

Supporting Information

Enhancing Efficiency and Stability of ZnSe Pure Blue Quantum Dot Light-Emitting Diodes via Ionic Liquid Doping

Lihua Lin^{1,2}, Xiaoxue Ye¹, Zhiqi Luo¹, Weiguo Chen¹, Tailiang Guo^{1,2}, Hailong Hu^{1,2},
and Fushan Li^{1,2*}

¹Institute of Optoelectronic Technology, Fuzhou University, Fuzhou 350002, China;

²Fujian Science and Technology Innovation Laboratory for Optoelectronic

Information of China, Fuzhou 350108, P. R. China.

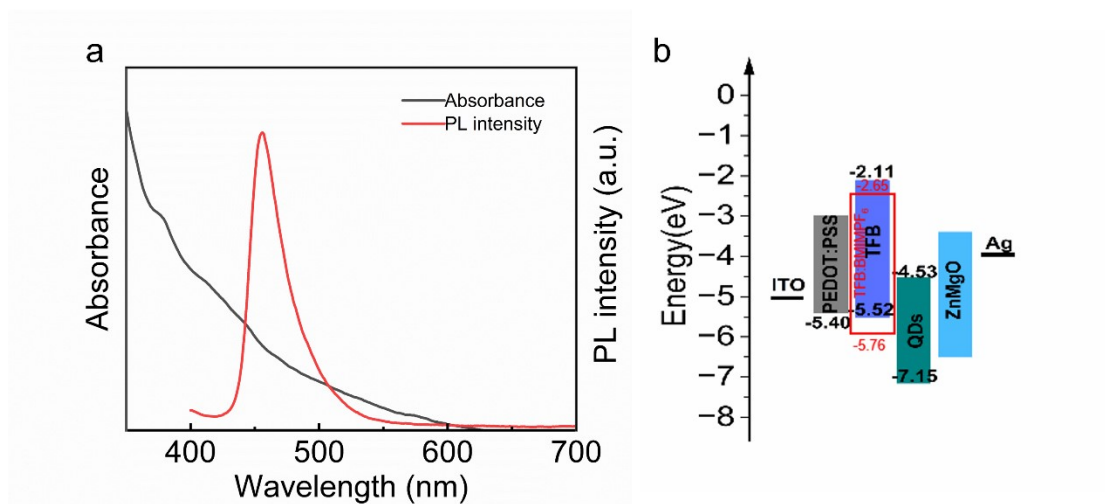


Fig. S1 (a) Absorbance and PL of QDs. (b) Energy level diagram of QLEDs with IL treated TFB.

The PL peak centered of QDs(ZnSe/ZnS) at 456 nm and the FWHM is 33 nm.

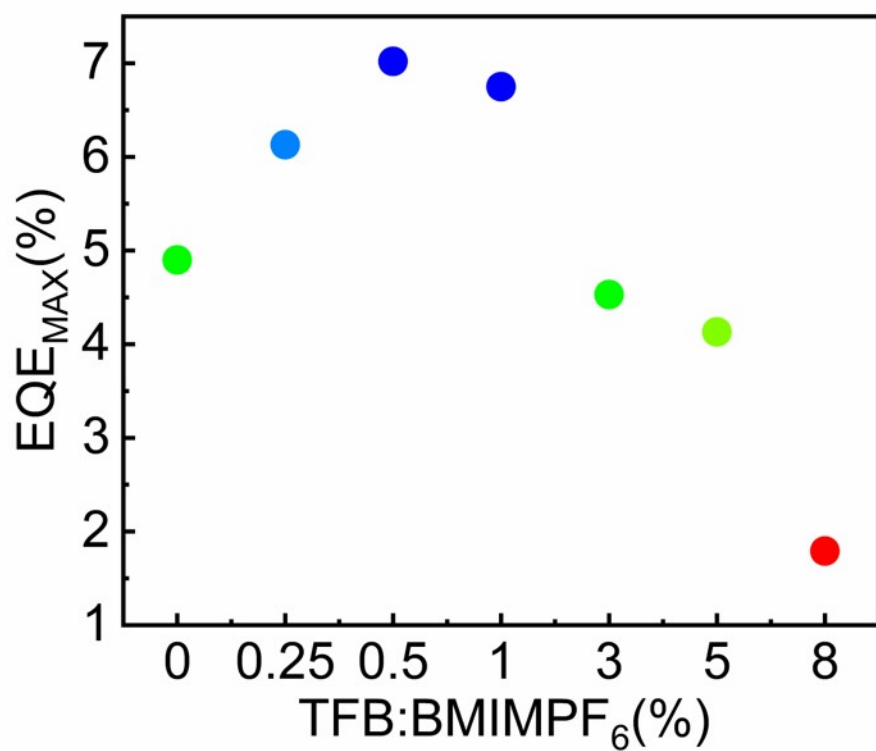


Fig. S2 Different doping concentrations characteristics of EQEs of the QLEDs with the TFB HTLs including the BMIMPF₆ treated ones.

