

Electronic supplementary information

Conversion-Type Electrochemical Artificial Synapse for Plasticity Modulation and Dendritic Application

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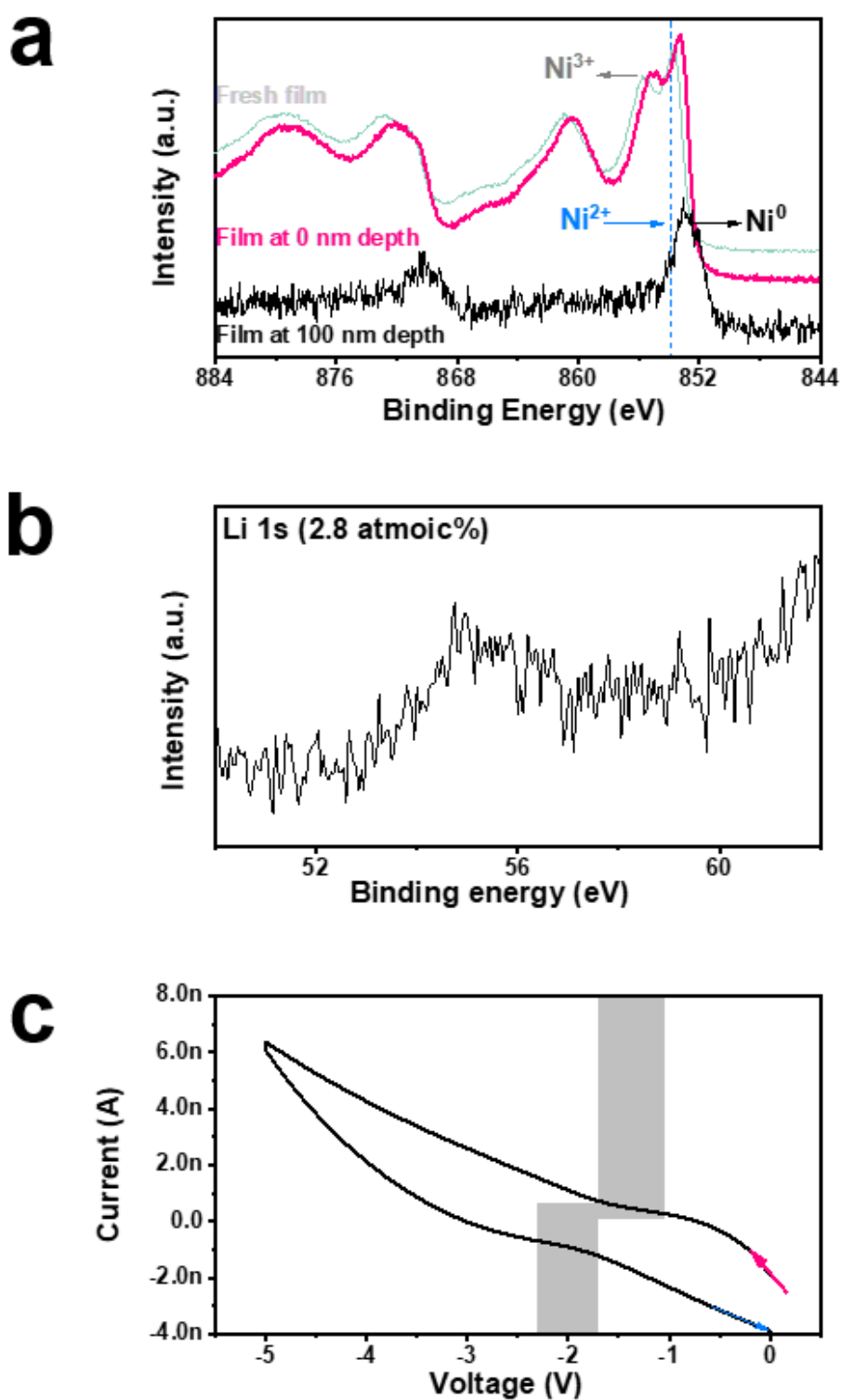


Fig. S1 (a) High-resolution Ni 2p XPS spectra in three states (fresh film, tested film at 0, and 100 nm depth) of NONP film. (b) Li 1s spectra of NONP film at 100 nm depth by XPS analysis. (c) *I-V* sweeps of the synapses.

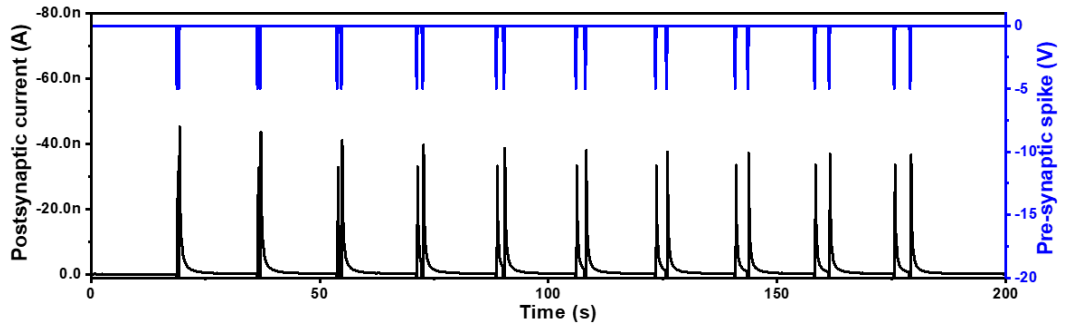


Fig. S2 Paired-pulse facilitation achieved by two successive negative pulses with various time intervals.

