



## Supporting Information

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Realizing High Brightness Quasi-2D Perovskite Light-Emitting Diodes with Reduced Efficiency Roll-Off via Multifunctional Interface Engineering

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## Supporting Information

### **Realizing High Brightness Quasi-2D Perovskite Light-Emitting Diodes with Reduced Efficiency Roll-Off via Multifunctional Interface Engineering**

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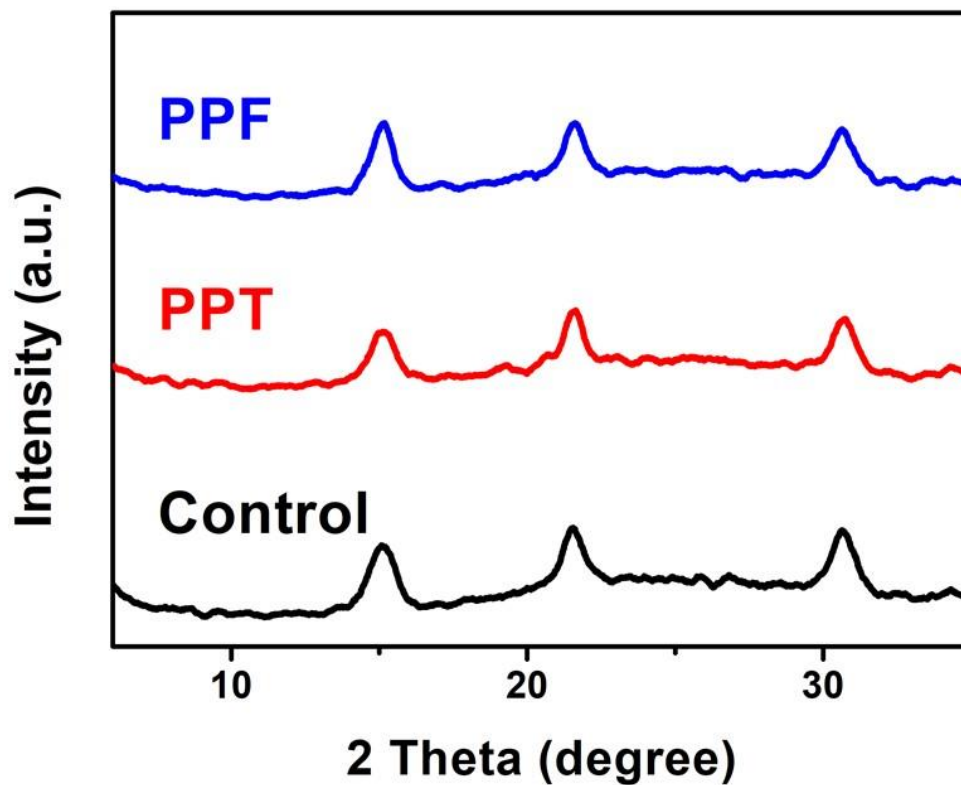
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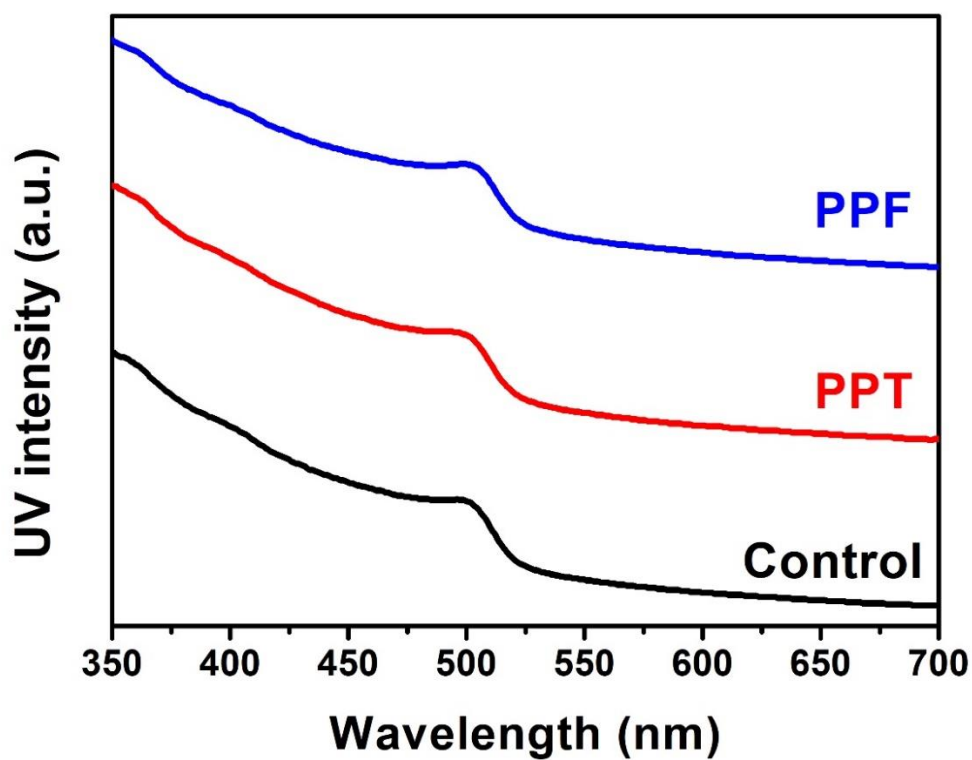
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**Keywords:** Light-emitting diodes; quasi-2D perovskite; efficiency roll-off; interface engineering; hole blocking



