

Supplementary Information

Multi-input Light-stimulated Synaptic Transistor for Complex Neuromorphic Computing

Weixin He, Yuan Fang, Huihuang Yang, Xiaomin Wu, Lihua He, Huipeng Chen, Tailiang Guo*

Institute of Optoelectronic Display, National & Local United Engineering Lab of Flat Panel Display Technology, Fuzhou University, Fuzhou 350002, China

Email: hpchen@fzu.edu.cn

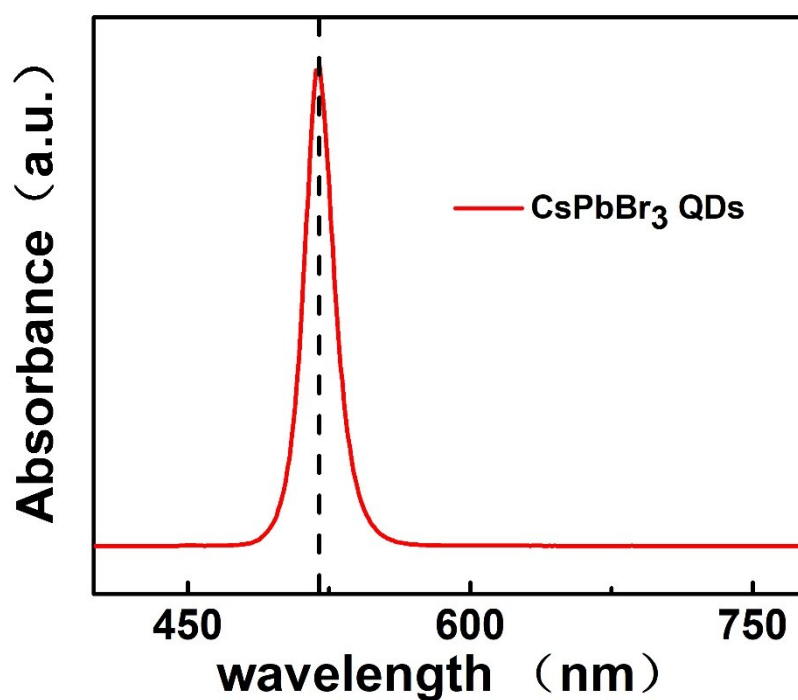


Figure S1. Photoluminescence (PL) spectrum of CsPbBr₃ QDs.

