

Supplementary Information

Defect Passivation and Electron Band Energy Regulation of ZnO Electron Transport Layer through a Synergetic Bifunctional Surface Engineering for Efficient Quantum Dot Light-Emitting Diodes

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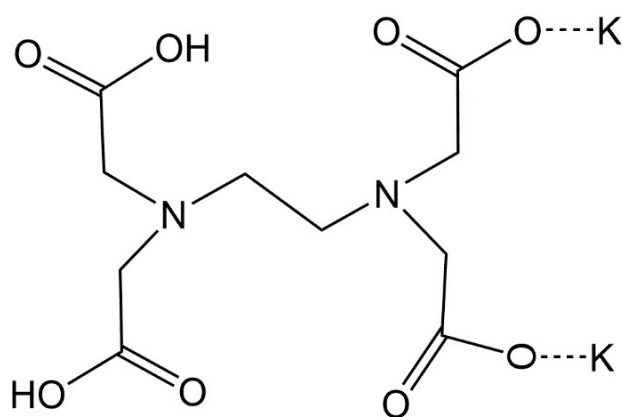


Fig. S1 Molecular structures of EDTAK.

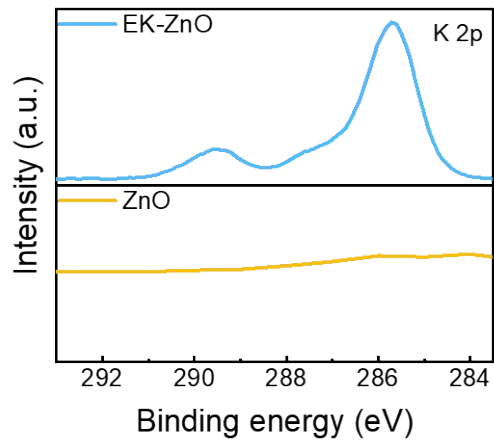


Fig. S2 XPS spectra of K 2p.

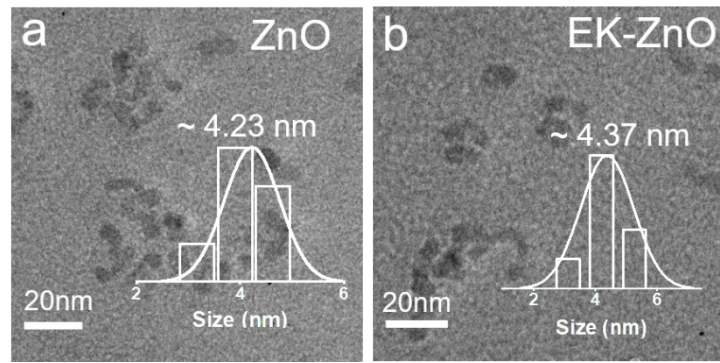


Fig. S3 TEM images of ZnO and EK-ZnO NPs. Insets, corresponding size distribution histogram.

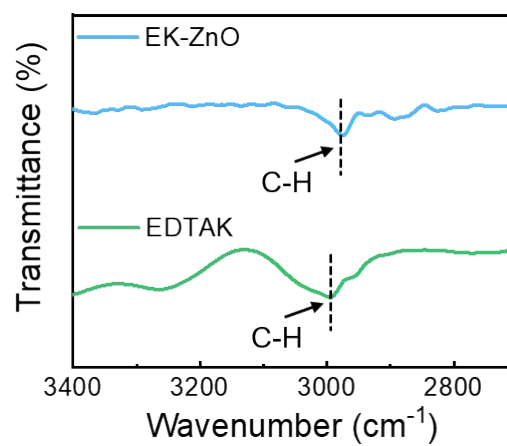


Fig. S4 FTIR of EDTAK and EK-ZnO NPs.

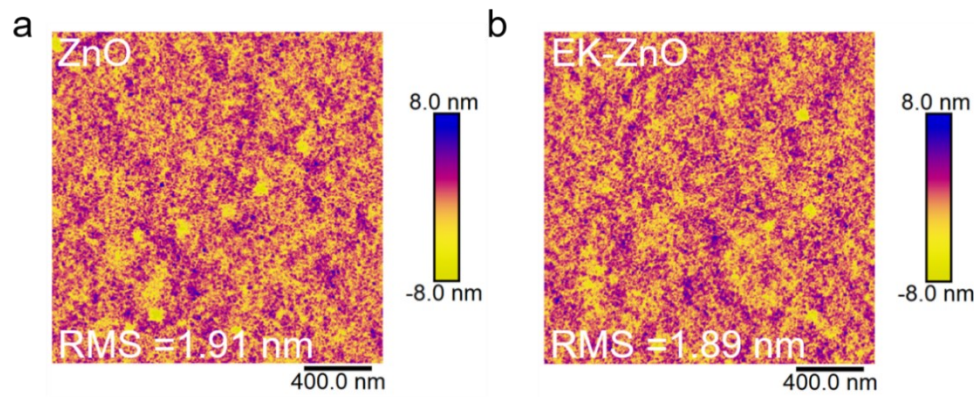


Fig. S5 AFM images of ZnO and EK-ZnO films on glass substrate.

