

Supporting Information

Bottom-Up Synthesized Carbon Nitride Quantum Dots- Based Light-Emitting Diode

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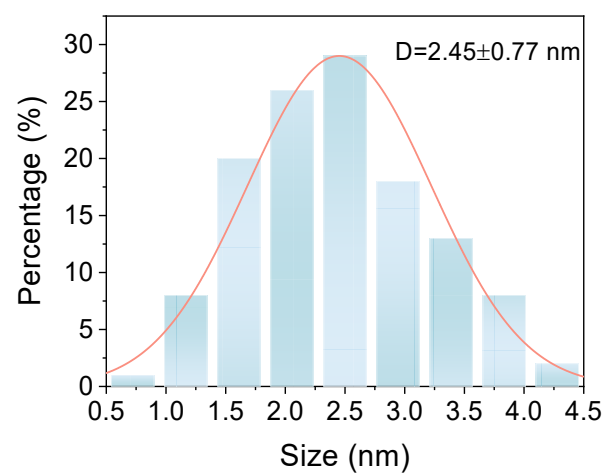


Figure S1. The size distribution histogram of CNQDs.

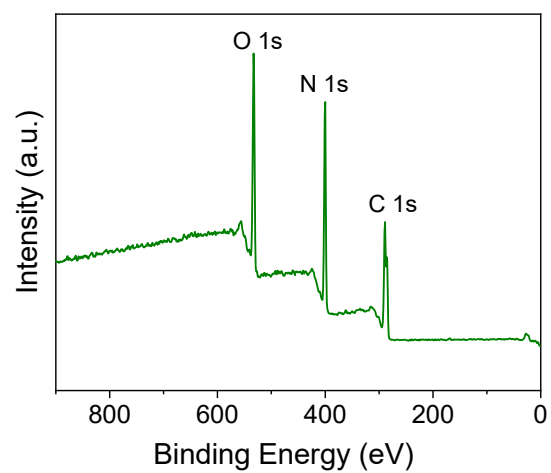


Figure S2. Full-range XPS spectrum of CNQDs.

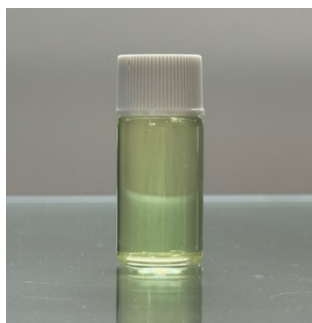


Figure S3. The photo of the QDs solution after storage for six months.

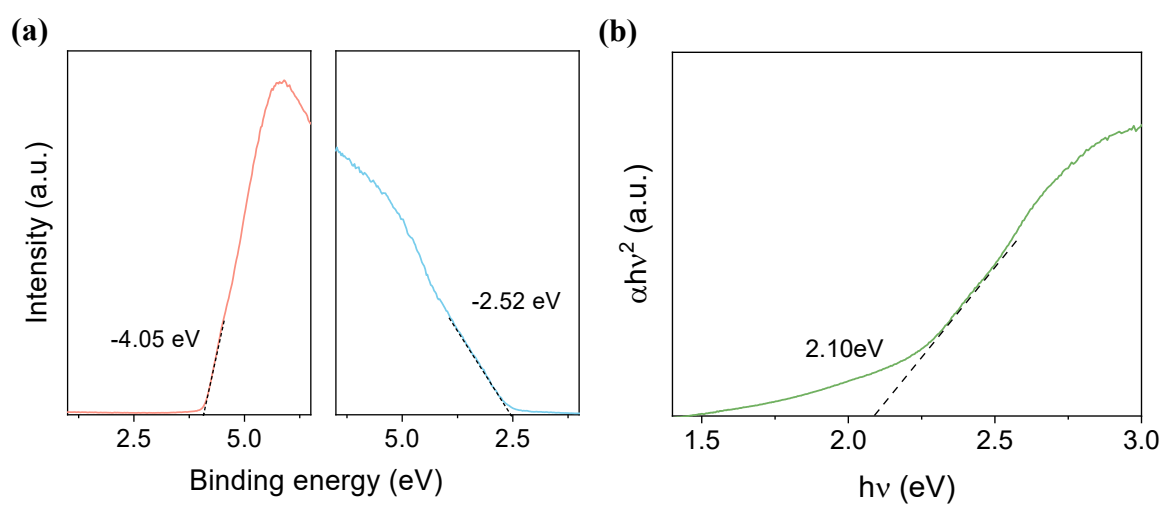


Figure S4. (a) Tauc plots of CNQDs. (b) UPS spectra of CNQDs. The HOMO and LUMO are calculated to be about -6.57 and -4.47 eV.