Doping different concentrations characteristics of maximum EQEs of the QLEDs is 4.90%, 6.13%, 7.02%, 6.75%, 4.53%, 4.13% and 1.79%, respectively.

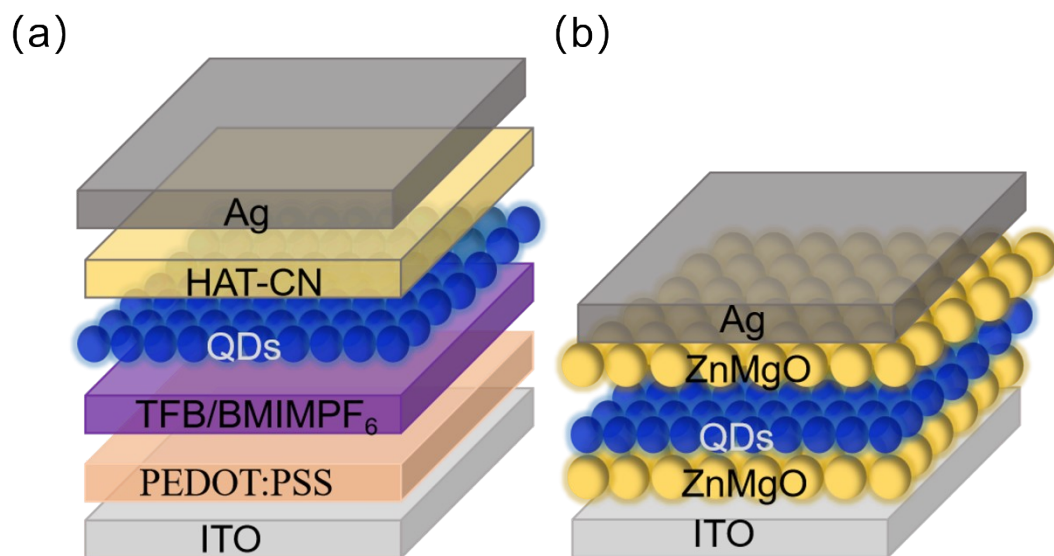


Fig. S3 Device structure of the (a) hole-only and (b) electron-only devices.

Device structure of the hole-only device is ITO/PEDOT:PSS/TFB/QDs/HAT-CN/Ag. Device structure of the electron-only device is ITO/ZnMgO/QDs/ZnMgO/Ag.

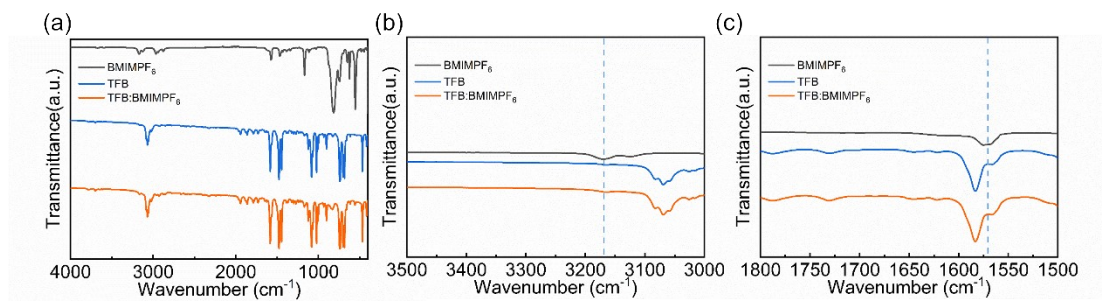


Fig. S4 Fourier-transform infrared (FTIR) spectra of BMIMPF₆ ionic liquid (IL) and TFB.