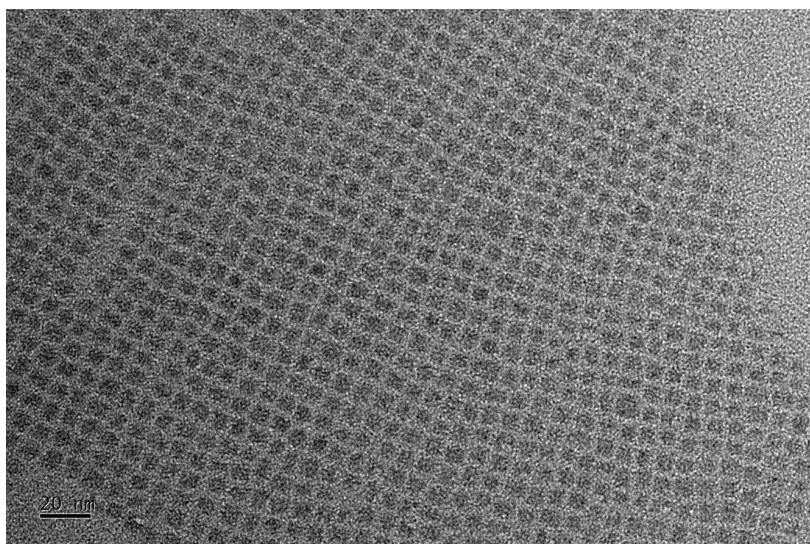
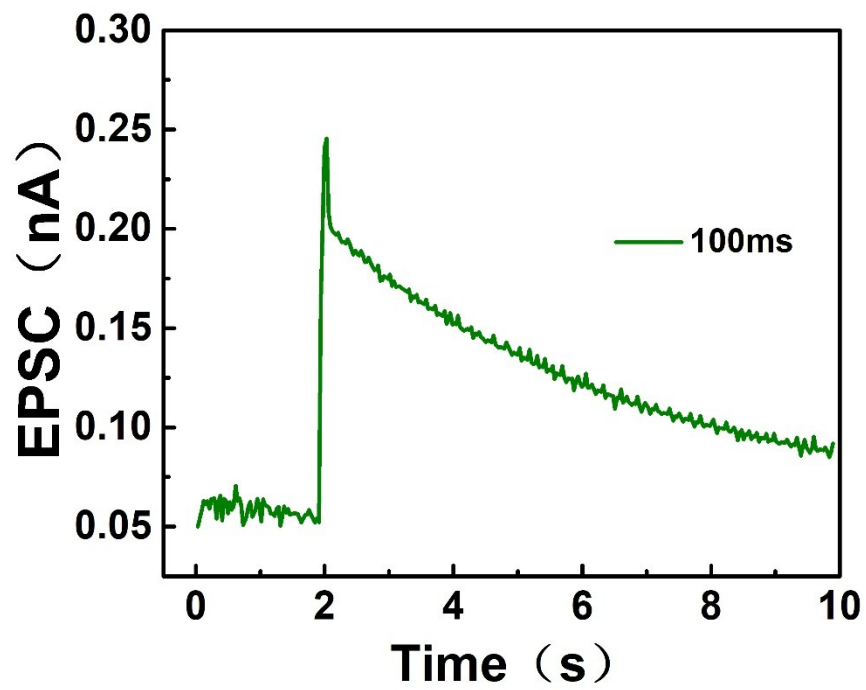
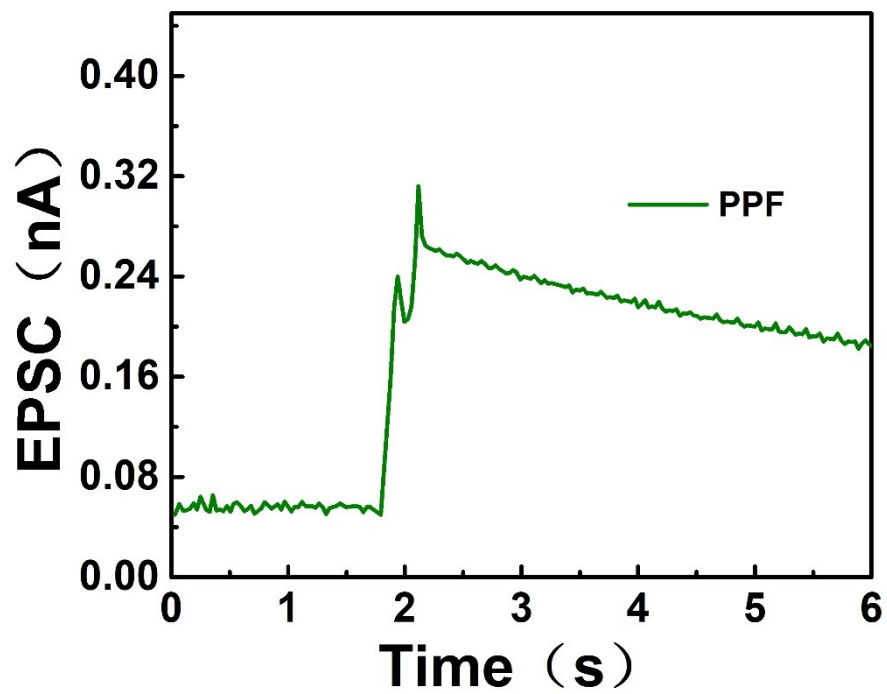


Figure S2. TEM image of the CsPbBr₃ QDs.

a)



b)



c)

