

## Supporting Information

# Dual Ligands Synergism Strategy for Fabrication of Highly Luminescent FAPbBr<sub>3</sub> Nanocrystal Films and Efficient Electroluminescent Devices

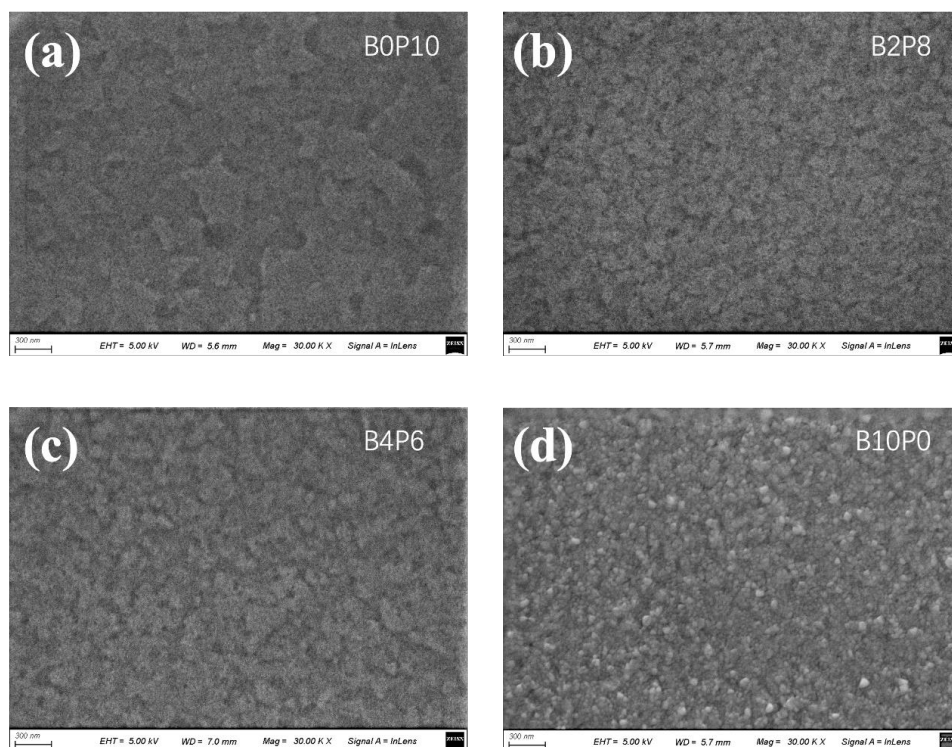
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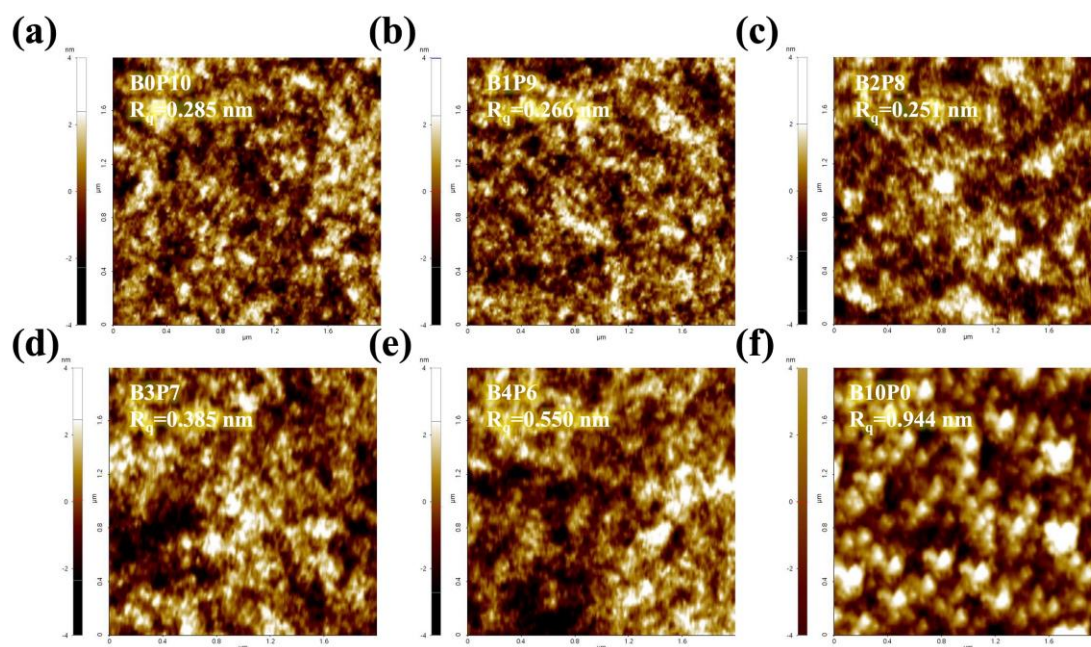
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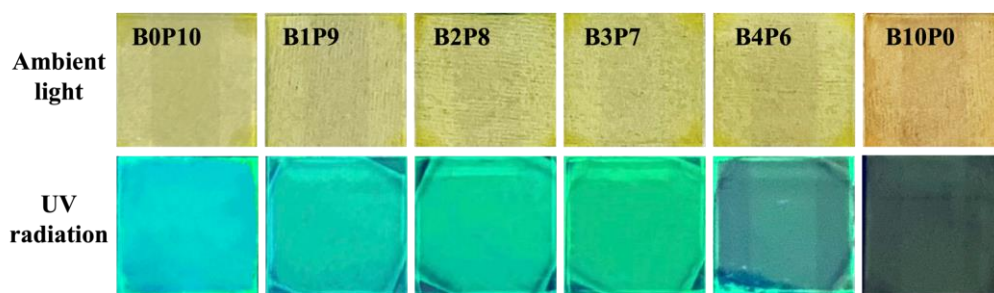
*E-mail address:* [fengzhang@bjut.edu.cn](mailto:fengzhang@bjut.edu.cn) (F. Zhang), [haoyuying@tyut.edu.cn](mailto:haoyuying@tyut.edu.cn) (Y. Hao).



