Supporting Information

Hybrid C8-BTBT/InGaAs nanowires heterojunction for

artificial photosynaptic transistors

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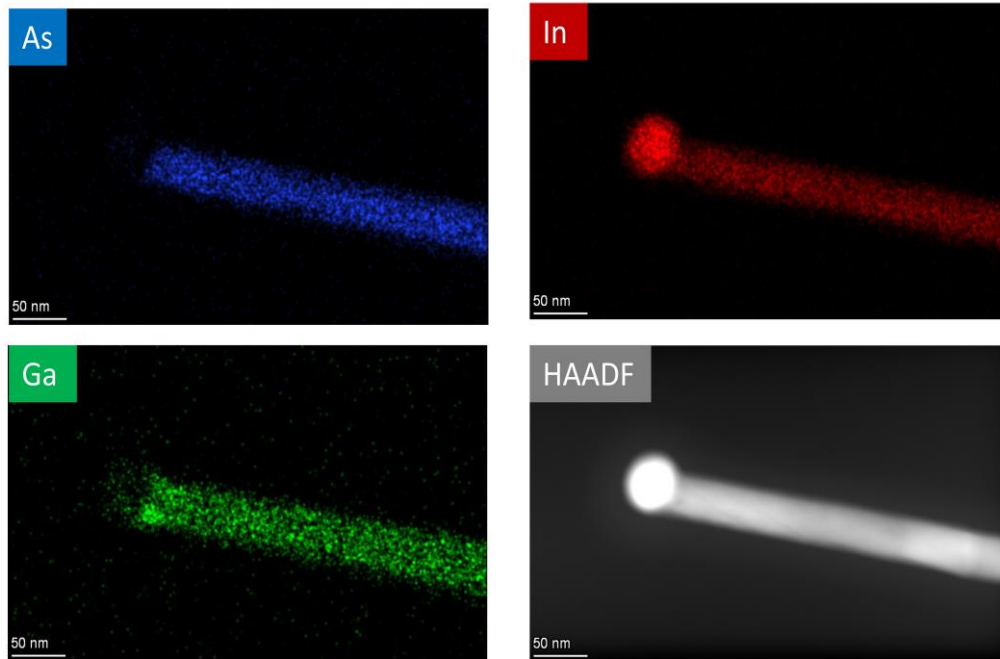
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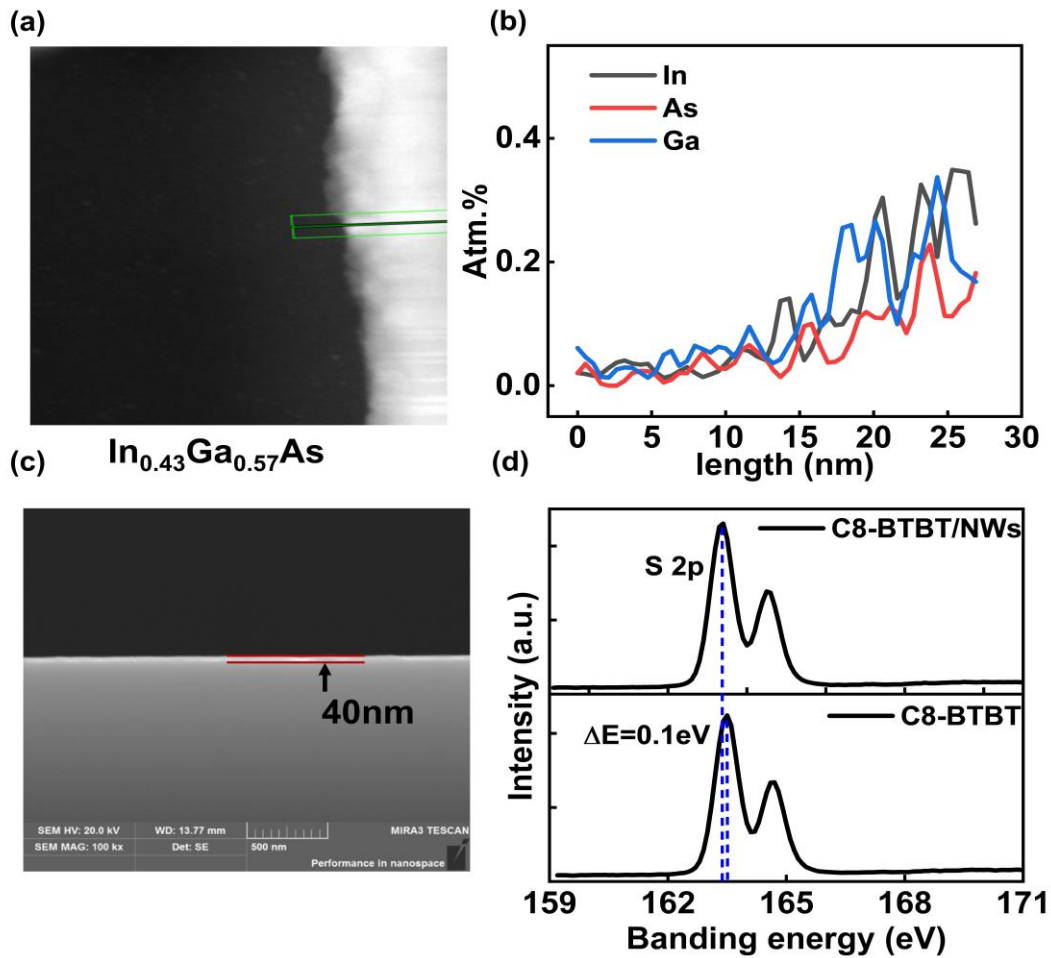
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1. Supplementary figures

**Fig. S1** Energy dispersive spectroscopy (EDS) of a typical InGaAs NWs.

