Supporting Information

Ultralow-power Flexible Transparent Carbon Nanotube Synaptic Transistors for Emotional Memory

Yarong Wang, Weihong Huang, Ziwei Zhang, Lingchong Fan, Qiuyue Huang, Jiaxin Wang, Yiming Zhang and Min Zhang*

School of Electronic and Computer Engineering, Peking University, Shenzhen 518055, China

E-mail: zhangm@ece.pku.edu.cn

1. **Device characteristic**

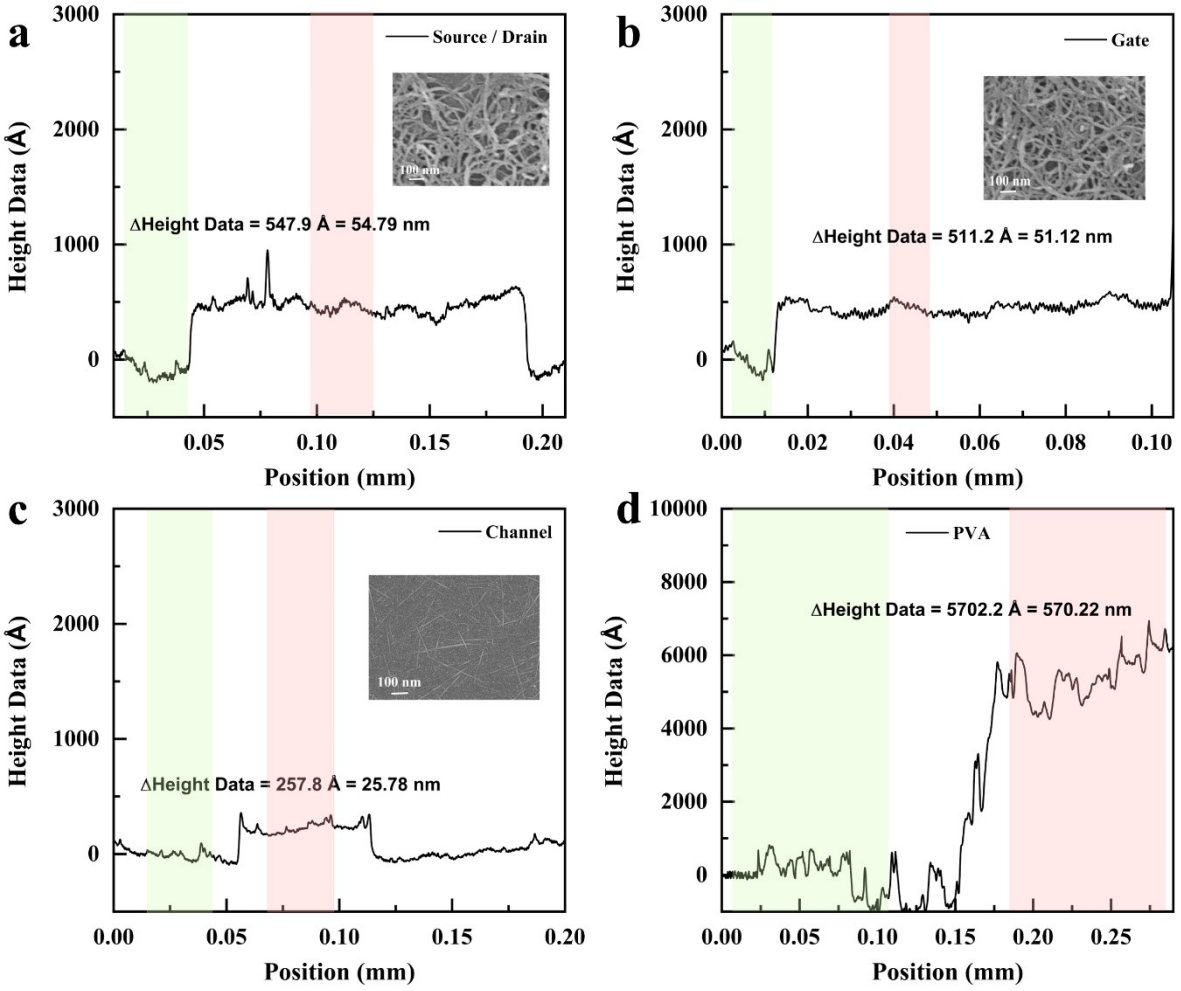

Fig. S1. Device thickness and SEM morphology characterization diagram. (a) Source/drain (b) Gate (c) Channel and (d) Dielectric layer.