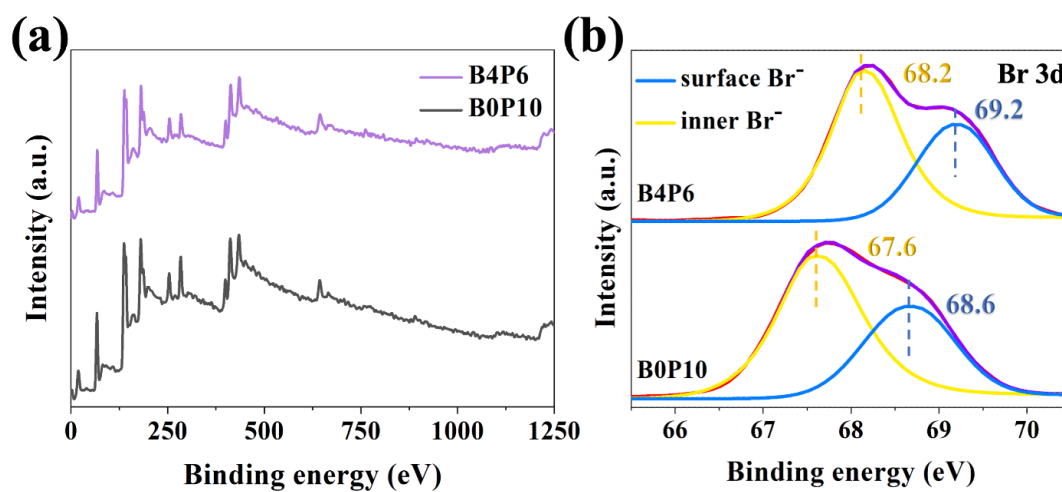
**Figure S1.** SEM images of FAPbBr<sub>3</sub> NC films of B0P10 (a), B2P8 (b), B4P6 (c), and B10P0 (d).



**Figure S2.** AFM images of FAPbBr<sub>3</sub> NC films of B0P10 (a), B1P9 (b), B2P8 (c), B3P7 (d), B4P6 (e) and B10P0 (f).



**Figure S3.** Photographs of FAPbBr<sub>3</sub> NC films with different amount of BZA and PEABr under ambient light and ultraviolet radiation (365 nm).



**Figure S4.** (a) XPS full spectra of B4P6 and B0P10 films. (b) XPS Br-3d spectra of B4P6 and B0P10 films.

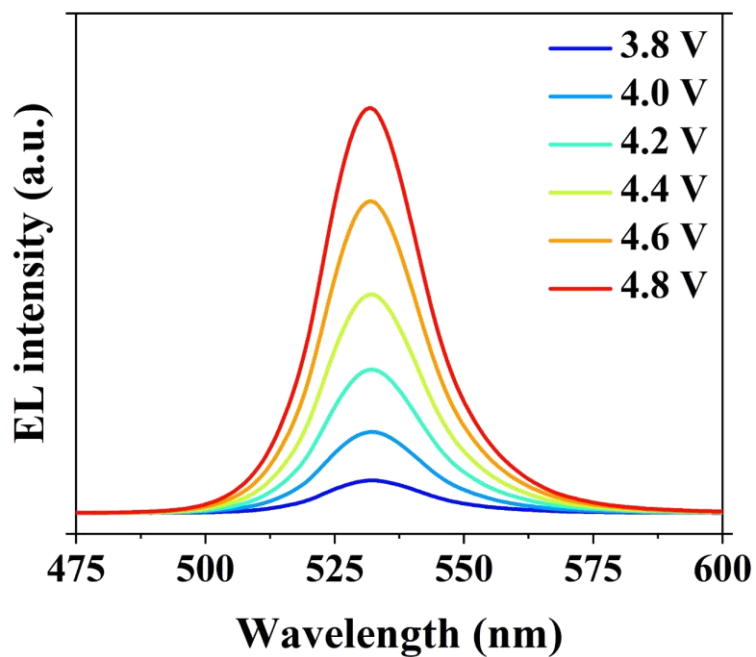


Figure S5. EL spectra of device B2P8 sample at different voltages.

