PT-P015

Inverted CdSe/ZnS Quantum Dots Light-Emitting Diode Using Low-Work Function Organic Material Polythylenimine Ethoylated

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Over the past several years, colloidal core/shell type quantum dots lighting-emitting diodes (QDLEDs) have been extensively studied and developed for the future of optoelectronic applications. In the work, we fabricate an inverted CdSe/ZnS quantum dot (QD) based light-emitting diodes (QDLED). In order to reduce work function of indium tin oxide (ITO) electrode for inverted structure, a very thin (< 10 nm) poly-ethylenimine ethoxylated (PEIE) is used as surface modifier[1] instead of conventional metal oxide electron injection layer. The PEIE layer substantially reduces the work function of ITO electrodes which is estimated to be 3.08 eV by ultraviolet photoemission spectroscopy (UPS). From transmission electron microscopy (TEM) study, CdSe/ZnS QDs are uniformly distributed and formed by a monolayer on PEIE layer. In this inverted QDLEDs, blend of poly (9,9-di-n-octyl-fluorene-alt-benzothiadiazolo) and poly(N,N'-bis(4-butylphenyl)-N,N'-bis(phenyl)benzidine] are used as hole transporting layer (HTL) to improve hole transporting property. At the operating voltage of 8 V, the QDLED device emitted spectrally orange color lights with high luminance up to 2450 cd/m2, and showed current efficacy of 0.6 cd/A, respectively.

Keywords: Inverted QD-LED, PEIE, Low-Work Function

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Comparative Investigation on the Light Emitting Characteristics of OLED Devices with a Single Layer of Alq3 and a Double Layer of Rubrene/Alq3

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Green-light emitting OLED with single layer of Alq3 and orange-light emitting OLED with double layer of rubrene/Alq3 as EML were fabricated and characterized comparatively. The two OLED devices were based on an anode of ITO, HTL of TPD, and cathode of Al, respectively. The green light emitting OLED was then prepared with Alq3 as both ETL and EML, while the orange-light emitting OLED was prepared with rubrene deposited on Alq3. All the component layers of the OLED devices were deposited by a thermal evaporation technique in vacuum. Photoluminescence characteristics of the EML layers were investigated. Electrolumiscence characteristics of the OLED devices were comparatively investigated.

Keywords: OLED, Alq3, rubrene, photoluminescence, electroluminescence