

High Performance Red Phosphorescent Organic Light-Emitting Diodes with Blue Common Layer by Solution Process

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The vacuum thermal evaporation has been widely used to fabricate organic light-emitting diodes (OLEDs). However, the vacuum thermal evaporation method for OLEDs has several difficulties such as complicated pixel patterning using fine metal mask (FMM) step, inefficient utilization of material, high equipment cost and high vacuum pressure condition. These kinds of problems can be resolved by solution process method which emerges as the alternative to vacuum thermal evaporation for the next generation OLED applications due to its possibility toward large area, low cost manufacturing.

In spite of the potential for solution processed OLEDs, it has been impeded by the critical limitation from the material selection and short lifetime, especially blue materials. Considering these issue, we focused on “advanced hybrid device structure” [as shown in Fig. 1. (a)] with evaporated blue common layer to overcome blue emission performance.

Moreover, we used the small molecular mixed host system that has advantage in terms of charge transport property leading charge balance in emission layer. In addition, using the small molecular mixed host system in solution process can quite freely change the composition of host so that optimization for improving device characteristics can be more realistic compared with vacuum evaporation method.

In this report, we fabricated the high performance red phosphorescent organic light-emitting diodes with blue common layer by solution process with changing the ratio of two types (PH and NH) of hosts. As a result, we obtained best performance in PH : NH = 7:3 (the current efficiencies at maximum and 1000 nit were 25.9 cd/A and 23.4 cd/A, respectively).

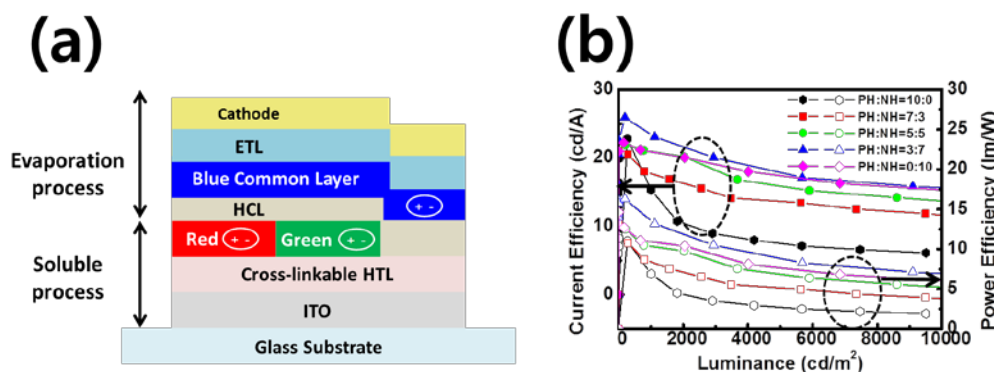


Fig. 1.(a) Hybrid device structure. (b) Current and power efficiency characteristics of the fabricated devices.

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