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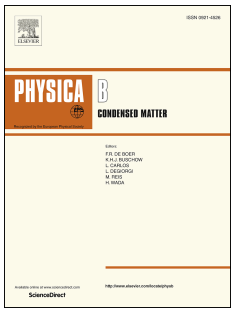

Investigation of optical properties of aluminium oxide doped polystyrene polymer nanocomposite films

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Investigation of Optical Properties of Aluminium Oxide Doped Polystyrene Polymer Nanocomposite Films

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Abstract. In the present work, a simple solution casting method was utilized to synthesize aluminium oxide (Al_2O_3) doped polystyrene (PS) polymer nanocomposite films. As synthesized films were characterized using X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, ultra violet (UV)-visible spectroscopy, photoluminescence (PL) method and scanning electron microscopy (SEM). The crystalline nature of the films was found to decrease after incorporation of filler in the polymer matrix as revealed by XRD results. A new carbonyl group was appeared in the FTIR spectra and confirmed the charge transfer reaction between filler and polymer matrix. The decrease in the band gap was found with the filler concentration in the synthesized polymer nanocomposite films. Photoluminescence emission spectra of nanocomposites were observed at 411 nm, 435 nm and 462 nm, respectively in violet-blue region which indicates interaction between the dopant and the polymer matrix. The PL emission spectra of polymer nanocomposite films with 3 wt% of Al_2O_3 filler exhibited higher peak intensity. The Al_2O_3 filler dispersion is found to reduce band gap and promote luminescence property in polystyrene. SEM analysis indicates the agglomeration of Al_2O_3 nanoparticles into PS matrix at higher concentration.

Keywords: Polystyrene; Aluminium Oxide; XRD; FTIR; UV-Vis; Photoluminescence.