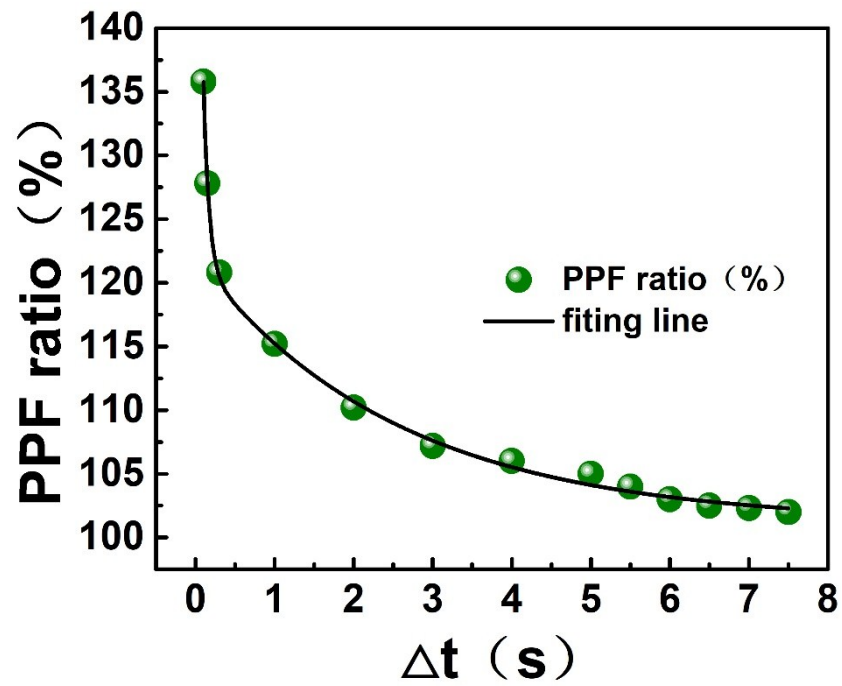


Figure S3. a) A typical EPSC triggered by a G3/G4 spike (500nm, 100 uW, 100ms). b) EPSCs stimulated by two successive G3/G4 spikes (500nm, 100 uW, time interval = 100ms), illustrating a PPF behavior. c) PPF index measured at different time intervals. The black curve is the exponentially fitting result.

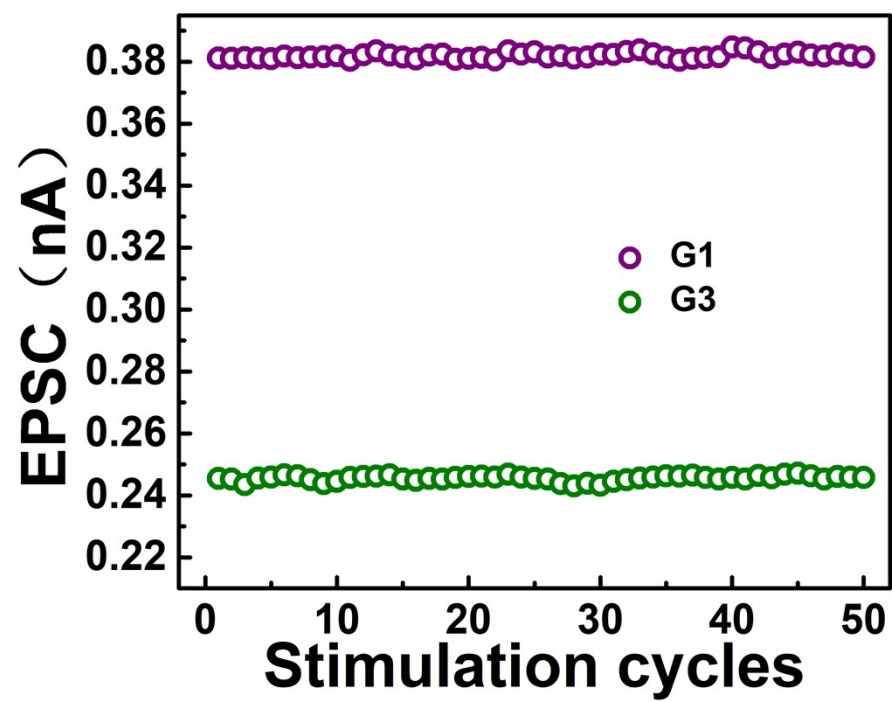
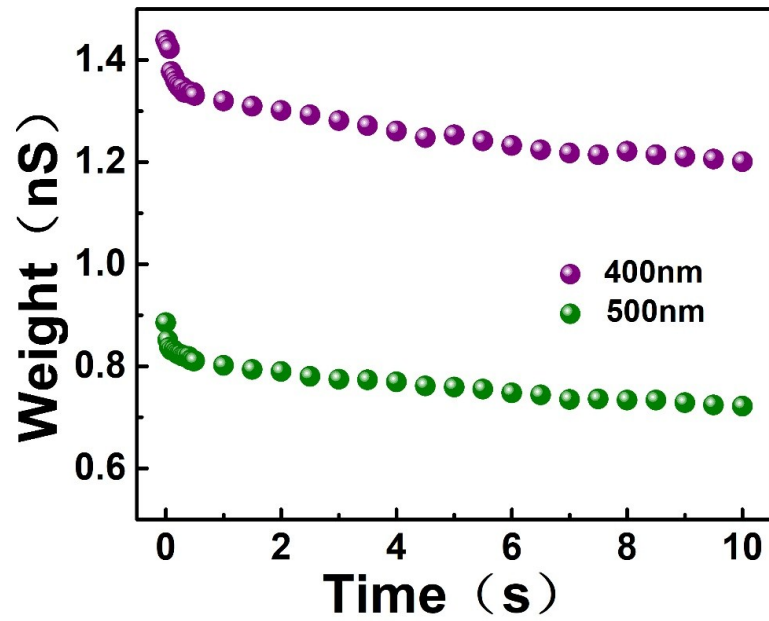


