

Supporting Information

High-Performance Quantum Dot Light-Emitting Diodes Based on Al-Doped ZnO Nanoparticles Electron Transport Layer

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Supporting Information: enlarged XRD view; absorption spectra; detailed energy characteristics; O1s XPS spectra; defect emission spectra; summarized components of the three-exponential fitting curves; current density and luminance versus voltage, CE versus current density, and EQE versus current density characteristics; histogram of maximum CEs; lifetime curves of the green QLEDs

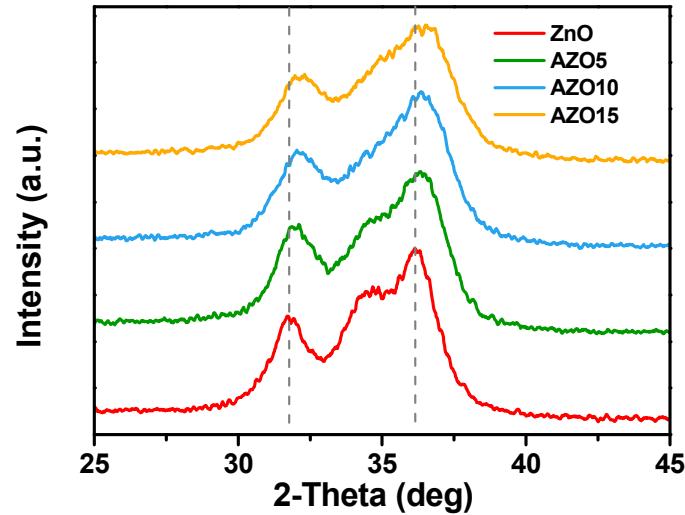


Figure S1. Enlarged XRD view for the range 25~45°.

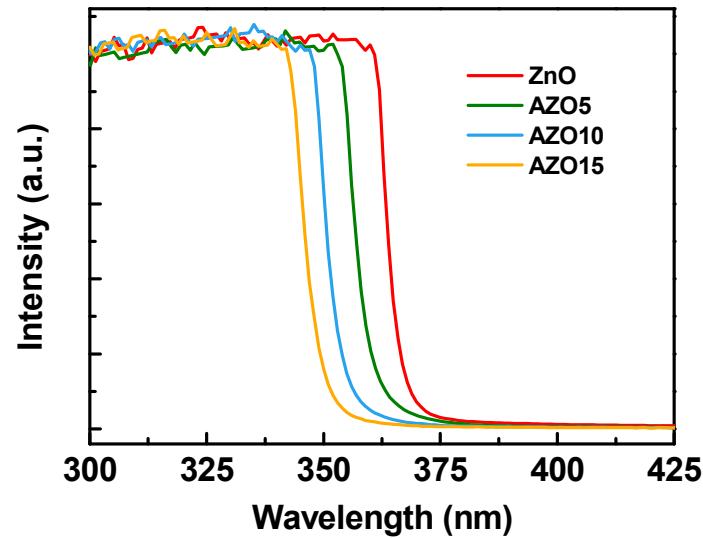


Figure S2. The absorption spectra of ZnO, AZO5, AZO10 and AZO15 films.

Table S1. Detailed energy characteristics of ZnO, AZO5, AZO10 and AZO15 NPs

Film	Secondary cut-off (eV)	WF (eV)	Valence band onset (eV)	VBM (eV)	E_g (eV)	CBM (eV)
ZnO	17.73	3.47	3.96	7.43	3.40	4.03
AZO5	17.80	3.40	3.99	7.39	3.46	3.93
AZO10	17.89	3.31	4.09	7.40	3.52	3.88
AZO15	18.00	3.20	4.23	7.43	3.57	3.86