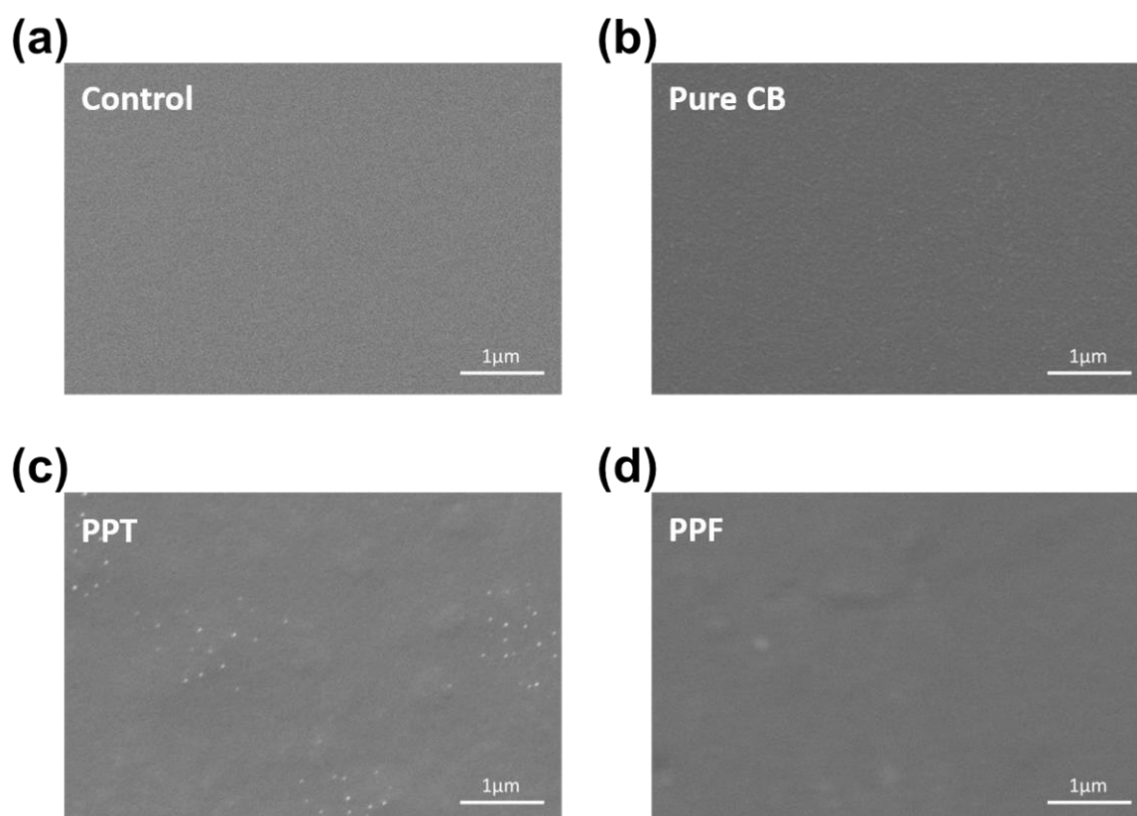
**Figure S1.** XRD characteristics of the pristine, PPT-modified and PPF-modified perovskite films.