Figure S4. EPSCs within 50 stimulated spikes cycle of G1 and G3.

a)



b)

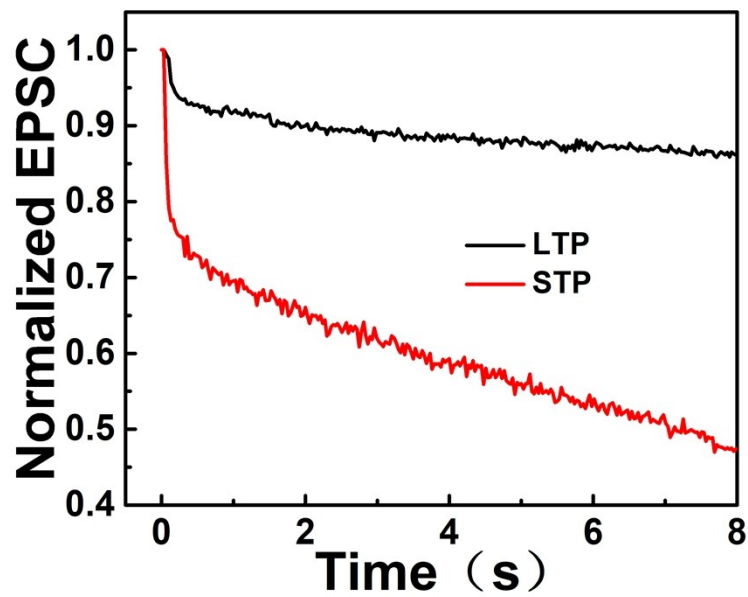
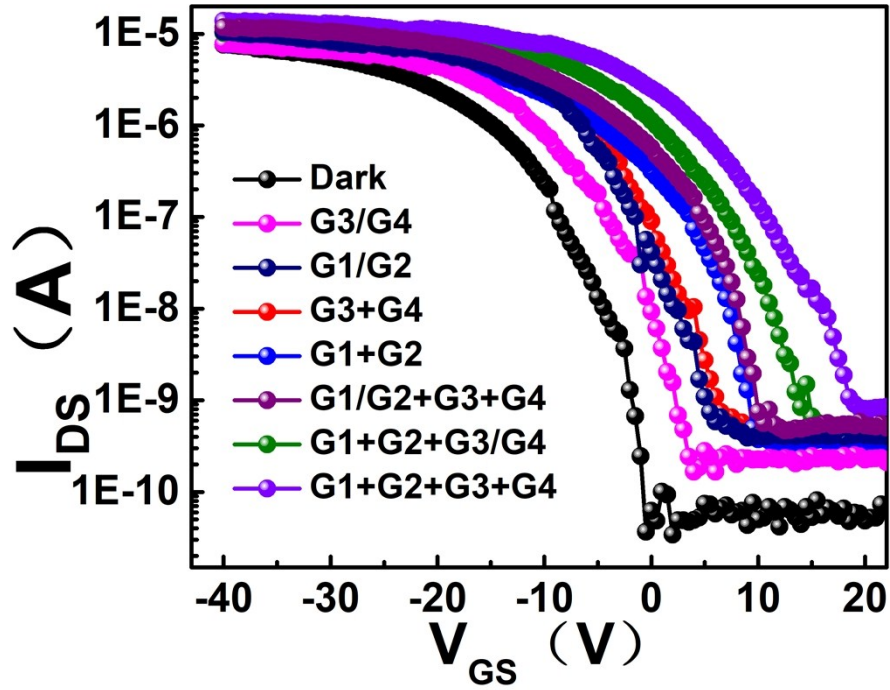