Fig. S2 (a) TEM image with the black line indicating the scanning path and (b) the corresponding EDS line scan of the InGaAs NWs. (c) Cross-sectional scanning electron microscope (SEM) image of fabricated device. (d) X-ray photoelectron spectroscopy (XPS) of the active layer film.
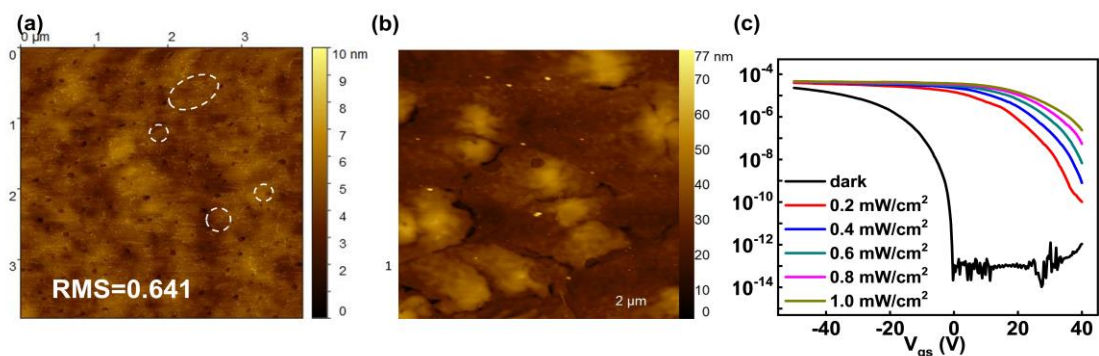

Figure S3 (a) AFM image of the C8-BTBT/InGaAs NWs heterojunction thin film. (b) AFM image of the C8-BTBT thin film. (c)Transfer curve of the device under different optical power densities.