**Figure S2.** UV-vis absorption spectra of the pristine, PPT-modified and PPF-modified perovskite films.

**Table S1.** Biexponential fitting parameters for the TRPL results.

	$A_1$	$\tau_1$ (ns)	$A_2$	$\tau_2$ (ns)	$\tau_{\text{avg}}$ (ns)
<b>Control</b>	$4.44 \times 10^4$	6.26	$4.88 \times 10^3$	45.5	10.1
<b>PPT</b>	$3.67 \times 10^4$	6.83	$4.33 \times 10^3$	57.4	12.2
<b>PPF</b>	$1.90 \times 10^4$	8.21	$3.82 \times 10^3$	67.6	18.2



**Figure S3.** SEM images of the (a) pristine, (b) CB-treated, (c) PPT-modified and (d) PPF-modified perovskite films.

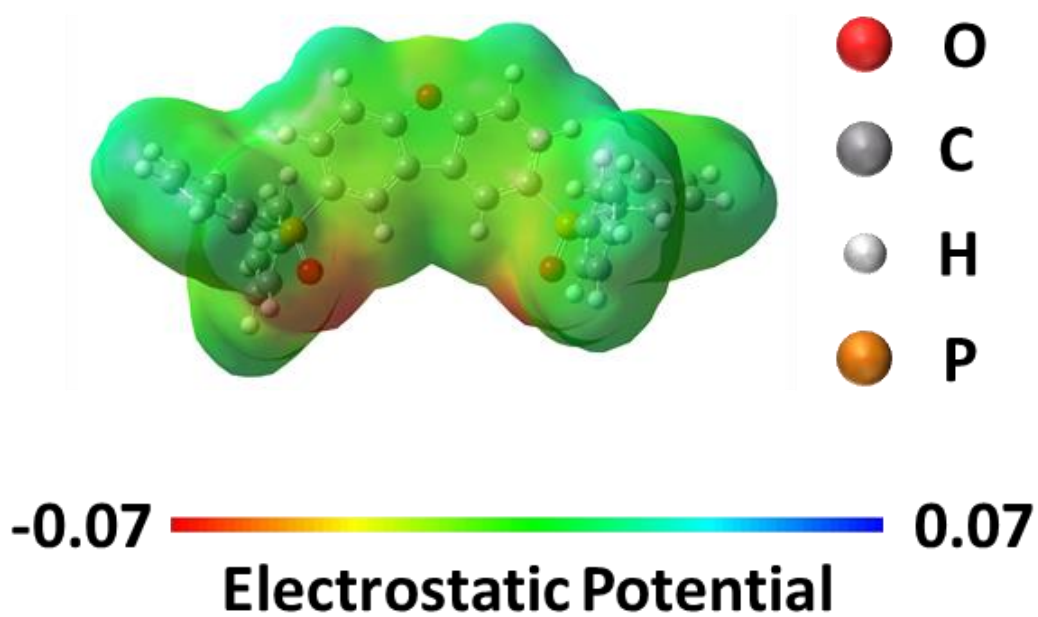


Figure S4. ESP map of PPF molecule.

