

Supplementary Information

Thermo-optoelectronic synaptic device for heat and light-regulated neuromorphic applications and artificial Sensory neuron system for humanoids

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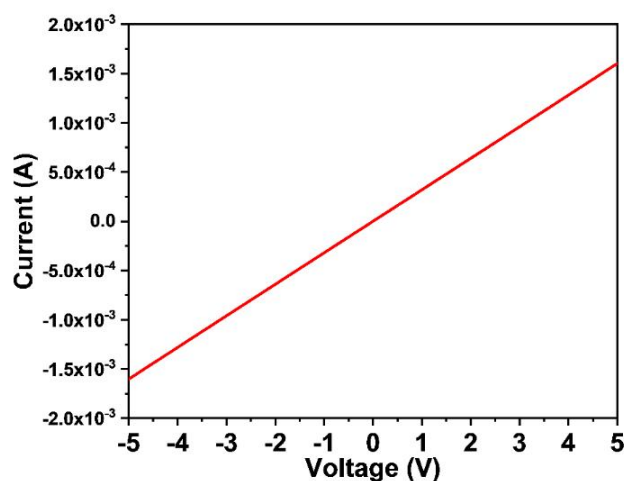


Fig. S1. (Color online) I–V Characteristic of ITO used on top of the PTCDI–C8 layer.

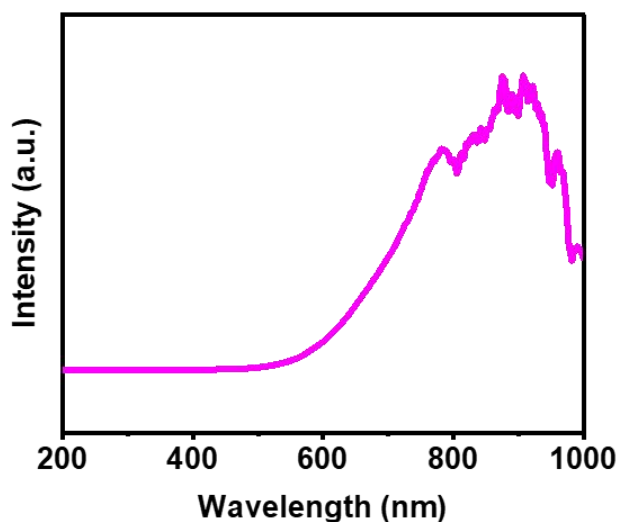


Fig. S2. (Color online) Optical spectrum of the tungsten source.

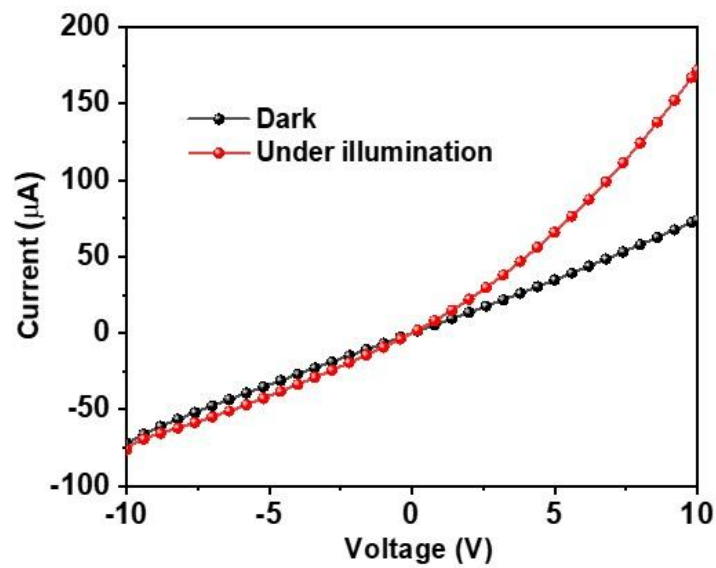


Fig. S3. (Color online) I-V characteristics of the device in dark and under illumination. A tungsten source, which consists of a broad spectrum of UV to IR, is illuminated.