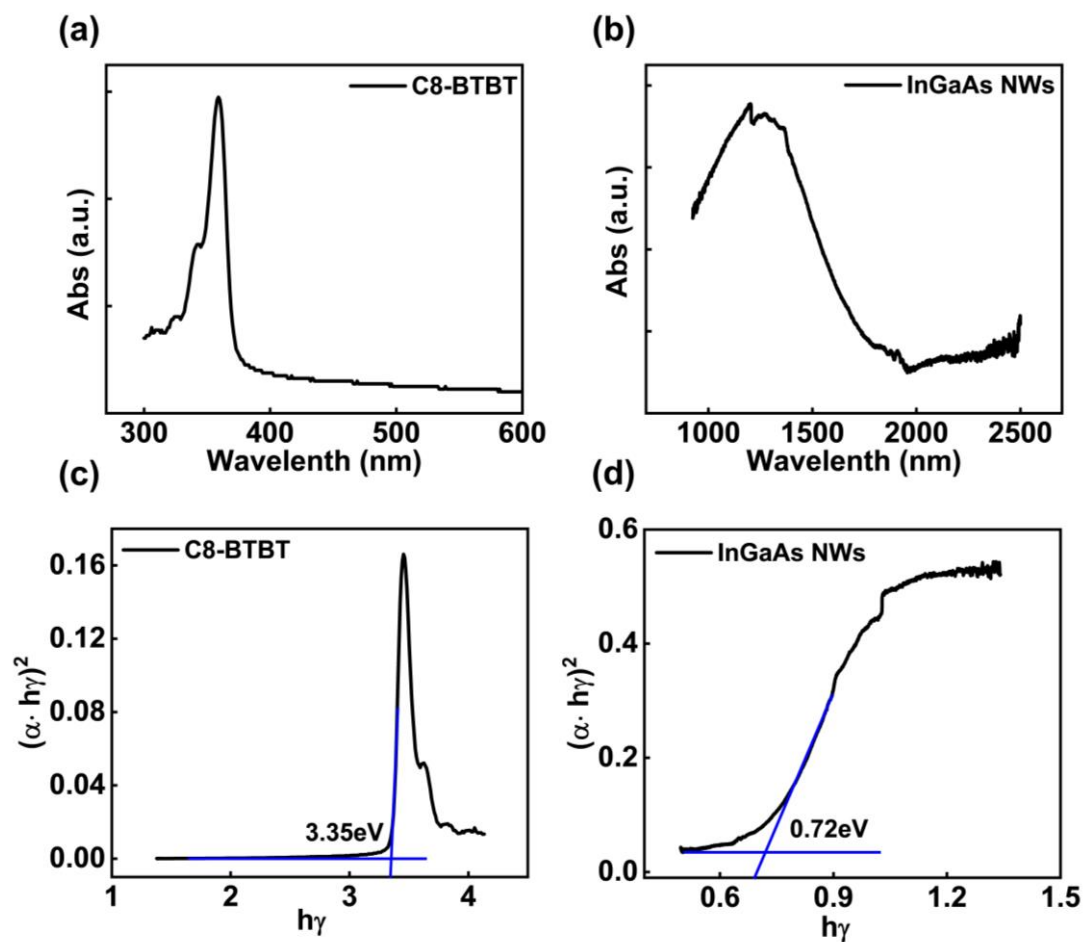
Figure S4 (a, b) Light absorption of the C8-BTBT and InGaAs NWs thin film, respectively. (c, d) Corresponding $(\alpha h v)^2$–hv curves of the C8-BTBT and InGaAs NWs thin film light absorption, respectively.
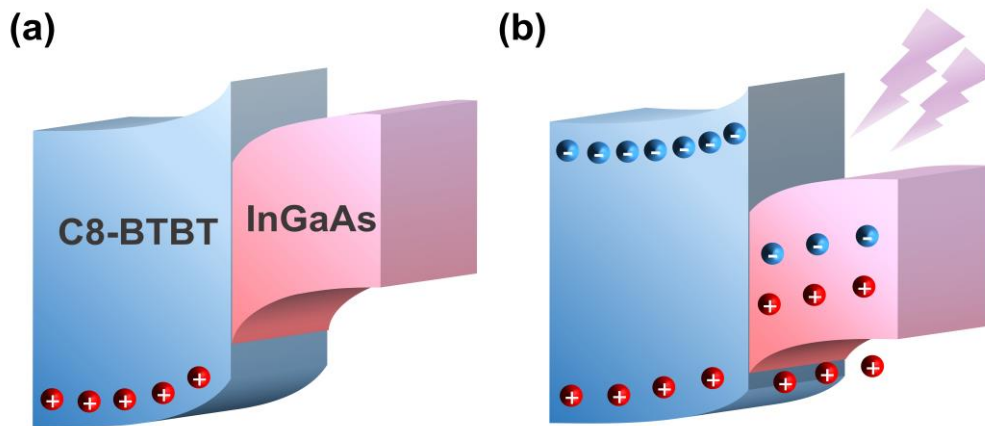
Fig. S5 Schematic of energy level arrangements. (a) Heterojunction charge distribution in the absence of light, (b) Heterojunction charge distribution when light is applied.