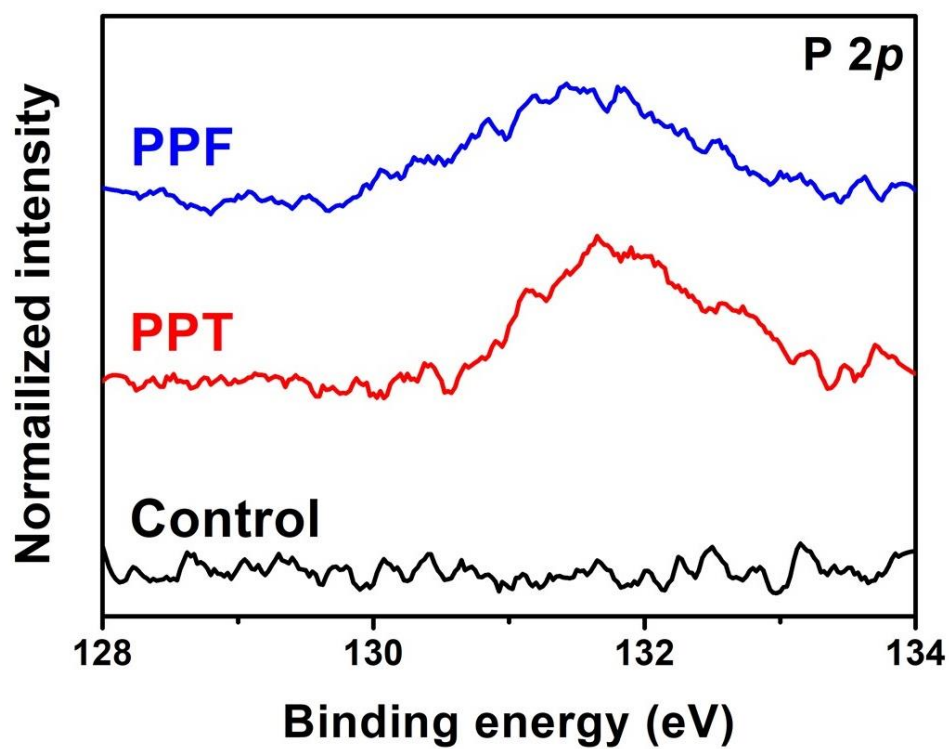


Figure S5. XPS spectra of P 2p signal for the pristine, PPT-modified and PPF-modified perovskite films.