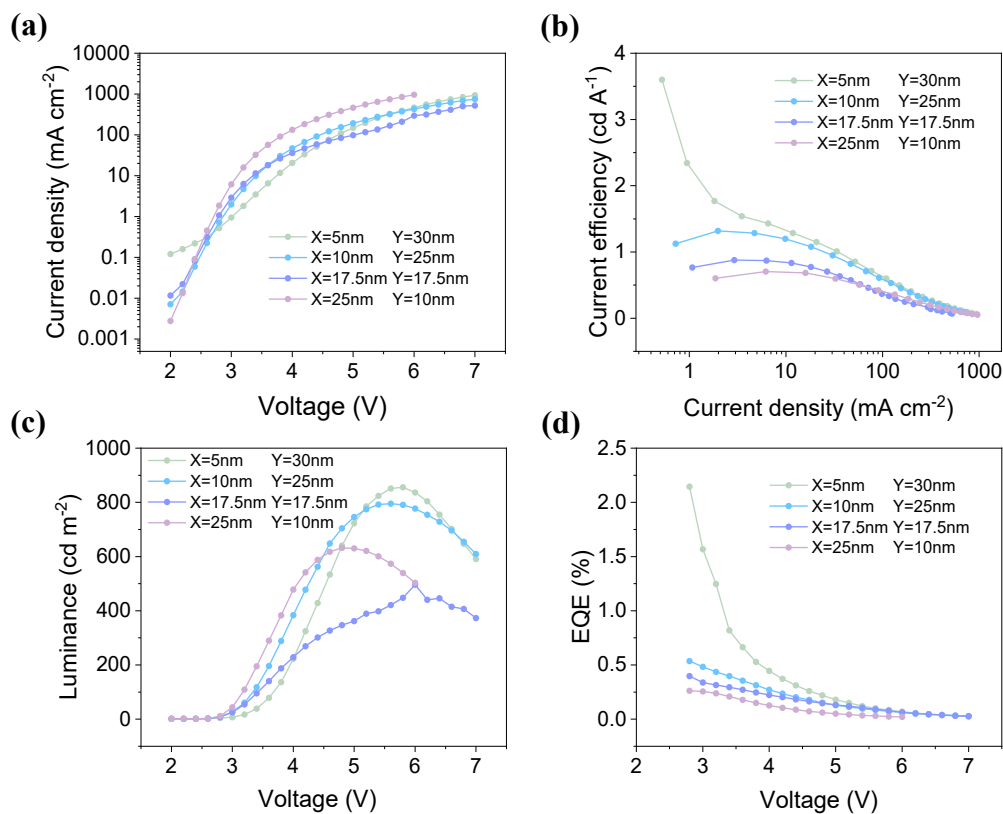


Figure S5. (a) Current density-voltage curves of CNQDs-LEDs. (X denotes the thickness of TpPyPB layer, Y denotes the thickness of B3PYMPM layer). (b) Current efficiency-current density curves, (c) luminance-voltage density curves and (d) EQE-voltage density curves of CNQDs-LEDs.

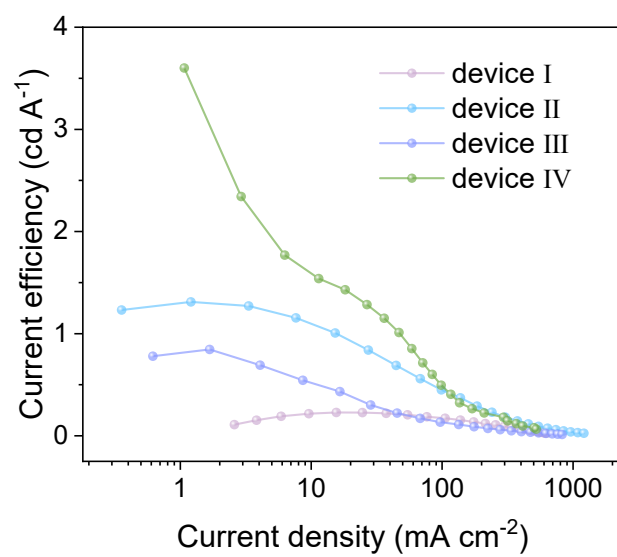


Figure S6. Current efficiency-current density curves of CNQDs-LEDs.