Figure S5. a) Weight changes after 20 G1/G2 spikes (purple points) and 20 G3/G4 spikes (green points). b) The normalized EPSC decay of STP (a G1 spike stimulation) and LTP (twenty succeeding G1 spikes stimulation) behaviors.

a)



b)

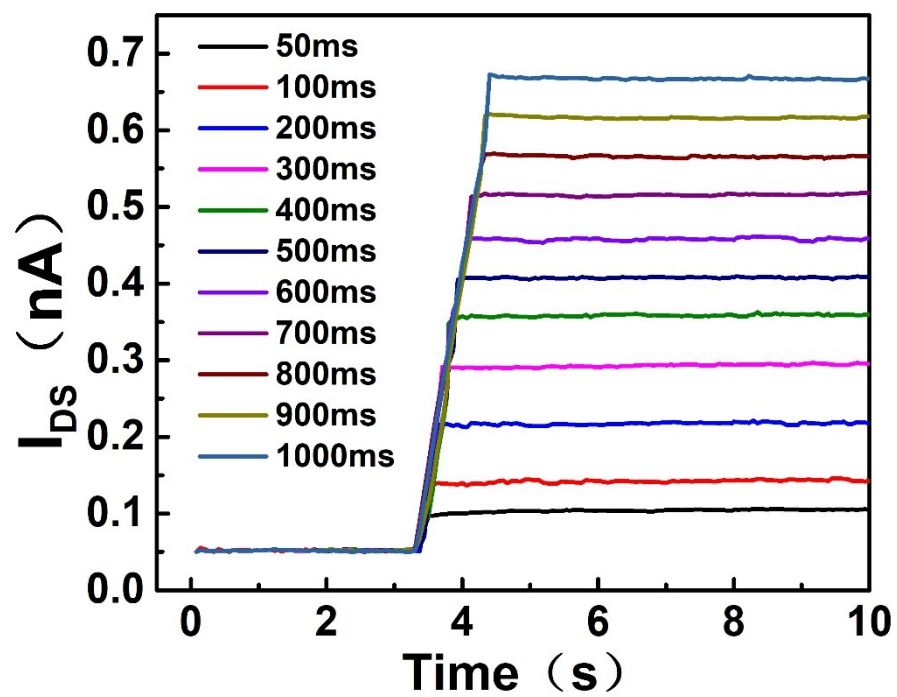
OR				AND			
I	I	O	EPSC (nA)	I	I	O	EPSC (nA)
1	0	1	0.285	1	0	0	0.164
0	1	1	0.285	0	1	0	0.164
1	1	1	0.536	1	1	1	0.294
0	0	0	0.05	0	0	0	0.05

Threshold = 0.24 nA

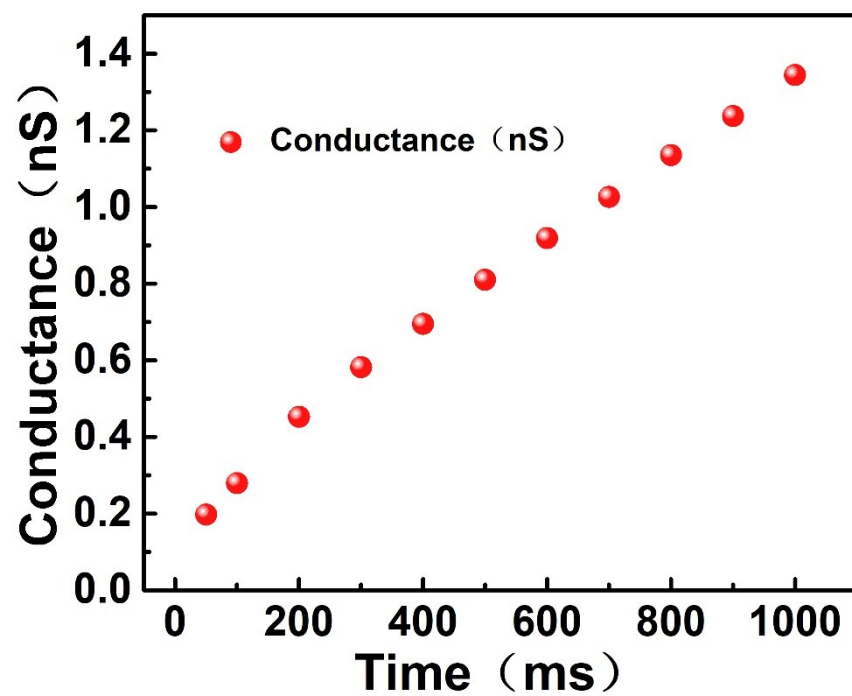
Figure S6. a) The transfer characteristic curves of the transistor under different light inputs

with $V_{DS} = -40V$. b) A logical table corresponded to logic functions in Figure 3e.