2. **Optical images**

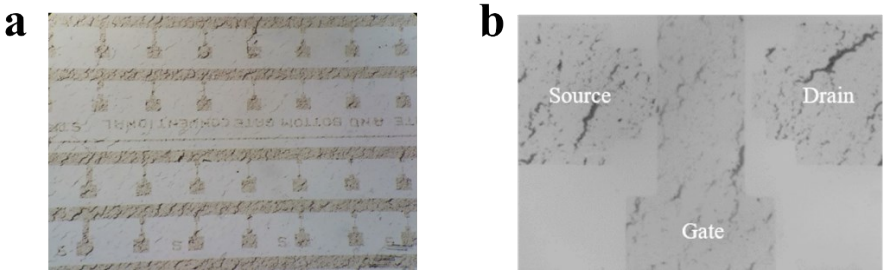

Fig. S2. The optical microscope images show the morphological characteristics of (a) the synaptic transistor arrays and (b) an individual device.

3. **Capacitance characterization**

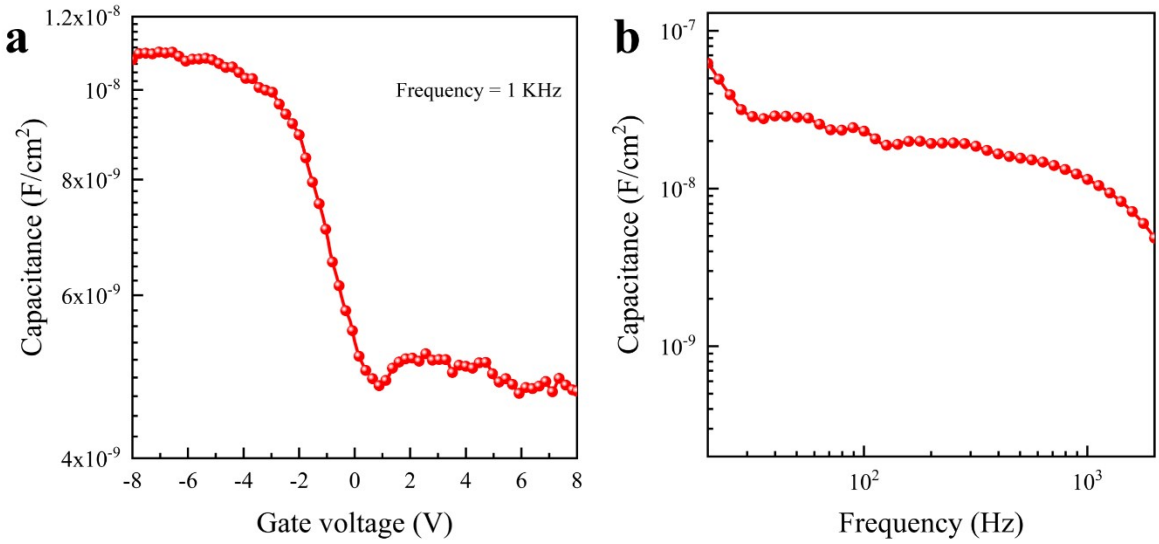

Fig. S3. The capacitances of the PVA/SiO_2 stack film. (a) Capacitance-voltage characteristics of the device. (b) Capacitance-frequency characteristics of the device.

