Transparent Cd-free Quantum Dots Light Emitting Diodes with Inorganic Oxide Charge Transport Layers

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Recently the applications of colloidal quantum dots (QDs) for the display industry have held the limelight as one of the potential technologies because of the color tunability, the narrow full width half maximum (FWHM) and the solution-process. For the commercialization, we need the eco-friendly (Cd-free) QDs and many development about the Cd-free QDs have been done until now and the properties of these QDs are coming close to those of QDs including toxic materials. And these QDs materials can be transparent in the visible region, we can fabricated the transparent QD-LED using eco-friendly QDs. But, since it is not easy to realize the transparent electrode on the organic charge transport layer without damage, we need to develop the transparent electrode on the organic materials.

In this work, we have fabricated QD-LED devices using eco-friendly InP QDs as emission layer and inorganic TiO_2 as electron transport layer with inverted structure. And, through the optimization of process parameter for transparent electrode, we could realize the transparent QD-LED with top and bottom emssion simultaneaously. We could also enhance the properties of devices by post-treatment of charge transport layer that was coated with nano-size TiO_2 solution. To realize the transparent devices, we used MoO_x layer as hole injection layer and protecion layer of organic HTL. Because of the non-thermal post-treatment, we could fabicate our device at low temperature of ~ 150 ^oC.

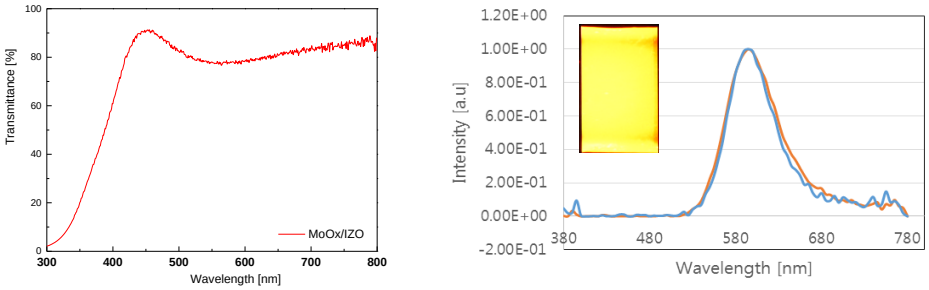

Fig. 1. Transmittance of top electrode and emission wavelength of QD-LEDs

Acknowledgment

This work was supported by the Industrial Strategic Technology Development Program (10045145, Development of high performance (>70 cm^2/Vs) chalcogenide TFT backplane and cadmium-free highly efficient (>30 cd/A) hybrid EL material/devices) funded by the Ministry of Trade, Industry and Energy (MOTIE, Korea).

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