

Study of nanostructured polymeric composites and hybrid layers used for light-emitting diodes

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Abstract: Nanocomposite polymeric thin films of poly(2-methoxy-5-(2-ethyl hexyloxy)phenylene vinylene) (MEH-PPV) with nano-crystalline titanium oxide (nc-TiO₂) and polycarbazole (PVK) with cadmium selenide (CdSe) were fabricated by spin-coating. A 20-nm-thick nanocrystalline (molybdenum oxide) MoO₃ layer prepared by using thermal oxidation was also spin-coated with a PVK film. A study of photoluminescence (PL) spectra of the polymers and nanocomposites showed an enhancement in the photoluminescence from the nanocomposites. Moreover, MEH-PPV+nc-TiO₂ composites exhibited a blue-shift of the PL spectrum as compared to that of the polymer film. The current-voltage characteristics of the Mo/nc-MoO₃/PVK/Al-Au structures show that a semitransparent metallic coating or a transparent polymer can serve as a cathode in devices with enhanced charge carrier injection.

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