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Electronic Supplementary Information (ESI)

Electric dipole modulation for boosting carrier recombination in green InP QLEDs under strong electron injection

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Table S1. Parameter information of functional layers used in simulations

Functional layers	HOMO (eV)	LUMO(eV)	Carrier mobilities (cm^2 V s^{-1})
PEDOT:PSS	-5.2	-4.7	7.0×10^{-3} for holes
MoO_3	-9.7	-6.7	8×10^{-6} for holes
PVK	-5.8	-2.2	1.6×10^{-6} for holes
Green InP/ZnS QDs			
ZnMgO	-7.6	-3.6	1.0×10^{-3} for electrons
ZnO	-7.5	-4.0	4.0×10^{-3} for electrons

The parameter information of functional layers is based on the data recognized in the literature [1-3] and others of them are based on the preset parameters in *Setfos* software.

Table S2. Lifetime of green InP QLEDs with different ETL (ZnMgO and ZnO) and with/without MoO_3 interlayer.

Devices designations	T_{50} @ 1000 cd m^{-2} (h)	T_{50} @ 100 cd m^{-2} (h)
ZnO	0.25	15.77
ZnMgO	0.75	47.31
ZnO with MoO_3	1.65	104.09
ZnMgO with MoO_3	4.45	280.75

We conducted the lifetime measurements with the initial luminance of 1000 cd m^{-2} under the constant current condition. Then, we calculated the lifetime of 100 cd m^{-2} initial luminance according to the following equations and the general aging coefficient of 1.8.

$$T_{50} = (L_0/100)^n\,T$$

Where the L_0 is the initial brightness of 1000 cd m^{-2} in this work, n is the general aging coefficient of 1.8, and T is the time taken for the actual brightness to decay to 50% of the initial brightness.

Table S3. Evaporation conditions of MoO_3 films with different thicknesses

No.	Average thickness (nm)	Average evaporation rate (nm s^{-1}) [a]	Time (s)
1	0.1	0.01	11
2	0.3		32
3	0.5		55
4	0.7		73
5 [b]	100.0	0.01	9381

[a] The average evaporation rate is an average value calculated by the built-in system of the evaporation equipment according to the crystal oscillator vibration frequency. The fluctuation of evaporation rate leads to the film thickness not completely equal to the product of the evaporation rate and the time.

[b] In order to ensure that the film can be evaporated at the low average rate, we have evaporated a film of 100nm for an extended time.

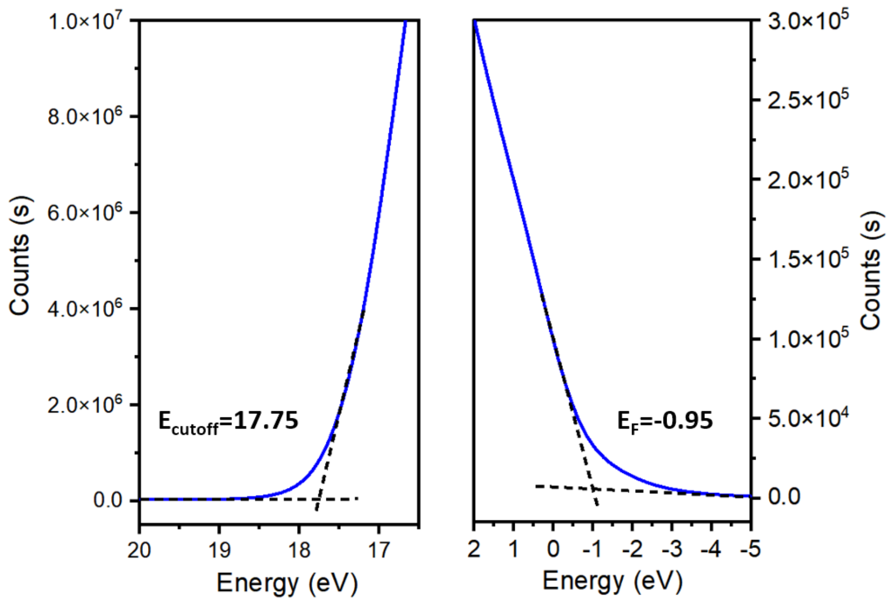

Figure S1†. UPS spectra of secondary-electron cutoff and Fermi edge regions (right) of green InP/ZnS QDs.

