Multilayer Color Conversion Structure with Quantum Dots and Phosphors for White Color Emission of Blue OLED

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Quantum dots (QDs) have attracted much attention for next generation displays due to their high color purity and a large color gamut.[1] Colloidal CdSe QDs show narrow full with half maximum (FWHM) of less than 50nm. In this work, we developed QD-embedded adhesive (QDEA) films for the color conversion of blue organic light emitting diode (OLED). Green emitting CdSe@ZnS (gradient shell) QDs were combined with red phosphor particles (Rph) and Y3Al5O12 scattering particles (SP). Various structures shown in Figure 1 are suggested their optical characteristics were analyzed. The combination of green QDEA and red phosphor, and scattering particles/green QDEA/red phosphor structure were realized on blue OLED panel to obtain high color rendering index (CRI) white emission. The red phosphor in the substrate of OLED enhances light extraction, resulting in the increase of external quantum efficiency by 50%. The scattering particles were found to improve viewing angle dependence of emission light intensity and color coordinate significantly. The white light emission with the structure of scattering particles/green QDEA/red phosphor also showed the improvement of CRI.

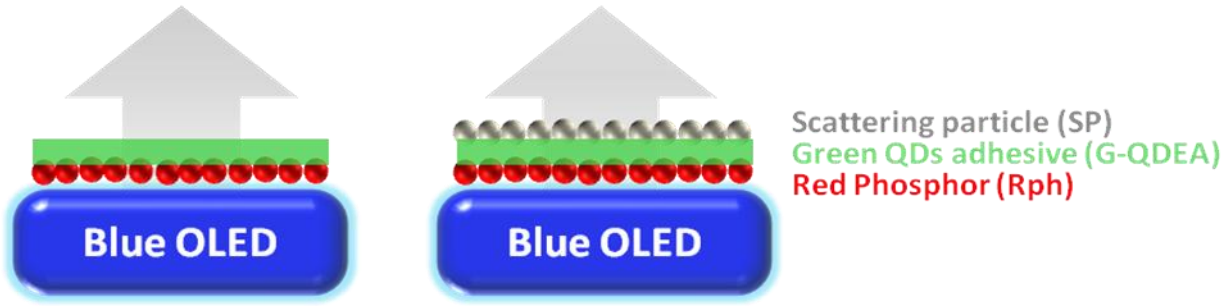

Figure 1. Scheme of OLED-based BLU structures using QDEA approaches

References

1. R. J. Martín-Palma, M. Manso and V. Torres-Costa, *Sensors*, vol.9, p.5149-5172 (2009)

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