Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Highly efficient white quantum dot light-emitting diode employing magnesium doped zinc oxide as the electron transport layer based on bilayered quantum dot layers

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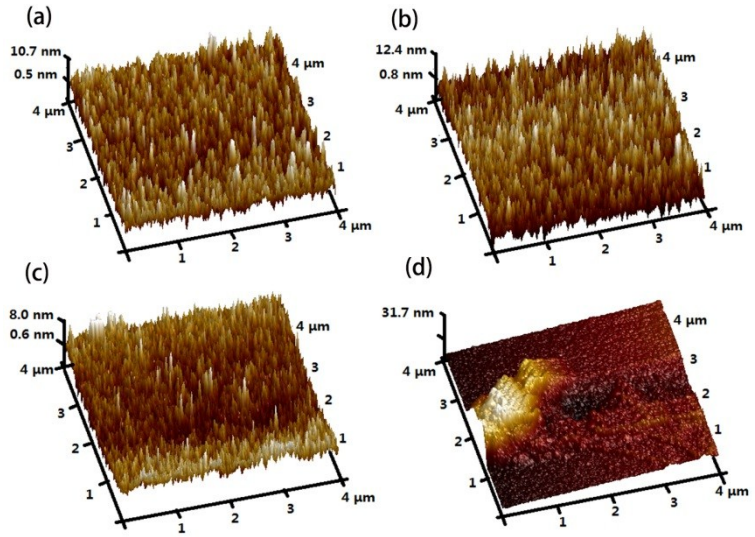

Fig. S1 AFM image of (a) Y-QDs (b) Y-QDs/ ZnO (c) Y-QDs/ ZnO/ B-QDs (d) Y-QDs/ B-QDs.

The performance of QLEDs without inserting ZnO layer has been measured as displayed below. It can be found that the current efficiency and power efficiency of the device without ZnO inserting layer is 0.31 cd/A and 0.27 lm/W, respectively. Because without the ZnO buffer layer, the underlying Y-QDs would be easily washed during spin coating of B-QDs layer and the film quality of these two layers could deteriorate. The deterioration of the film quality of QDs and the failure of concurrent exciton recombination in both QDs layers could result in the low performance and could not realize the white light as displayed in the inset of Fig. S2(a).

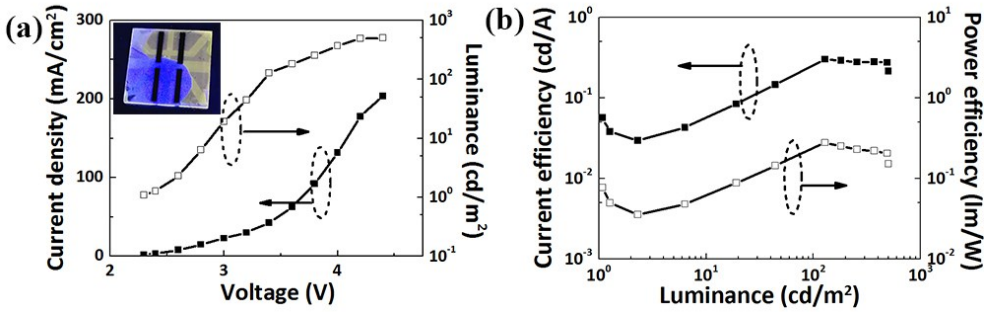

Fig. S2 (a) Current density and luminance versus driving voltage. Inset shows the device without ZnO buffer layer under UV light (b) Current efficiency and power efficiency versus luminance of the QLED without inserting ZnO buffer layer.

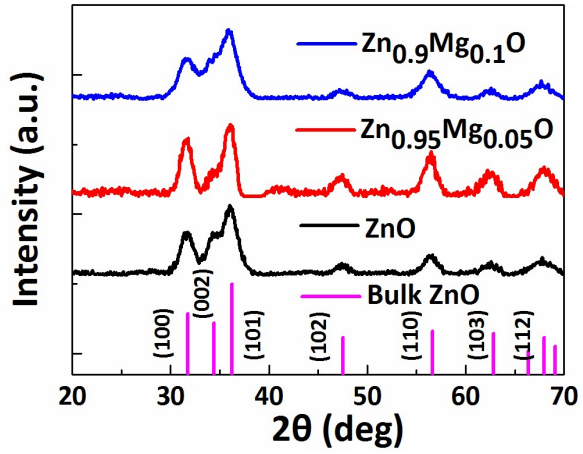

Fig. S3 XRD spectrum of a series of Zn_{1-x} Mg_xO (x=0, 0.05, 0.1).

The AFM of PEDOT: PSS / TFB/ Y-QDs / ZnO/ B-QDs, PEDOT: PSS / TFB/ Y-QDs / ZnO/ B-QDs / ZnO, PEDOT: PSS / TFB/ Y-QDs/ ZnO/ B-QDs/ $Zn_{0.95}Mg_{0.05}O$ and PEDOT: PSS / TFB/ Y-QDs / ZnO/ B-QDs / $Zn_{0.9}Mg_{0.1}O$ have been measured as displayed in Fig. S4. The root-mean square (RMS) roughness (R_q) of these four samples are 2.02, 2.31, 2.36, 2.47 nm. It can be found that the film roughness does change slightly between ZnO and $Zn_{1-x}Mg_xO$(x=0.05, 0.1), maybe due to the similar size of ZnO and $Zn_{1-x}Mg_xO$(x=0.05, 0.1) NPs.

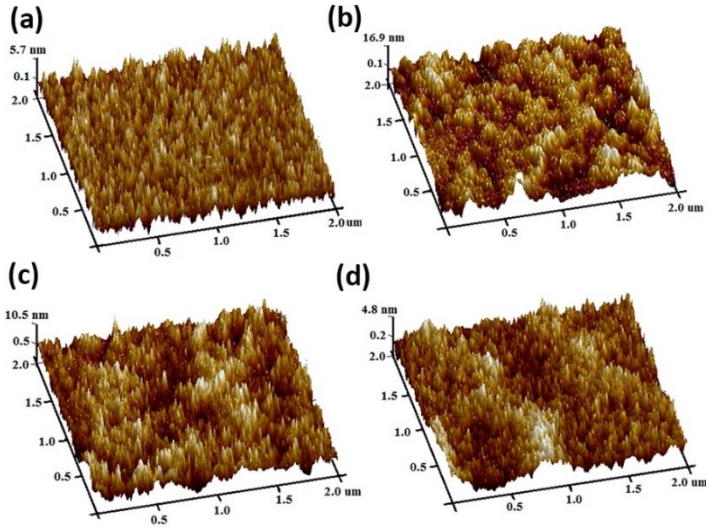

Fig. S4 AFM image of (a) PEDOT: PSS/ TFB/ Y-QDs / ZnO/ B-QDs, (b) PEDOT: PSS / TFB/ Y-QDs / ZnO/ B-QDs / ZnO, (c) PEDOT: PSS / TFB/ Y-QDs / ZnO/ B-QDs / $Zn_{0.95}Mg_{0.05}O$ and (d) PEDOT: PSS / TFB/ Y-QDs / ZnO/ B-QDs / $Zn_{0.9}Mg_{0.1}O$.