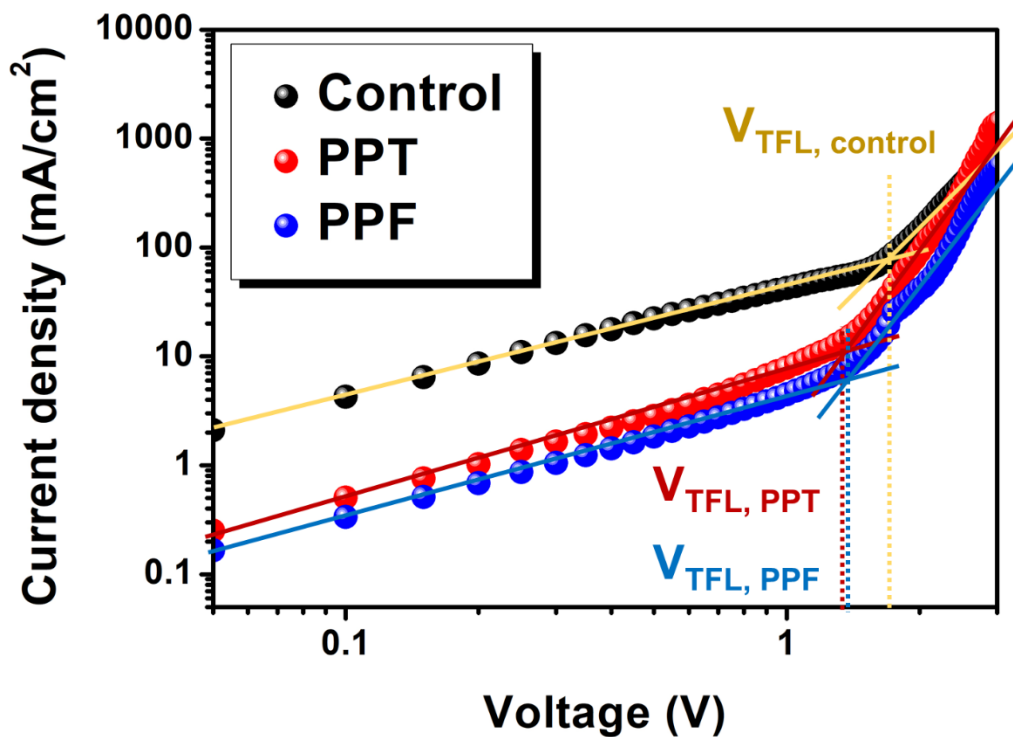


Figure S6.  $J$ - $V$  characteristics of the studied hole-only devices.

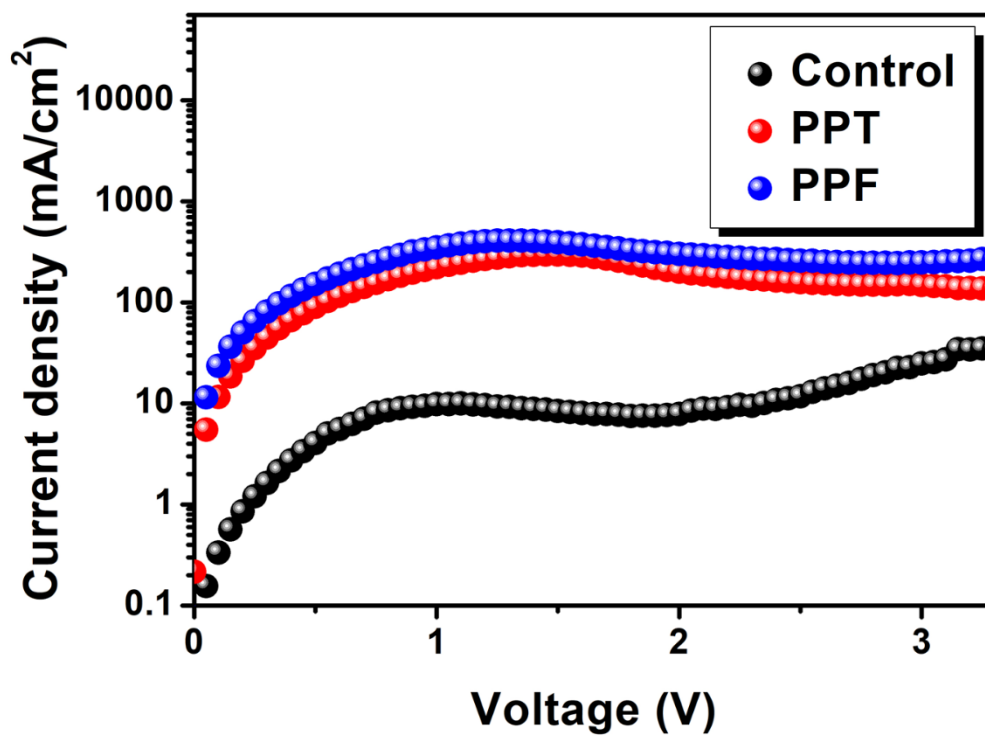


Figure S7.  $J$ - $V$  characteristics of the studied electron-only devices.