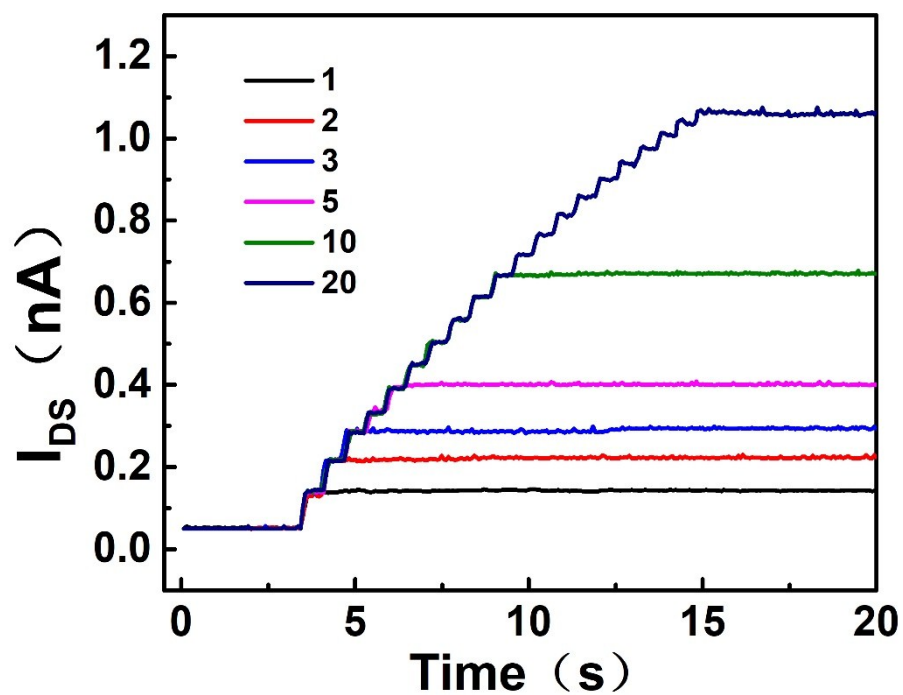
a)



b)



c)



d)

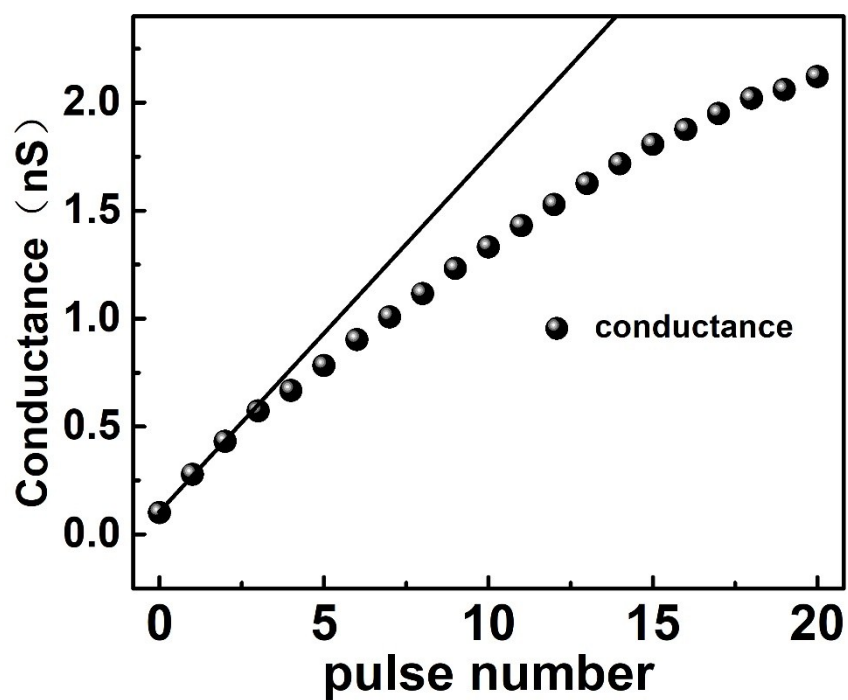


Figure S7. a) I_{DS} triggered by light spike illuminations (650 nm, 100 uW) with different light spike duration time. b) Channel conductance variation under a series of light spike (650 nm, 100 uW) with different light spike duration time. c) I_{DS} by applying different number of light

spikes from 1 to 20 (650 nm, 100 uW, duration time = 100 ms, interval time = 500 ms). d) I_{DS} variation with the increment of pulse number from 1 to 20.