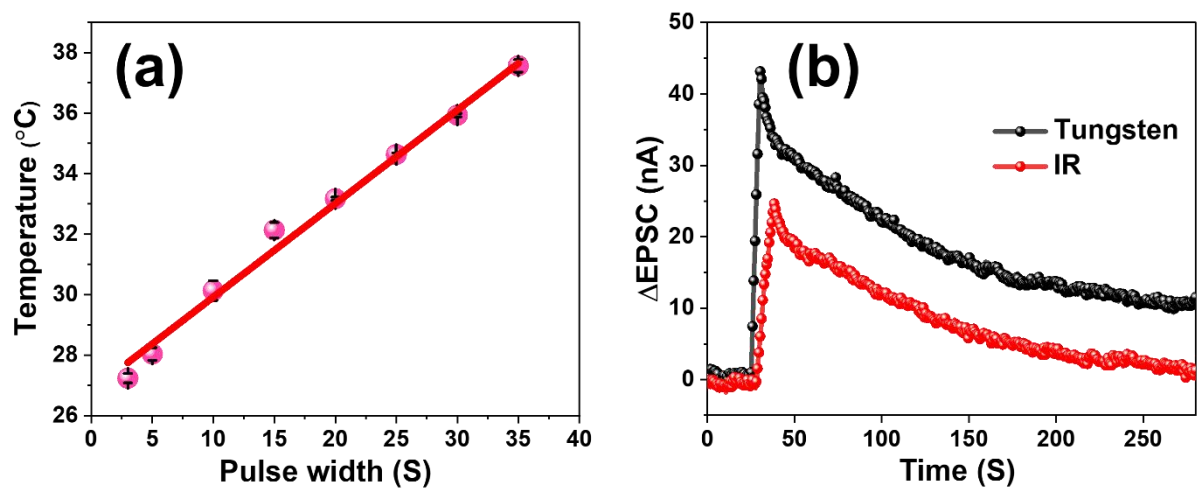


Fig. S4. (Color online) Calibration of temperature with DHT 22 sensor by varying the pulse width (a) IR source. (b) Comparison study of ΔEPSC for tungsten and IR.

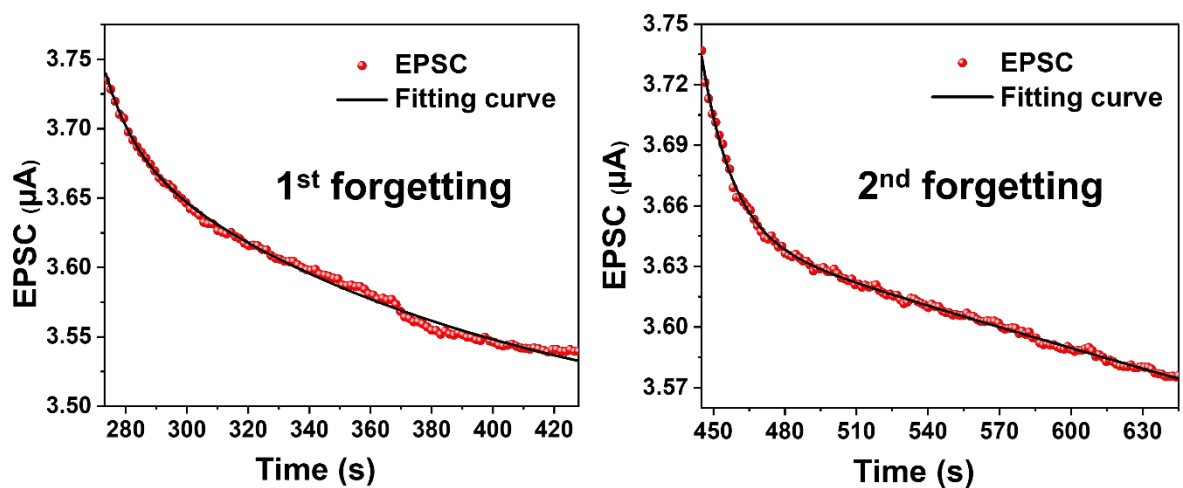


Fig. S5. (Color online) Forgetting regions (150 s after removing the pulse in each case) are fitted by the equation $y = y_0 + A_1 \exp(-t/\tau_1) + A_2 \exp(-t/\tau_2)$. The τ_1 , τ_2 values of 1st and 2nd forgetting are 10.16 ± 0.48 s, 124.53 ± 4.62 s and 12.91 ± 0.11 s, 1479.17 ± 311.57 s, respectively.

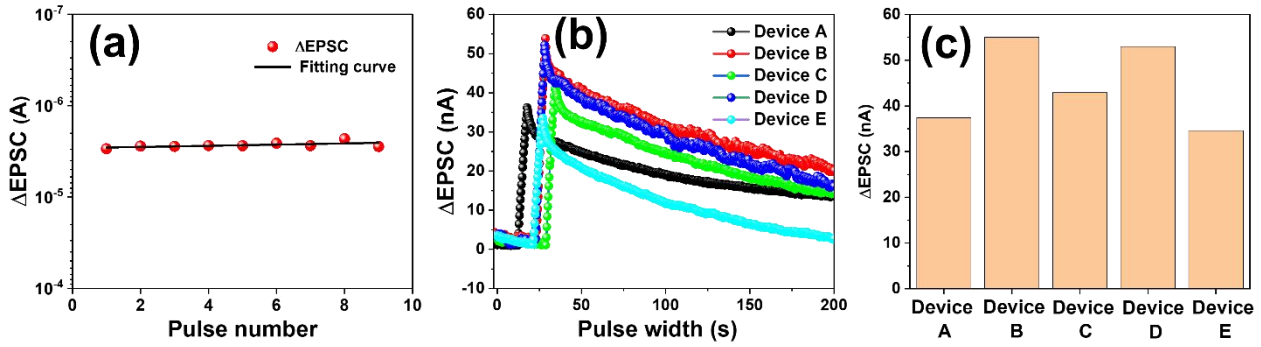


Fig. S6. (Color online) (a) $\Delta EPSC$ variation for 9 consecutive pulses for 5 s. Fitted it with a linear equation having a slope of -0.006 , which signifies the good consistency of the device. (b) and (c) $\Delta EPSC$ reproducibility for multiple devices.

The external stimulation energy consumption can be estimated as $E_{ex} = P \times S \times t$, where P and S represent the external stimulation power density and the active device area, having values of 150 mW/cm^2 , 0.5 mm^2 . ' t ' is the pulse width of 5 sec, leading to the E_{ex} value of 1.87 mJ.