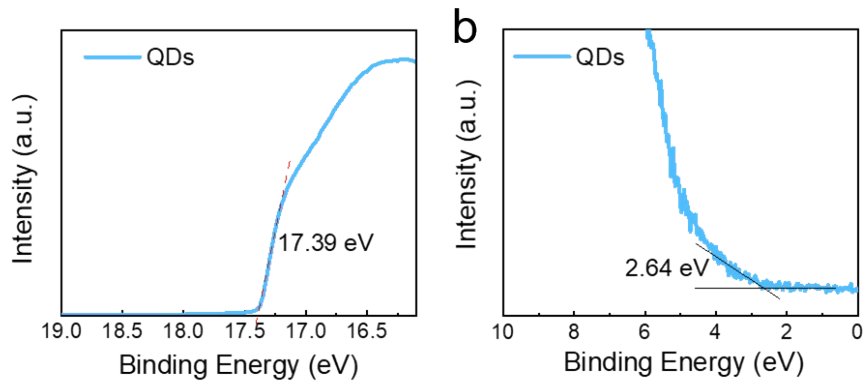


Figure S6. UPS spectra of QDs film on ITO.

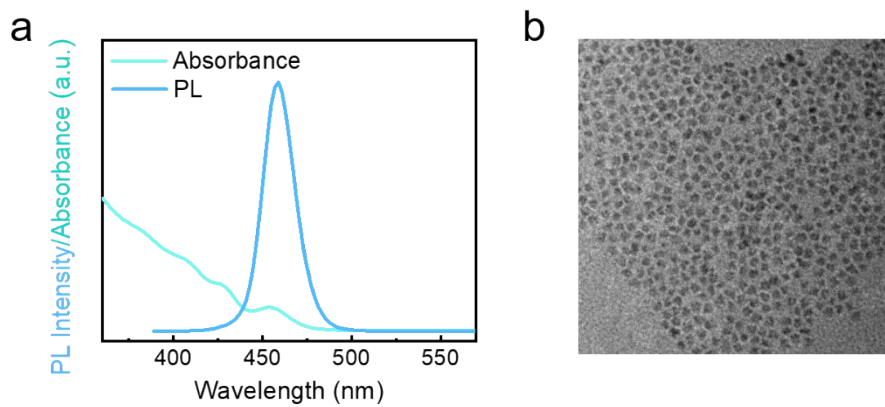


Fig. S7 (a) UV-vis absorption and PL spectra of the CdSe/ZnSe/ZnS QDs. (b) TEM image of CdSe/ZnSe/ZnS QDs.

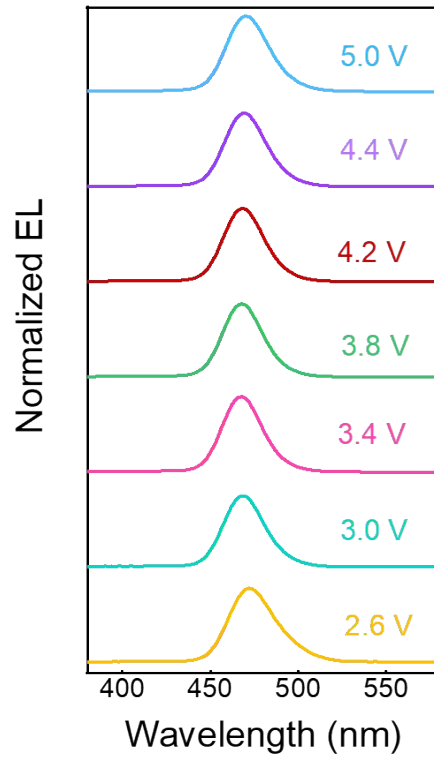


Fig. S8 EL spectra of the QLED with EK-ZnO under an applied voltage of 3.0-5.0 V.

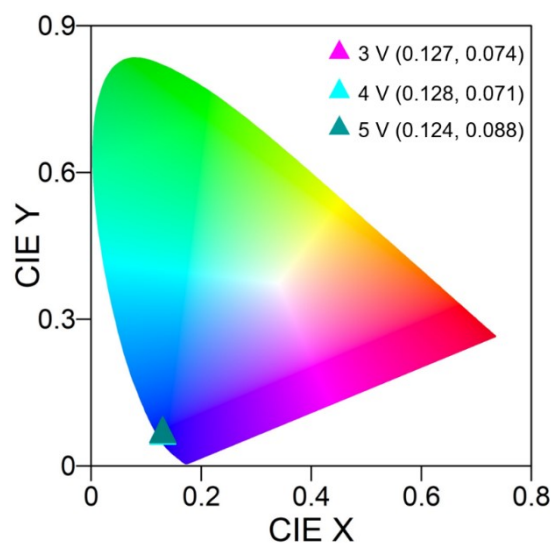


Fig. S9 CIE coordinates of QLEDs based on EK-ZnO ETL under an applied voltage of 3.0-5.0 V.