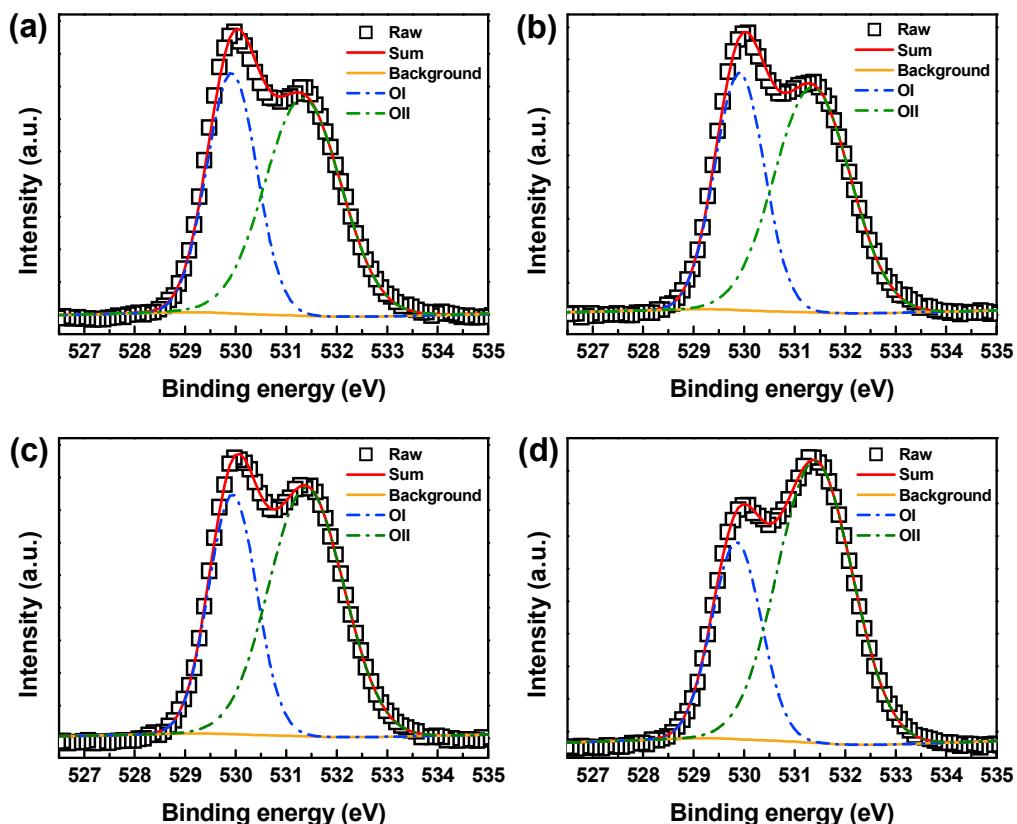


Figure S3. The O1s XPS spectra of (a) ZnO, (b) AZO5, (c)AZO10 and (d)AZO15 films.

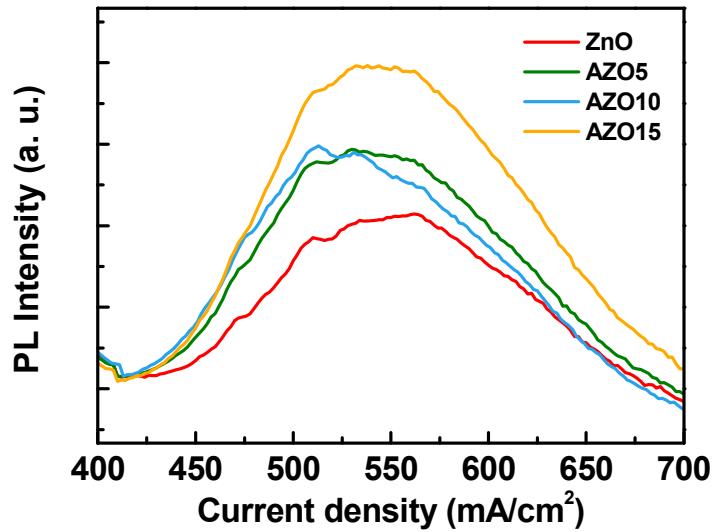


Figure S4. The defect emission spectra of ZnO, AZO5, AZO10 and AZO15 NPs.

Table S2. Summarized components of the three-exponential fitting curves of QD emission in QDs, QDs/ZnO, QDs/AZO5, QDs/AZO10 and QDs/AZO15

	QD	QD/ZnO	QD/AZO5	QD/AZO10	QD/ AZO15
τ_1	1.13	0.68	0.74	0.78	0.72
(ratio %)	(7.08)	(29.75)	(32.95)	(20.53)	(19.93)
τ_2	3.96	2.60	2.65	2.87	2.71
(ratio %)	(79.87)	(65.48)	(63.30)	(74.55)	(75.98)
τ_3	8.01	7.78	8.82	7.81	8.36
(ratio %)	(13.05)	(4.77)	(3.75)	(4.91)	(4.09)

