

Highly transparent o-PDA functionalized ZnS-polymer nanocomposite thin films with high refractive index

Abstract

We prepared highly transparent nanocomposite films with high refractive index using fluorescent nanocrystal quantum dots (NQDs). The as synthesized transparent solution of ZnS NQDs was blended with poly(vinylpyrrolidone) (PVP) to prepare nanocomposite thin films. Morphological data, studied by atomic force microscopy (AFM) and X-ray diffraction (XRD), revealed that NQDs were impregnated with polymer matrix and the size distributions (3.0 ± 0.30 nm) of them were preserved in the composite films. The nanocomposite films show high optical transparency ($T > 95\%$ at 400 nm and $T > 98.5\%$ at 750 nm) and the refractive index is satisfactorily increased (1.565 at 550 nm, 15 wt.% ZnS) compared to the base polymer (1.480 at 550 nm). The nanocomposite films show defectless fluorescence emissions as observed from NQDs before impregnation.

Keywords: Composites; Semiconductors; Nanomaterials; ZnS; Polymers; Optical materials and properties