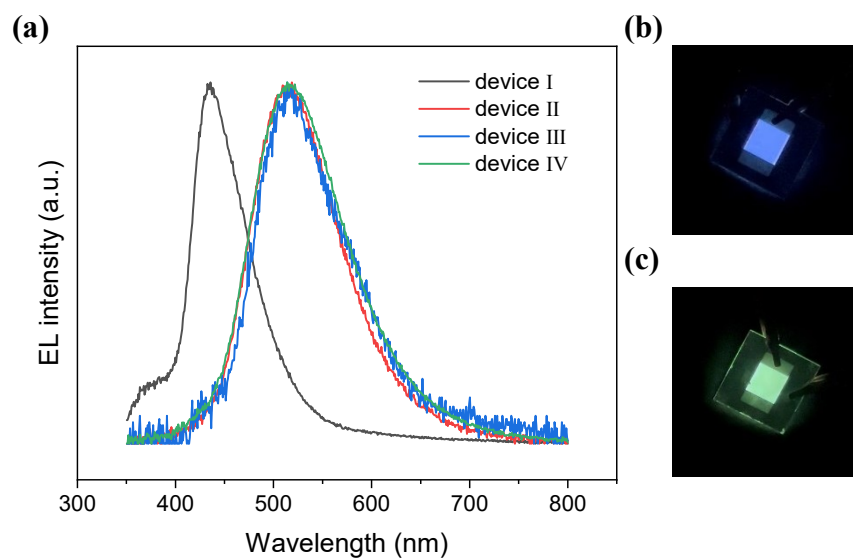


Figure S7. (a) EL spectra of device I, II, III, IV. (b) Photograph of device I under operation.
(c) Photograph of device IV under operation.

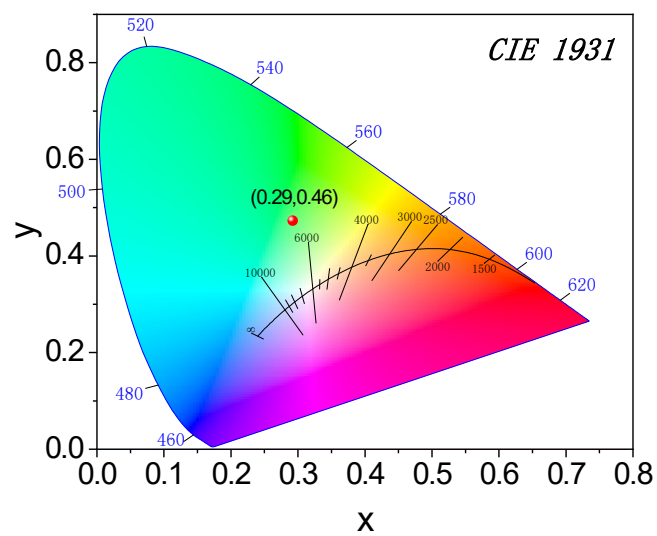


Figure S8. CIE chromaticity coordinates and corresponding color temperatures for device IV.

Table S1. The performance of CNQDs-LEDs devices.

Thickness(nm)		$V_{\text{turn-on}}$	L_{max}	EQE_{max}	CE_{max}
TpPyPB	B3PYMPM	@1 cd m ⁻²	(cd m ⁻²)	(%)	(cd A ⁻¹)
5	30	2.80	855@5.8V	2.14	3.61
15	20	2.80	795@5.6V	0.54	1.32
17.5	17.5	2.80	496@6V	0.40	0.88
25	10	2.80	632@4.8V	0.26	0.70

Table S2. Summary of the performance of reported CNQDs-LEDs devices.

Precursors	Synthesis method	EL peak (nm)	$V_{\text{turn-on}}$ @1 cd m ⁻²	L_{max} (cd m ⁻²)	EQE_{max} (%)	CE_{max} (cd A ⁻¹)	Year
melamine	top-down	427, 513	-	~20@20 V	-	-	2018 ¹
melamine	top-down	438	6 V	605@9V	-	0.09	2019 ²
melamine	top-down	456, 595	-	5@17 V	-	-	2024 ³
urea + malic acid	bottom-up	517	2.8 V	855@5.8V	2.14	3.61	This work

“-” means no report in the literature.

References

- 1 He, L. *et al.* Graphitic C₃N₄ quantum dots for next-generation QLED displays. *Materials Today* **22**, 76-84 (2019).
- 2 He, X. *et al.* One-pot exfoliation of graphitic C₃N₄ quantum dots for blue qleds by methylamine intercalation. *Small* **15**, 1902735 (2019).
- 3 Chen, L. *et al.* Electroluminescent white quantum dot light-emitting diodes based on high pressure synthesis of graphitic C₃N₄ semiconductor. *Carbon* **228**, 119433 (2024).