Supporting Information

Optically and Electrically Modulated Printed Carbon Nanotube Synaptic transistors with Single Input Terminal and Multi-functional Output Characteristics

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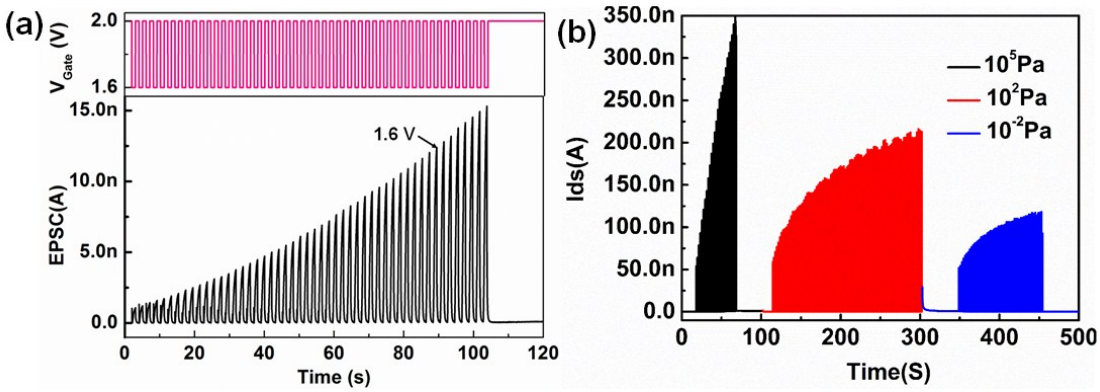

Figure S1. (a) Amplitude of EPSC increases gradually with the successive pulsed voltage stimulus for the phosphorous-doped silicon gate synaptic transistor device (from 2 to 1.6 V). (b) The light-response properties of a printed carbon nanotube transistor (using boron-doped silicon as the gate electrode) under different atmospheric pressures at V_{Gate}= 2 V and V_{DS} = -0.5 V (the laser wavelength is 532 nm; the optical pulse frequency is 0.5 Hz; the power of laser is 50 mW).

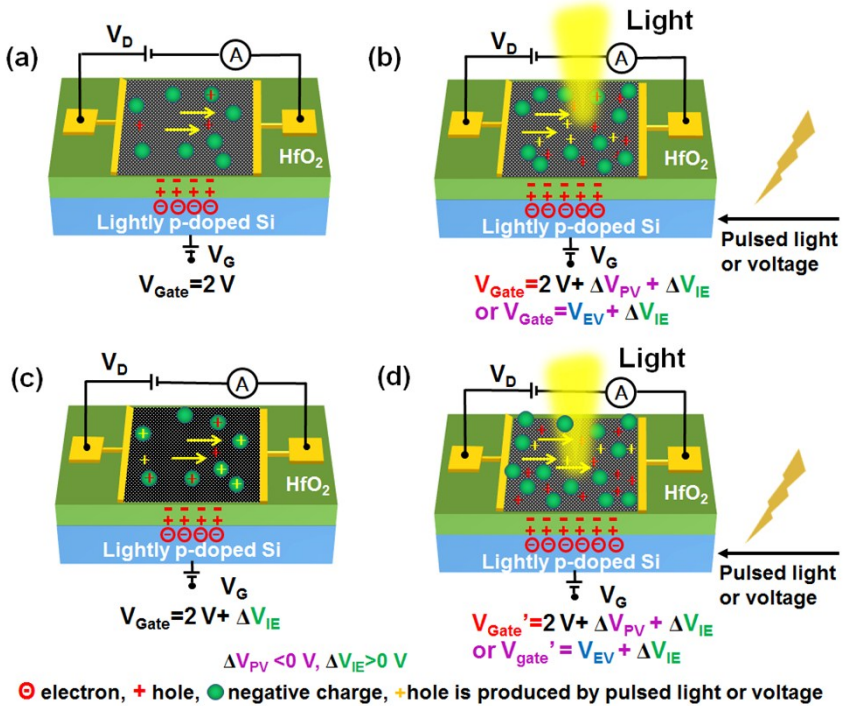

Figure S2. Schematic of carrier distributions in an optically and electrically modulated carbon nanotube synaptic transistor under the pulsed optical and electrical signals. (a) Without and (b) with optical or electrical signals, and second optical pulse cycle (c) without and (d) with optical

or electrical signal stimulation. V_{EV}, ΔV_{PV} and ΔV_{IE} represent the gate voltage, the changes of the photogating voltage and the induced voltage.