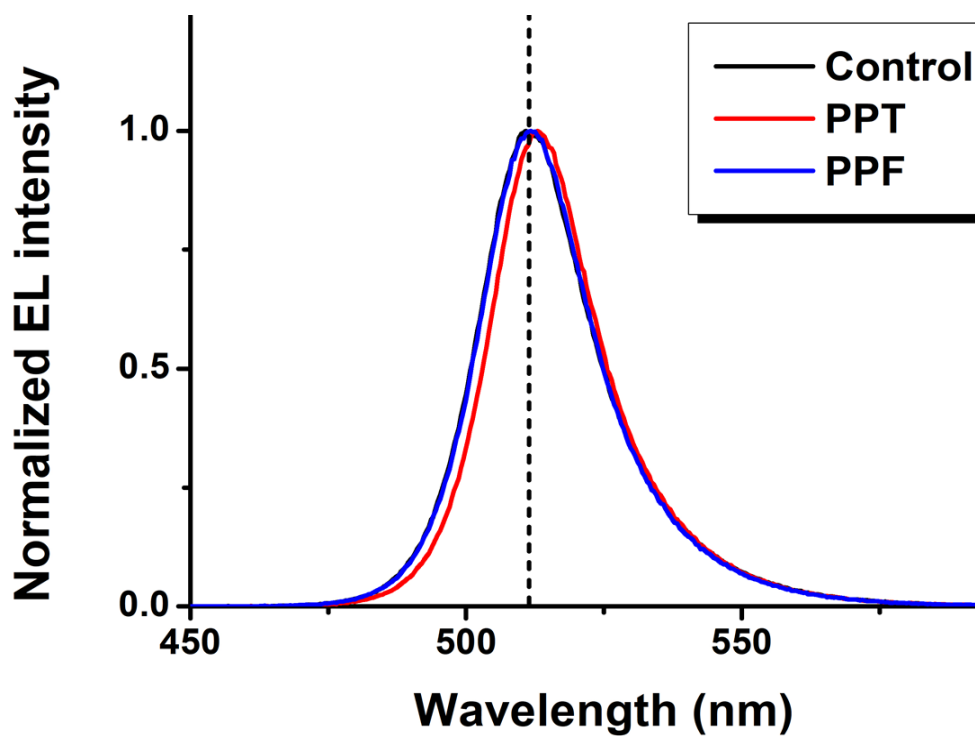


Figure S8. EL curves of the fabricated PeLEDs measured at 4V.