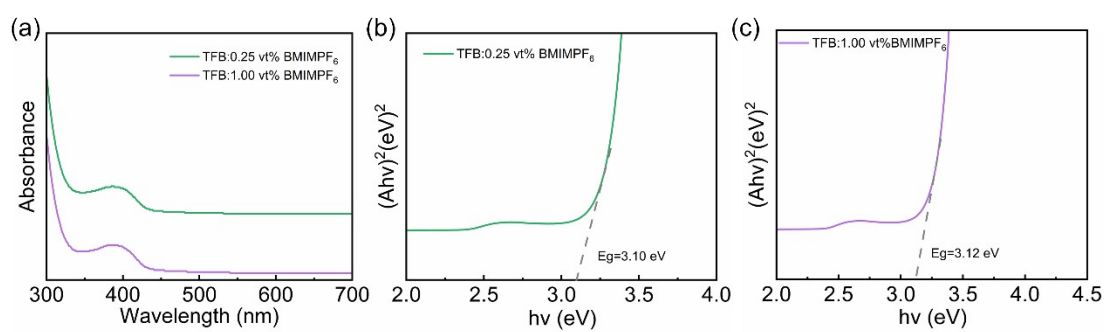


Fig. S5 (a) Absorbance of TFB:0.25%BMIMPF₆ and TFB:1.00%BMIMPF₆ films. Tauc plots of (b) the TFB:0.25%BMIMPF₆ films and (d) the TFB:1.00%BMIMPF₆ films.

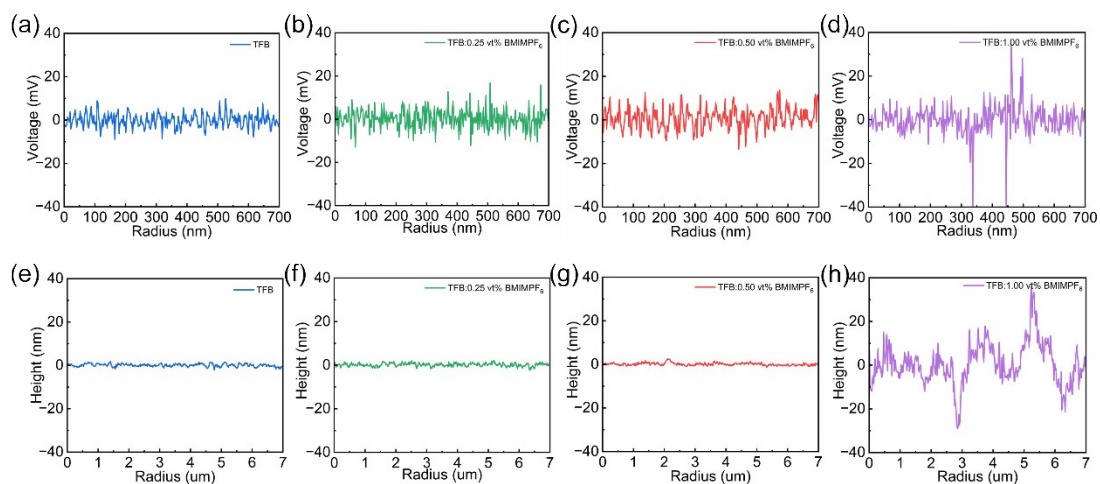


Fig. S6 Surface potentials of a) the TFB films, b) the TFB:0.25%BMIMPF₆ films, c) the TFB:0.50%BMIMPF₆ films and d) the TFB:1.00%BMIMPF₆ films. Surface morphologies of e) the TFB films, f) the TFB:0.25%BMIMPF₆ films, g) the TFB:0.50%BMIMPF₆ films and h) the TFB:1.00%BMIMPF₆ films.

Table S1: A list of the performance of QLEDs.

	Turn-on	Driving	Maximum	Maximum	EQE (%)	EQE (%) /
	voltage (Von)	voltage (V) @	current	EQE (%) @	@100 cd m-2	Luminance
	@ 1 cd m-2	100 cd m-2	efficiency (cd	(Luminance		(cd m-2) @ 9V
			A-1)	(cd m-2))		
TFB	5.2	7.6	5.40	4.90 @ 277	4.39	4.40/733
TFB with	5.4	6.8	6.19	6.13 @ 1029	2.50	5.91/1670
0.25%						
BMIMPF ₆						
TFB with	5.2	7.0	7.09	7.02 @ 486	5.34	6.52/1305
0.50%						
BMIMPF ₆						
TFB with	5.0	6.8	6.79	6.75 @ 966	3.85	6.58/1440
1.00%						
BMIMPF ₆						

Table S2: A list of the resistance and capacitance in the equivalent circuit of corresponding Nyquist plots.

	R(Ω)	R_{tr}(Ω)	CPE1(F)	R_{rec}(Ω)	CPE2(F)
TFB	185	3.83 e ⁴	8.104 e ⁻⁹	4.323 e ⁶	2.559 e ⁻⁹
TFB with	283.9	3.285 e ⁵	1.746 e ⁻⁶	8843	2.927 e ⁻⁹
0.50%					
BMIMPF₆					