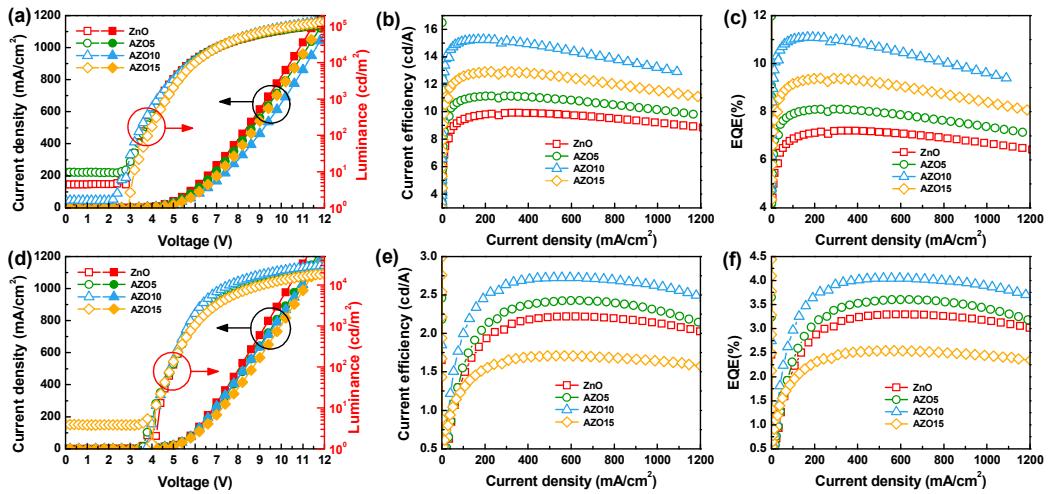


Figure S5. Current density and luminance versus voltage, CE versus current density, and EQE versus current density characteristics of the (a) (b) (c) R-QLEDs and (d) (e) (f) B-QLEDs, respectively.

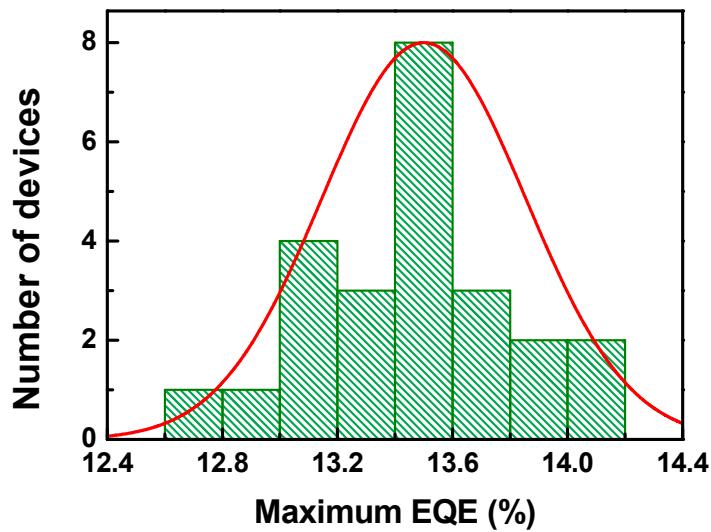


Figure S6. Histogram of maximum CEs of 24 tandem G-QLEDs from different batches.

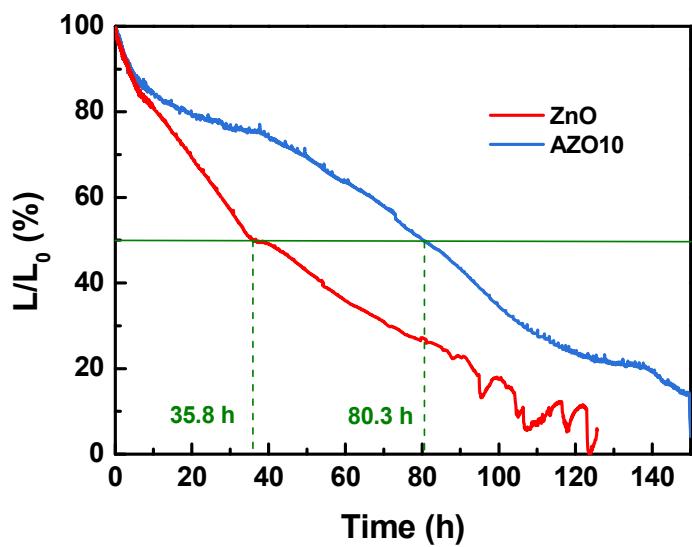


Figure S7. Lifetime curves of the green QLEDs based on ZnO and AZO10 ETLs.