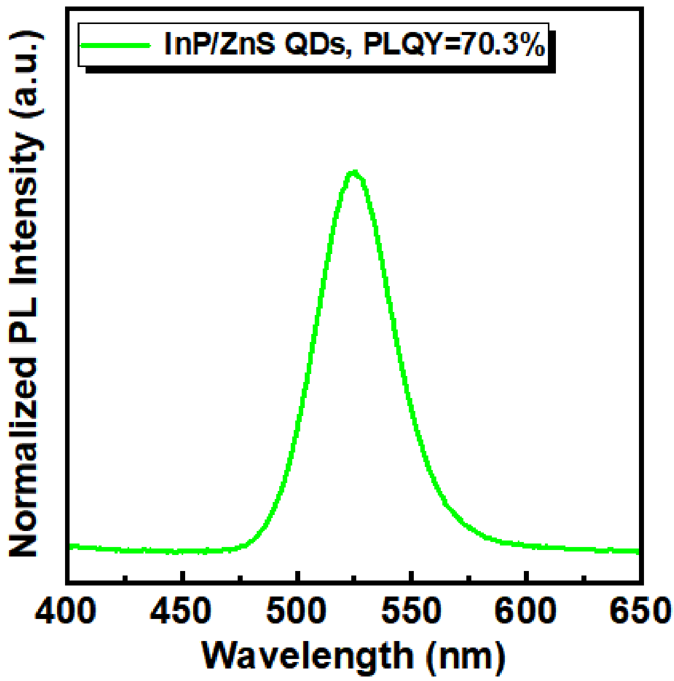

Figure S2†. The photoluminescence (PL) spectra of green InP/ZnS QDs solution.

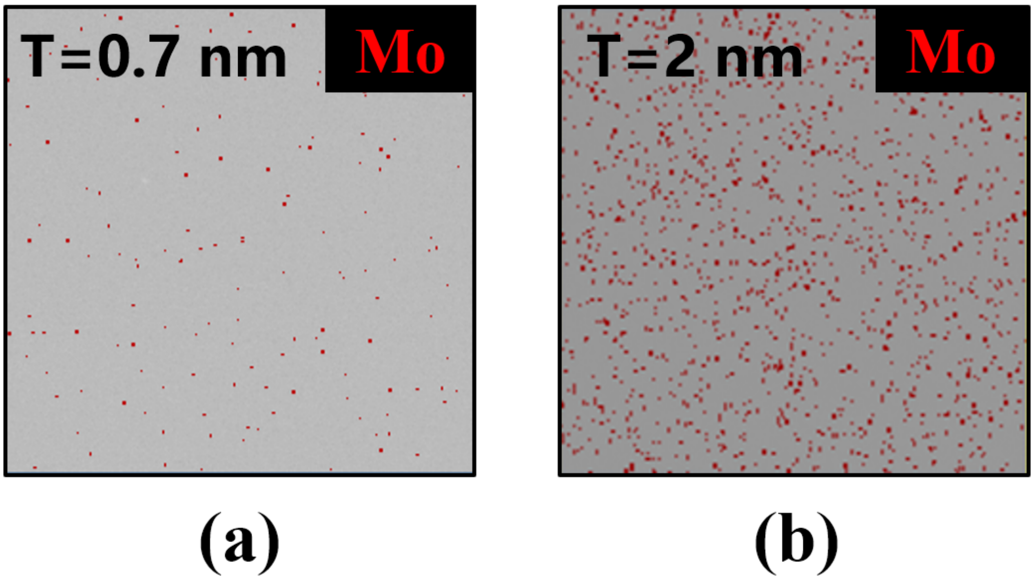

Figure S3†. EDS compositional mapping images (top view) for ITO/PEDPT:PSS modified with different average thicknesses of MoO_3 layer: (a) 0.7 nm, (b) 2 nm.

Reference

1. H. Moon, W. Lee, J. Kim, D. Lee, S. Cha, S. Shin, and H. Chae, *Chem. Commun.*, 2019, **55**, 13299-13302. (**Ref. 23**)
2. Q. Su, H. Zhang, and S. M. Chen, *Appl. Phys. Lett.*, 2020, **117**.(**Ref. 26**)
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