Electronic Supplementary Information (ESI) for

Solvothermal Synthesis of Cesium Lead Halide Perovskite Nanowires with Ultra-High Aspect Ratios for High-Performance Photodetectors

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Figure S1.Typical SEM image of the as-prepared $CsPbI_3$ microrods.

Table S1 .The time-resolved PL decay curve of the $CsPbX_3$ NWs can be described by two-exponential fitting: I(t)=A+B1*exp-i/T1+B2*exp-i/T2

PL(nm)	T1(ns)	Amplitude 1	T2 (ns)	Amplitude 2	<t> (ns)
410 nm	2.46	0.49	15.73	0.51	**4.3**
520 nm	5.28	0.22	24.26	0.78	**13.6**

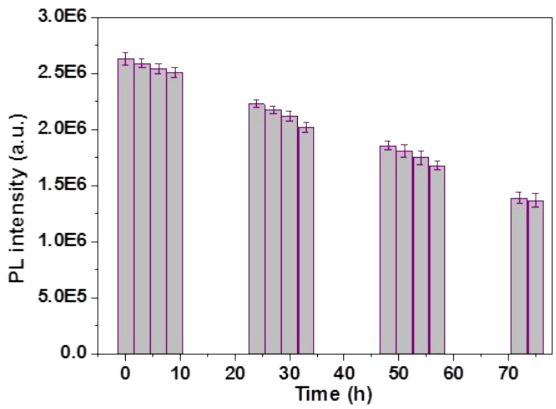

Figure S2. The PL intensity change of soild $CsPbBr_3$ NWs powder after stored in air for different times. For the stability testing of NWs powder, the as-prepared $CsPbBr_3$/n-hexane solutions with high NW concentration were dropped onto a piece of glass sheet with 1*1*0.1 cm groove. The n-hexane solvent was completely volatilized to form the NWs powder. Then the glass sheet was stored in air at room temperature (25°C) with humidity of ~40%. The PL intensity remains ~50% of the original intensity even after 75 h of storage in air.

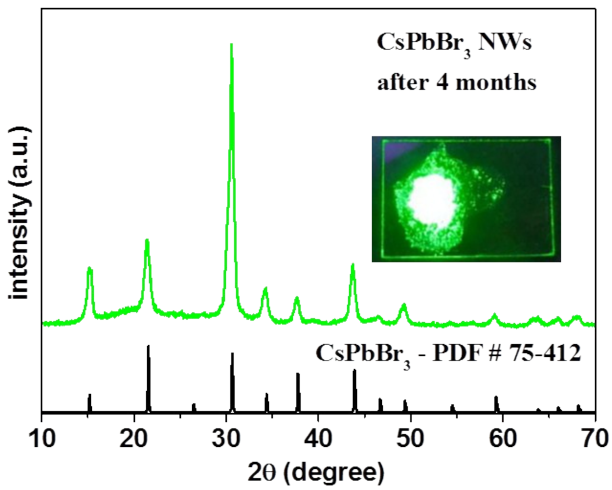

Figure S3. XRD pattern of $CsPbBr_3$ NWs after stored in air for 4 months. (inset) Photo of the XRD sample stage after being left at room temperature (10-25 °C) for 4 months in the air humidity range from 35% to 45%, showing bright green light under a UV lamp irradiation.