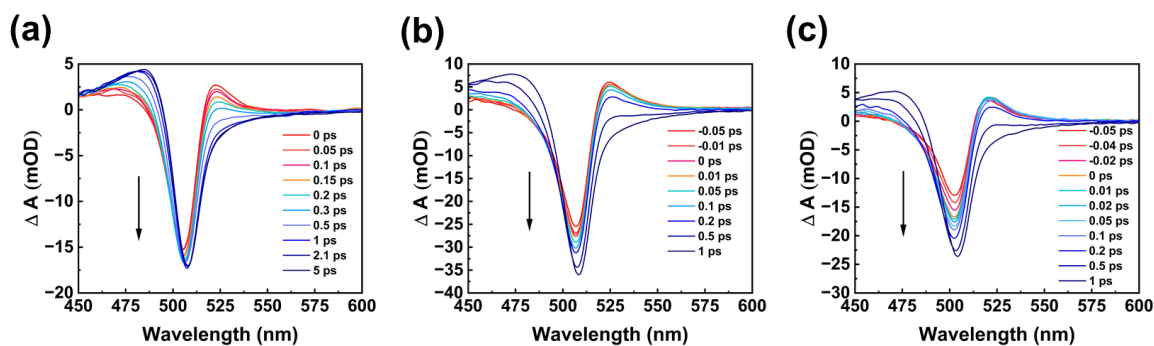
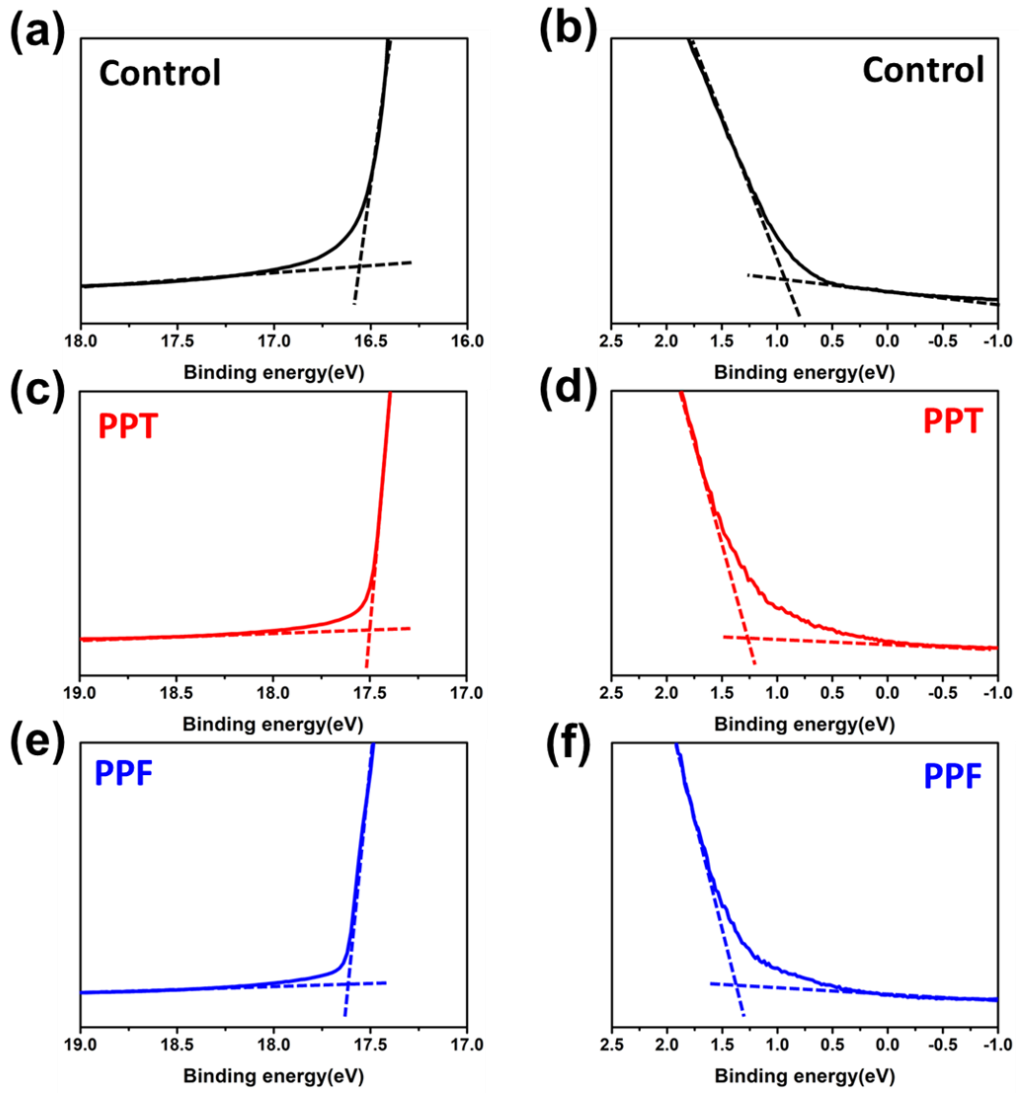


Figure S9. Femtosecond time-resolved TA spectra of (a) pristine, (b) PPT-modified and (c) PPF-modified perovskite films.



**Figure S10.** UPS results of the (a,b) pristine, (c,d) PPT-modified and (e,f) PPF-modified perovskite films.