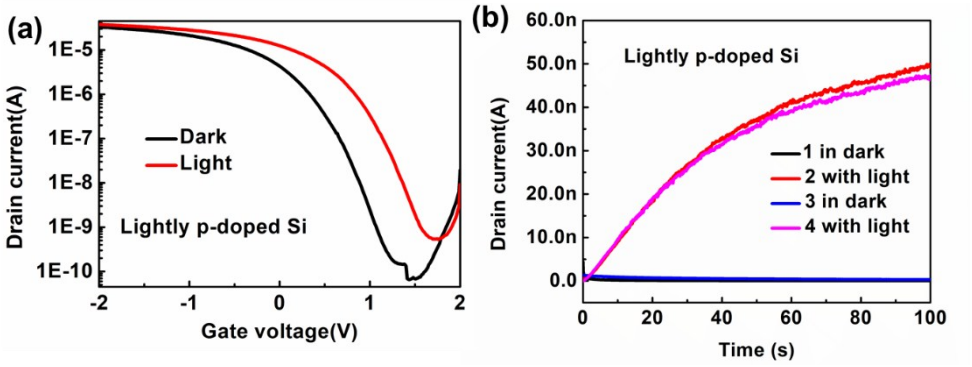

Figure S3 (a) Transfer curves under the light and dark conditions, and (b) the relationship between drain current and time under light and dark (1-4 are the test sequences).

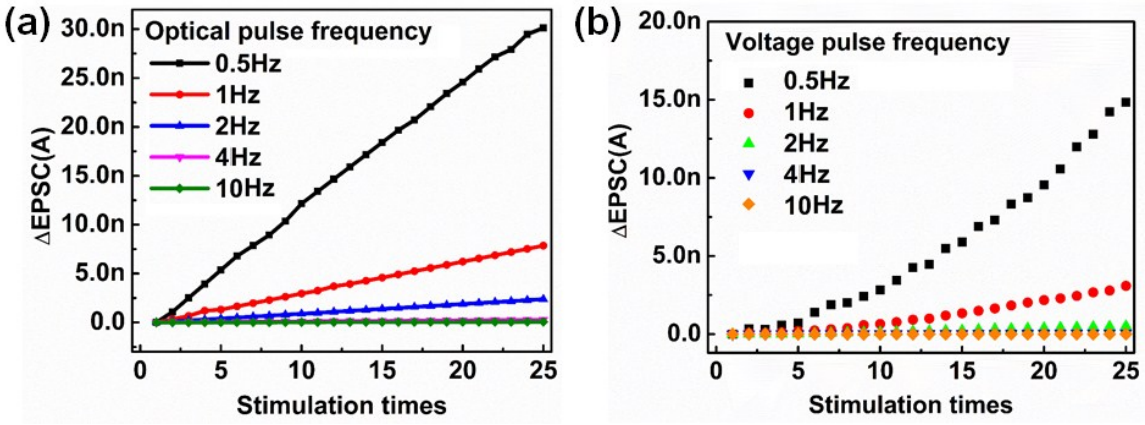

Figure S4. ΔEPSCs is defined as "An-A1", which is recorded for pre-synaptic pulse sequence under different (a) gate voltage and (b) light pulse frequency (the power of light is 50 mw).

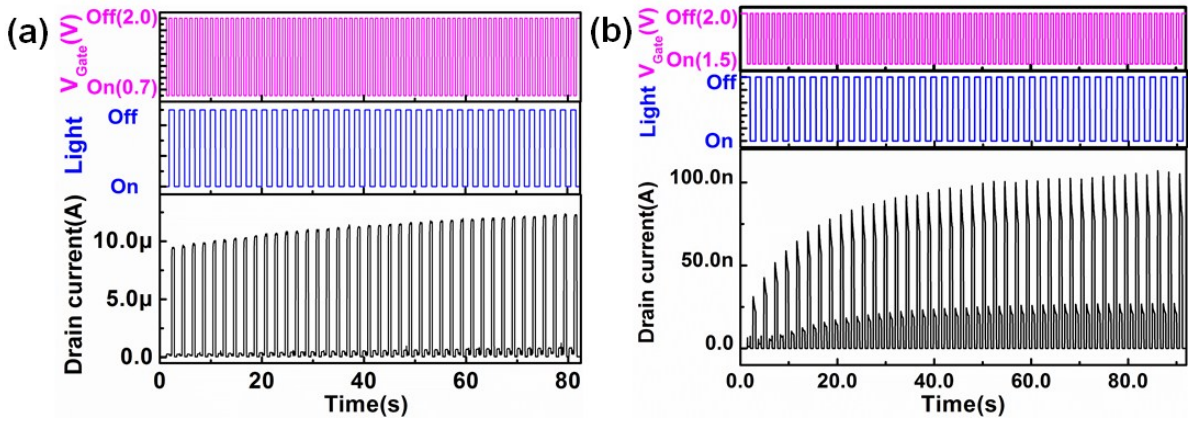

Figure S5. "NOR" logic operation with 40 cycles. Gate voltages of 2.0 and 0.7 or 1.5 V are regarded as the binary "1" and "0", and the light is on as "0" and off as "1", respectively.