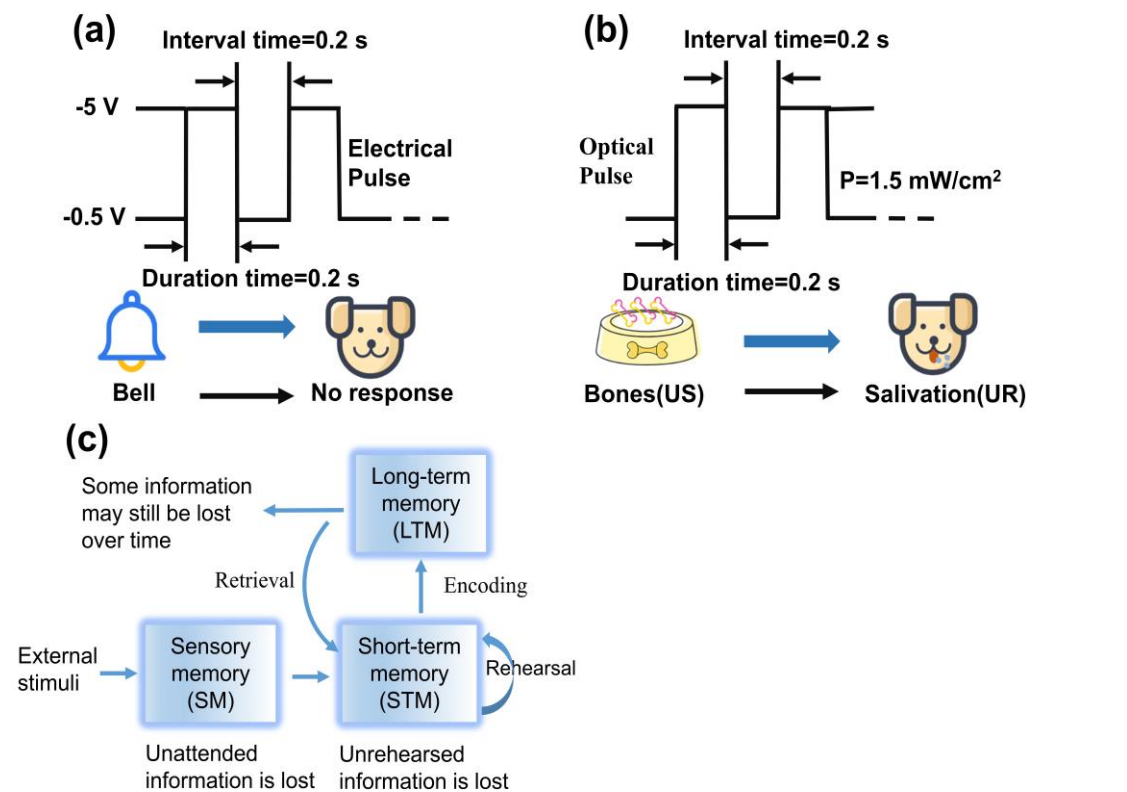
Fig. S6 Pavlovian conditioned reflection implied by the coupling of continuous light pulses and electric pulses. (a) Light pulse is used as unconditioned stimulus (US), which is called unconditioned response. (b) Electrical pulses as a conditioned stimulus (CS), the dog has no response after stimulation. (c) Scheme of the memory formation process in the human brain.