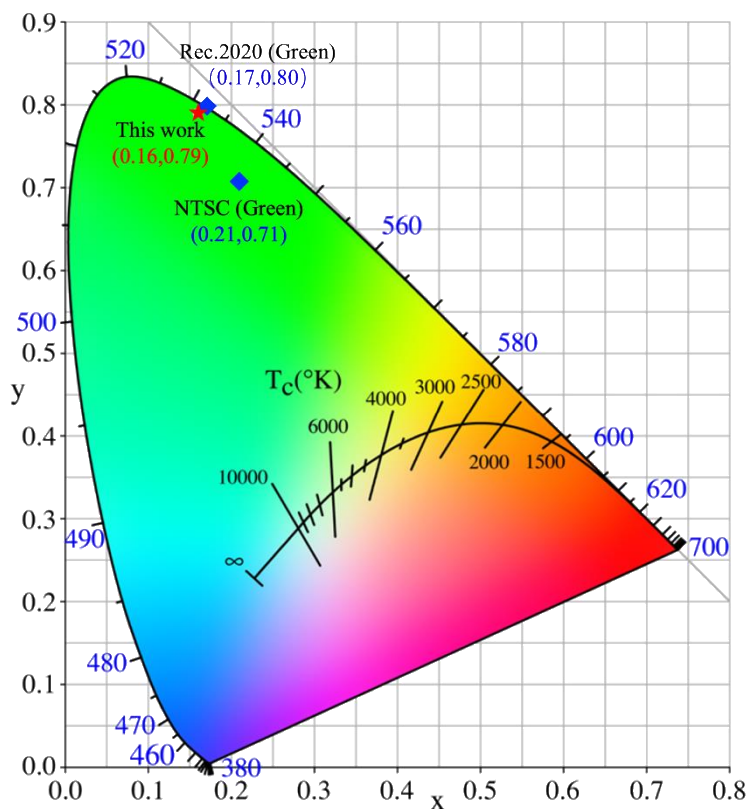
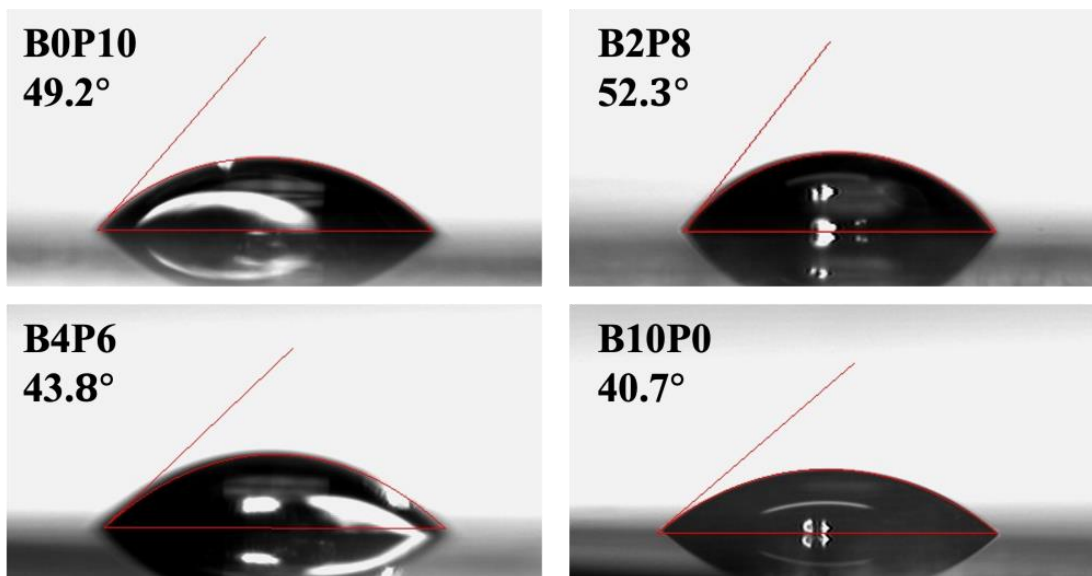
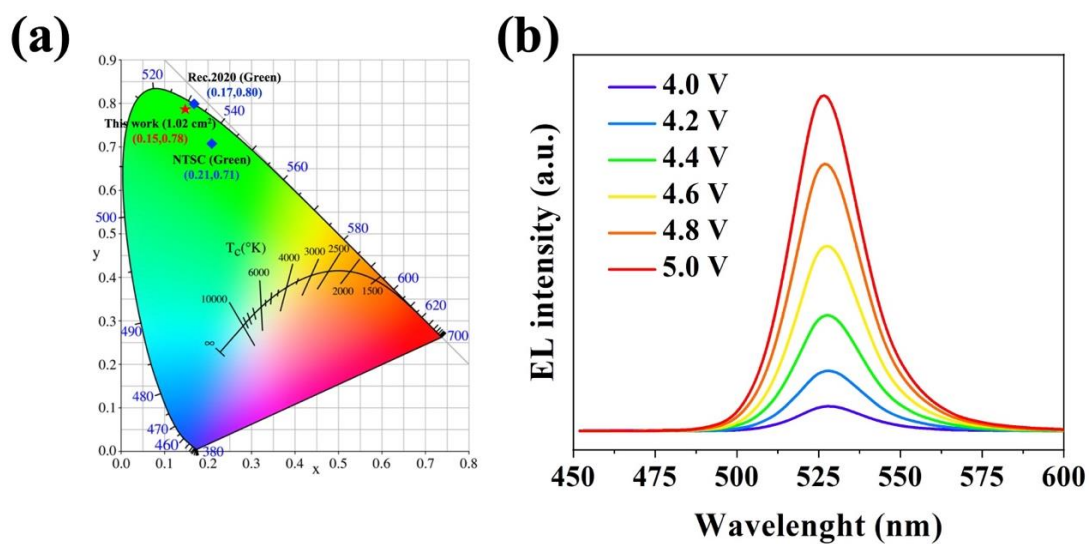


