °C around 6–8 h then undergone different heat treatment (600, 700, 800, 900, and 1000 °C). The nanophosphors powder sample was characterized using X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), Fourier transforms infrared spectroscopy (FTIR), and photoluminescence (PL) spectroscopy. XRD analysis revealed the α & β - Zn_2SiO_4 at 800 °C and it turned to pure α - Zn_2SiO_4 phase at 1000 °C. FESEM images showed the samples have irregular in shapes and proved the formation of the nanophosphor. The obtained zinc silicate nanophosphors was further confirmed by FTIR analysis. PL emission revealed two peaks at blue emission (420 and 480 nm) and one at green emission (525 nm). This result shows that $Co^{2+}: Zn_2SiO_4$ is potentially good to use as blue and green phosphors for luminescent optical material.

Keyword: Cobalt (II) doped zinc silicate; Transition metal; Sol-gel method; Nanophosphor