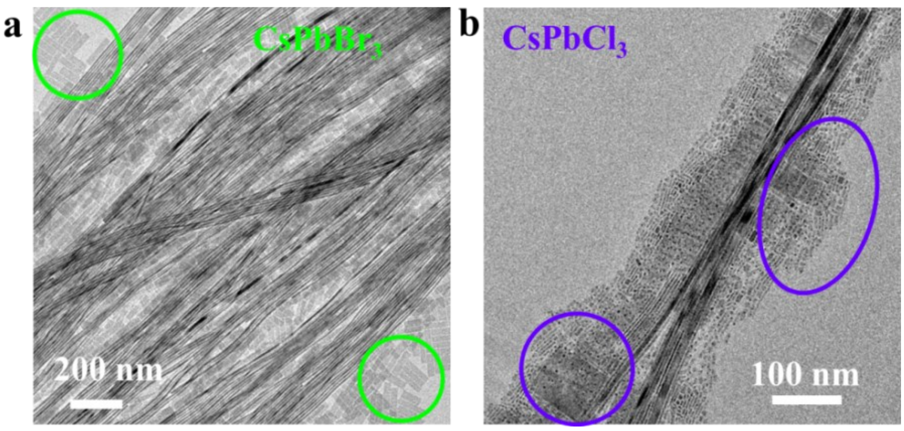

Figure S4. (a) TEM image of $CsPbBr_3$ NWs and NPLs prepared at 100 °C for about 48 h. (b) TEM image of $CsPbCl_3$ NWs and NPLs prepared at 100 °C for about 48 h.

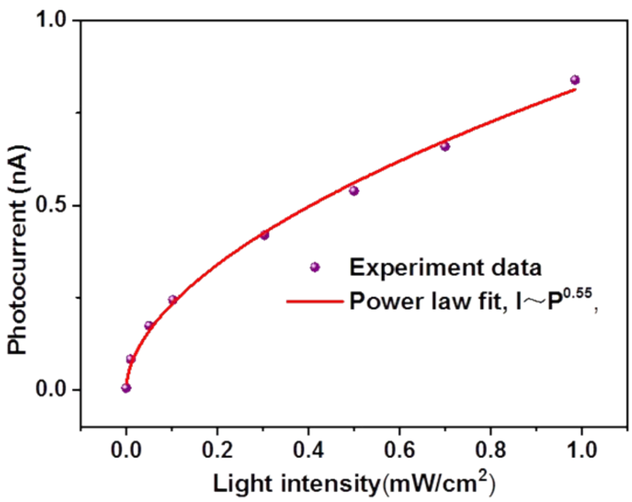

Figure S5. Photocurrent as a function of light intensity and corresponding fitting curve using the power law for $CsPbCl_3$ NWs device.

It can be seen that the optical power value we selected did not make the photocurrent reach saturation value. The corresponding dependence can be fitted to a power law, $I_p \propto P^{\theta}$, the exponent θ determines by the photocurrent response to light intensity. The fitting gives a sub-linear behavior of θ = 0.55. This result may indicate a complex process of electron–hole generation, recombination, and trapping within a semiconductor.

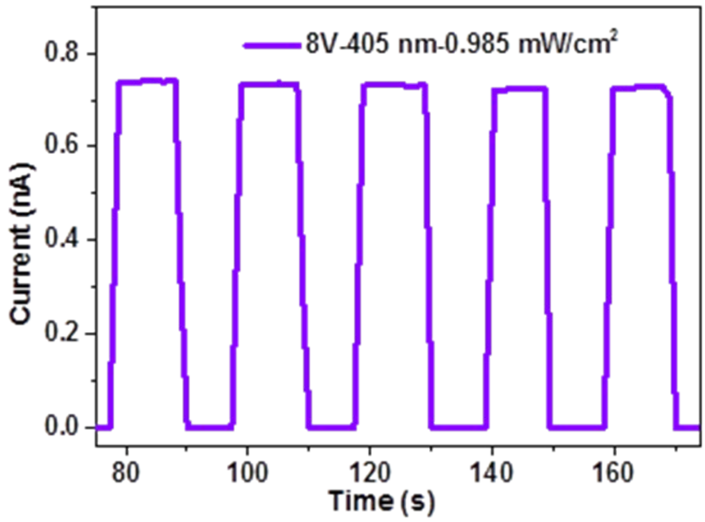

Figure S6. I_{ph}-t photoresponse of $CsPbCl_3$ NWs device after two day placed in the air environment (temperature and air humidity are 25 °C and 40%) with the same test parameters (bias voltages at 8 V, light intensity=0.985 mW/cm^2).