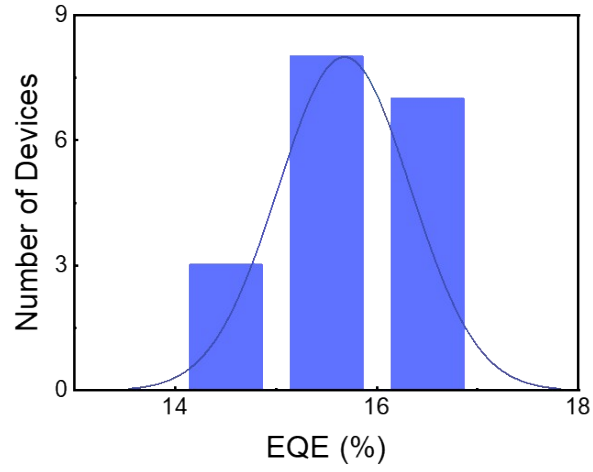


Fig. S10 EQE histogram of 18 devices based on EK-ZnO ETL. The fitting curve is a distribution function curve.

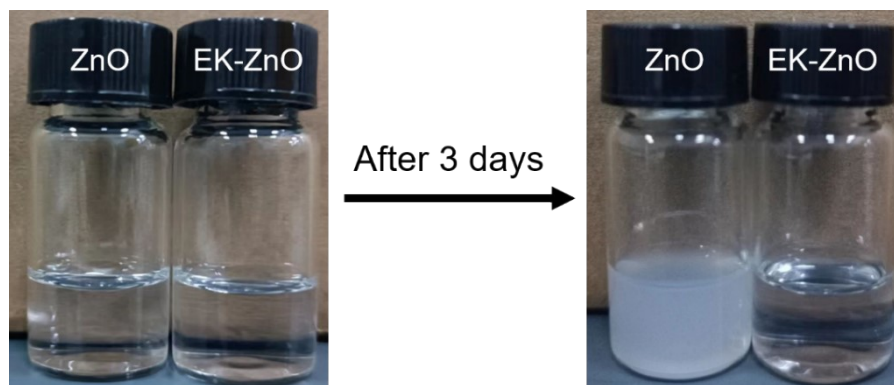


Fig. S11 Photo-graphs of ZnO and EK-ZnO nanoparticle solutions in air.

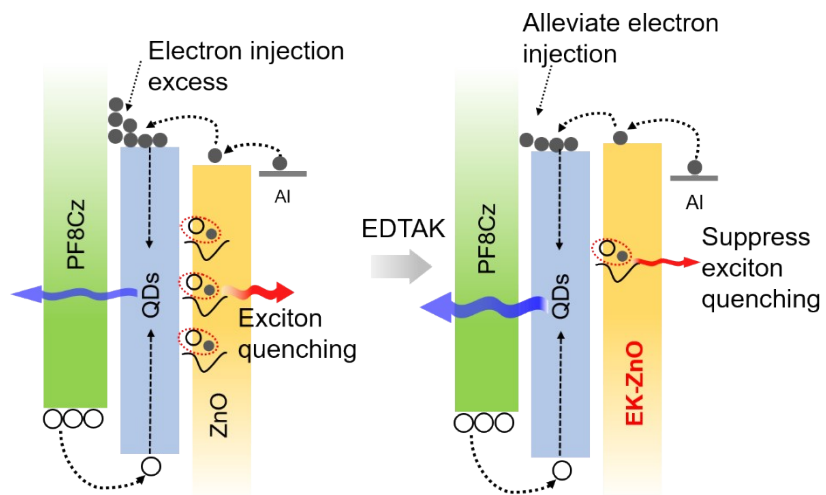


Fig. S12 Schematic of performance enhancement for devices with primordial ZnO and additives-treatment ZnO films.

Table S1 Kinetic parameters obtained from TRPL spectra of Blue QDs deposited on Various substrates.

	τ_1 (ns)	A_1 (%)	τ_2 (ns)	A_2 (%)	τ_{avg} (ns)
Quartz/QDs	0.67	17.17	6.96	82.83	5.88
Quartz/QDs/ZnO	0.67	30.55	5.97	69.45	4.35
Quartz/QDs/EK-ZnO	0.71	23.88	6.52	76.12	5.13

Table S2 Detailed parameters extracted from the UPS and absorption spectra for ZnO and EK-ZnO films.

	Eonset (eV)	Ecutoff (eV)	WF (eV)	VBM (eV)	Eg (eV)	CBM (eV)
ZnO	3.69	17.42	3.80	7.49	3.52	3.97
EK-ZnO	3.65	17.69	3.53	7.18	3.49	3.69