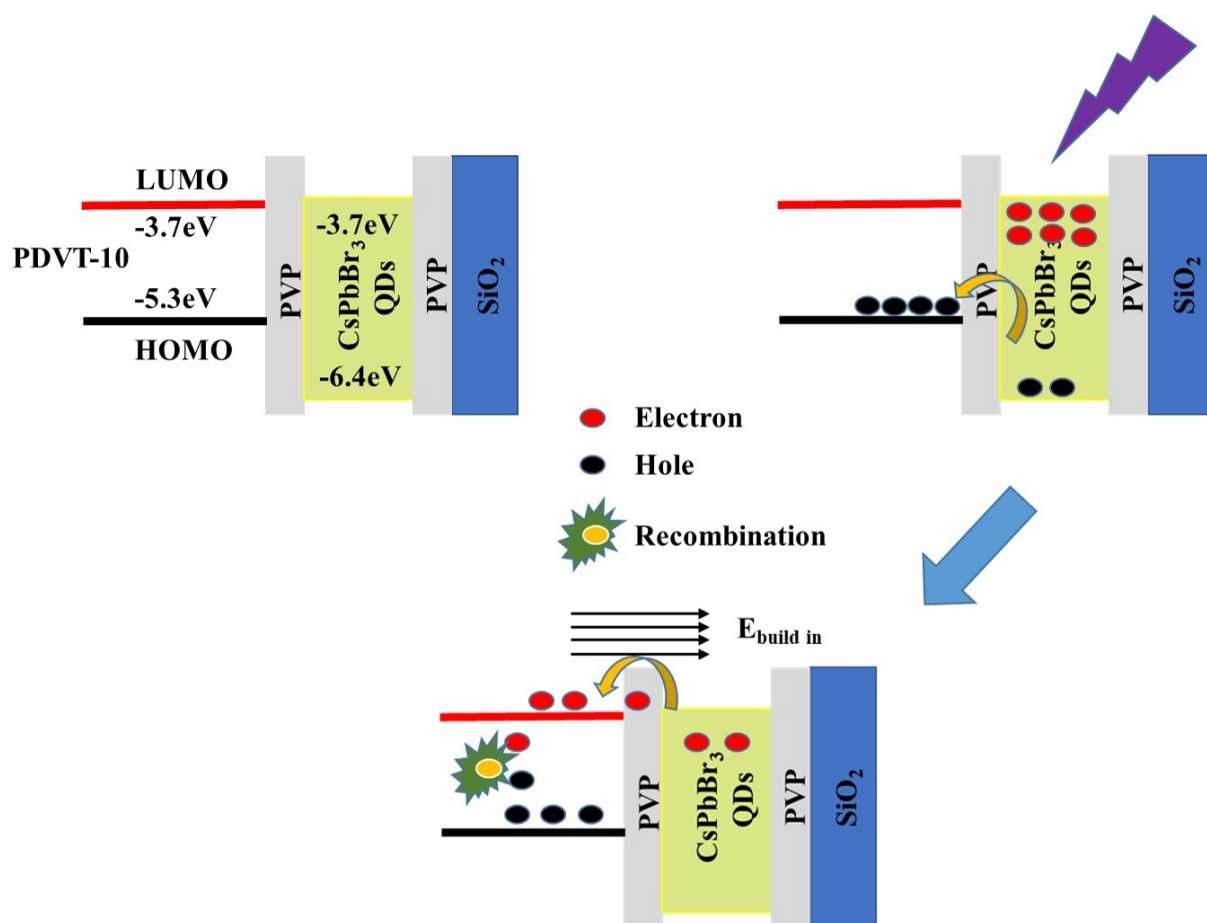


Figure S8. Schematic diagram of photogenerated carrier migration under and after light illumination (400 nm or 500 nm).