Figure S6. CIE color coordinates of device B2P8 (labeled as blue dot).



**Figure S7.** Photographs of the water contact angle for B0P10, B2P8, B4P6 and B10P0 films.



**Figure S8.** Large area PeLED photoelectric performance. (a) CIE color coordinates for large-area devices (labeled as red dot); (b) EL spectra of large area devices at different voltages.

**Table S1.** Detailed fitting results of FAPbBr<sub>3</sub> NC films with different amount of BZA and PEABr.

The TRPL data was fitted with a tri-exponential function ( $I = \sum_i A_i \exp(-t/\tau_i)$   $i = 1,2,3 \dots$ ). The

average PL lifetime was calculated through the equation ( $\tau_{avg} = \sum_i \frac{A_i \tau_i^2}{A_i \tau_i}$   $i = 1,2,3 \dots$ ).

	$\tau_1$ (ns)	$\tau_2$ (ns)	$\tau_3$ (ns)	$A_1$	$A_2$	$A_3$	$\tau_{avg}$ (ns)
B0P10	1.50	7.99	80.90	0.48	0.38	0.14	14.73
B1P9	1.88	11.12	80.92	0.30	0.41	0.29	28.40
B2P8	2.29	11.12	96.56	0.31	0.38	0.31	35.02
B3P7	2.27	10.01	86.80	0.34	0.46	0.20	22.74
B4P6	1.96	8.83	70.05	0.41	0.43	0.16	16.05
B10P0	0.52	7.24	71.98	0.49	0.37	0.13	12.62

**Table S2.** The maximum luminance, CE, and EQE data of resulted PeLEDs.

	$L_{max}$ (cd)	$CE_{max}$ (cd/A)	$EQE_{max}$
B0P10	1590	14.17	3.68
B1P9	1813	26.34	7.08
B2P8	5813	38.99	9.48
B3P7	6389	32.76	7.41
B4P6	20240	20.71	4.69

**Table S3.** The series resistance ( $R_s$ ), recombination resistance ( $R_{rec}$ ), and low-frequency capacitance

( $C_{LF}$ ) data of PeLEDs.

	$R_s$	$C_{LF}$ ( $10^{-9}$ )	$R_{rec}$
B0P10	38.05	5.706	11249
B1P9	32.6	5.449	9402
B2P8	52.26	23.28	6825
B3P7	33.29	5.398	7946
B4P6	32.05	7.244	13917
B10P0	97.76	6.333	23936

**Table S4.** The device structure of single carrier devices.

		Device structure
Single electron Devices	B0P10	ITO/TPBi/PVK/TPBiAl
	B2P8	ITO/TPBi/PVK/TPBi/Al
Single Hole Devices	B0P10	ITO/PEDOT:PSS/PVK/PTAA/Al
	B2P8	ITO/PEDOT:PSS/PVK/PTAA/Al