4. **Postsynaptic current**

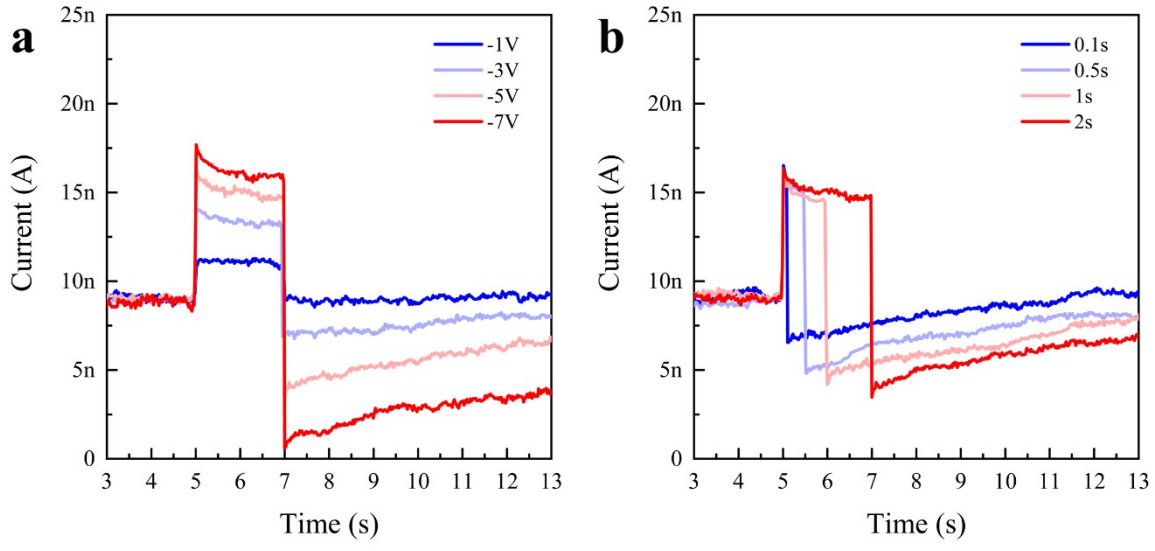

Fig. S4. (a) Postsynaptic current triggered by gate spikes with the identical duration time (2 s) and different amplitudes. (b) Postsynaptic current triggered by gate spikes with identical amplitude (-5V) and different duration time.

5. **Synaptic properties at same pulse interval**

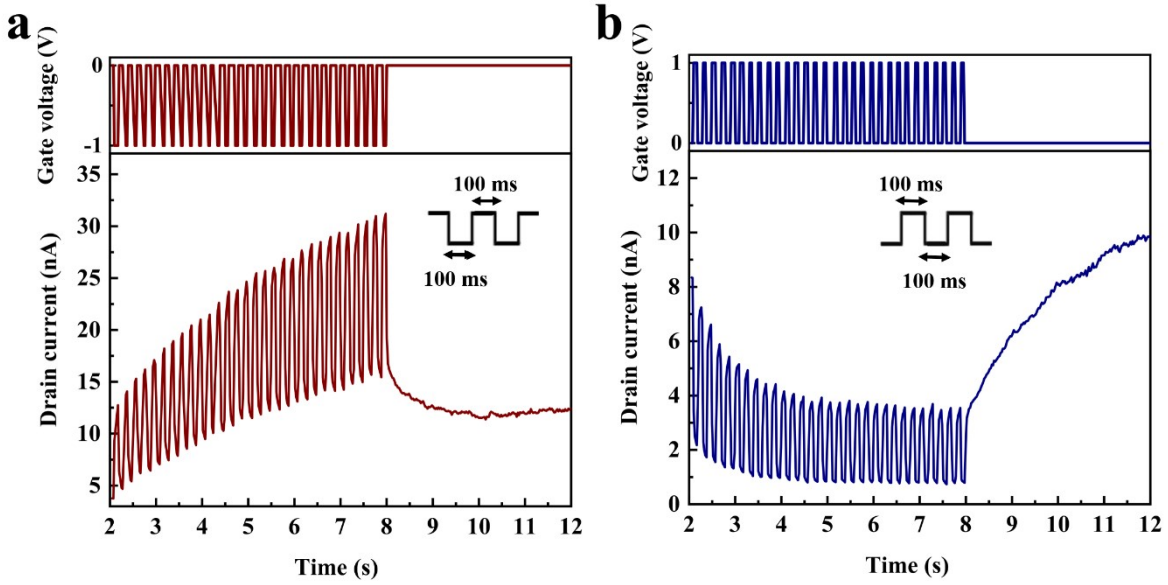

Fig. S5. Synaptic properties at the same pulse interval (100ms). (a) 30 negative presynaptic pulses (b) 30 positive presynaptic pulses.