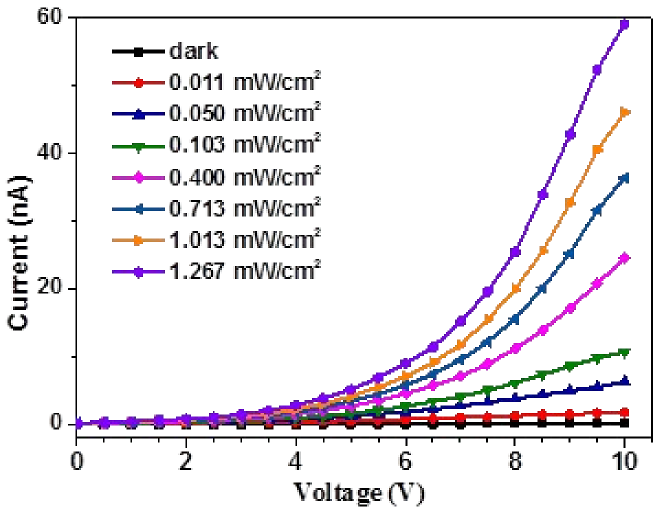

Figure S7. I-V curves of a $CsPbBr_3$ NWs photodetector measured under dark and light conditions. The light intensity increases from 0.011 to 1.267 mW/cm^2.

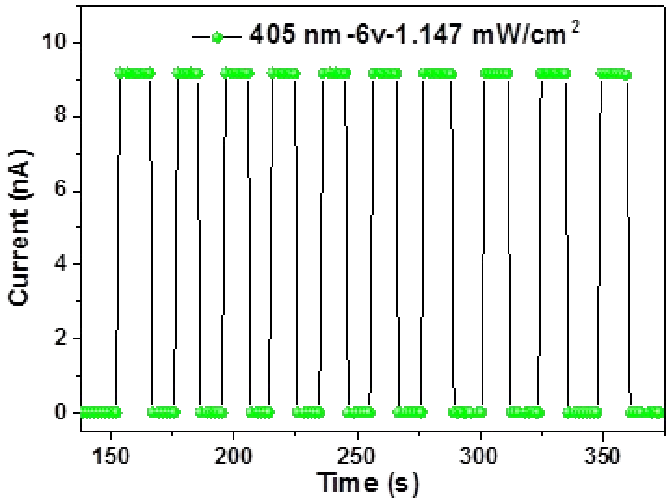

Figure S8. I_{ph}-t photoresponse of $CsPbBr_3$ NWs device under bias voltages at 6 V (light intensity=1.147 mW/cm^2).

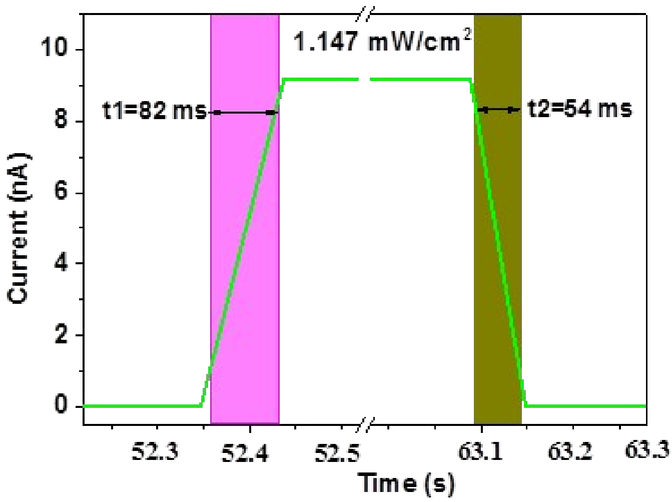

Figure S9. Rise and decay times of the $CsPbBr_3$ NWs photodetector device (light intensity=1.147 mW/cm^2).