6. **Transfer characteristic curve shifts after presynaptic pulses operation**

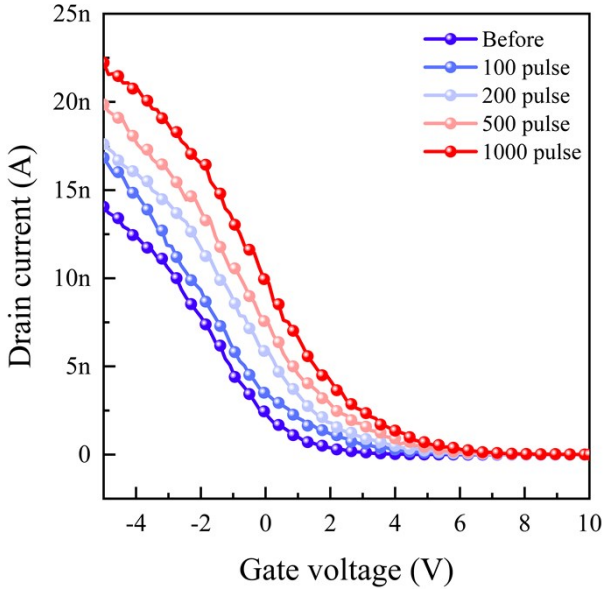

Fig. S6. The transfer characteristic curve shifts toward positive direction after different cycles of negative presynaptic pulses operation.

7. **Statistics on the synaptic properties of devices with different sizes**

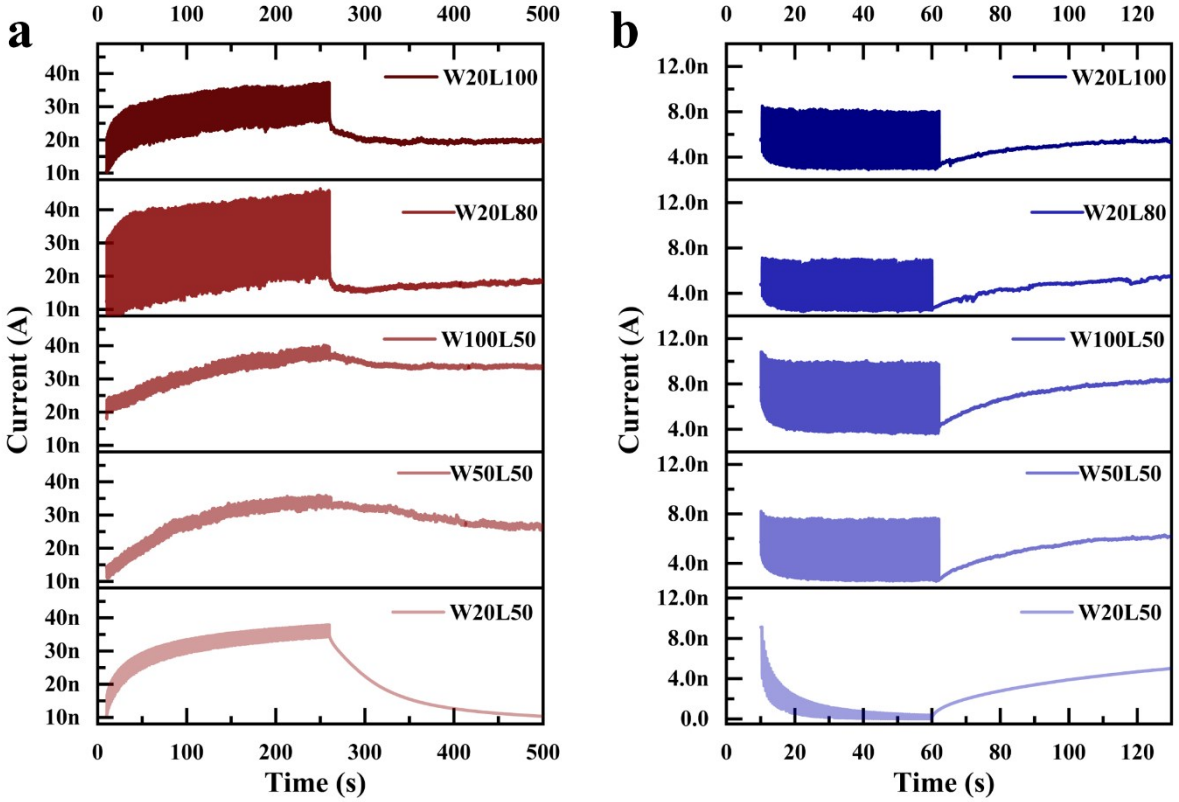

Fig. S7. LTP and LTD behavior of biological synapses under different dimensions of the device. The pulse width is 100 ms, and the time interval between adjacent pulses is 400 ms. (a) 500 negative presynaptic pulses (b) 100 positive presynaptic pulses.