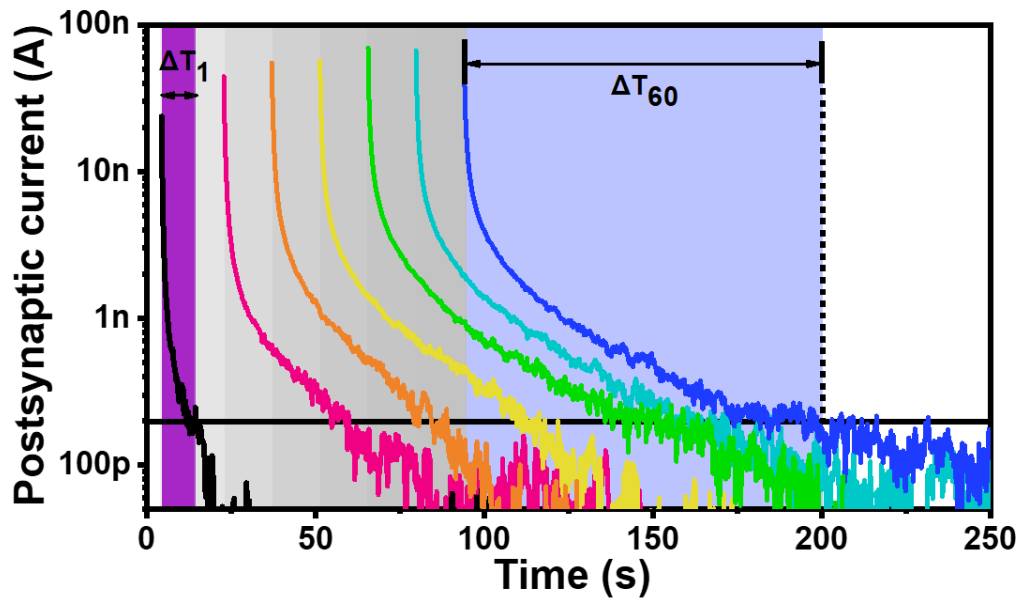


Fig. S3 Memory changes of synaptic currents after different numbers N of positive pulses (+5 V; from left to right: $N = 1, 10, 20, 30, 40, 50, 60$).

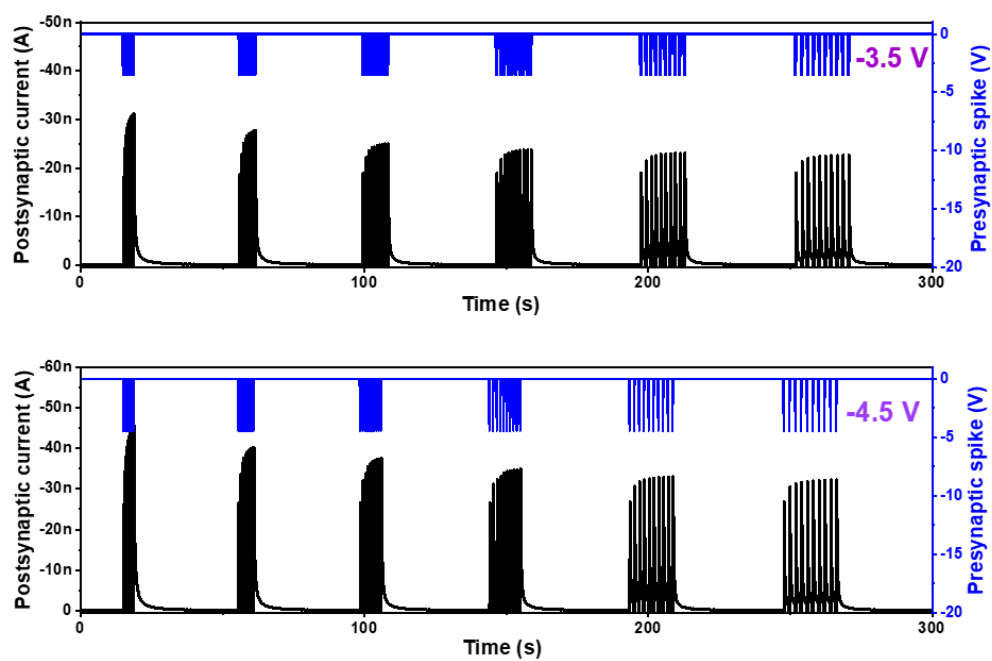


Fig. S4 SRDP at different pulse voltage (-3.5 and -4.5 V) in ECAS according to the spike rate from 1.26 s/spike to 0.36 s/spike.

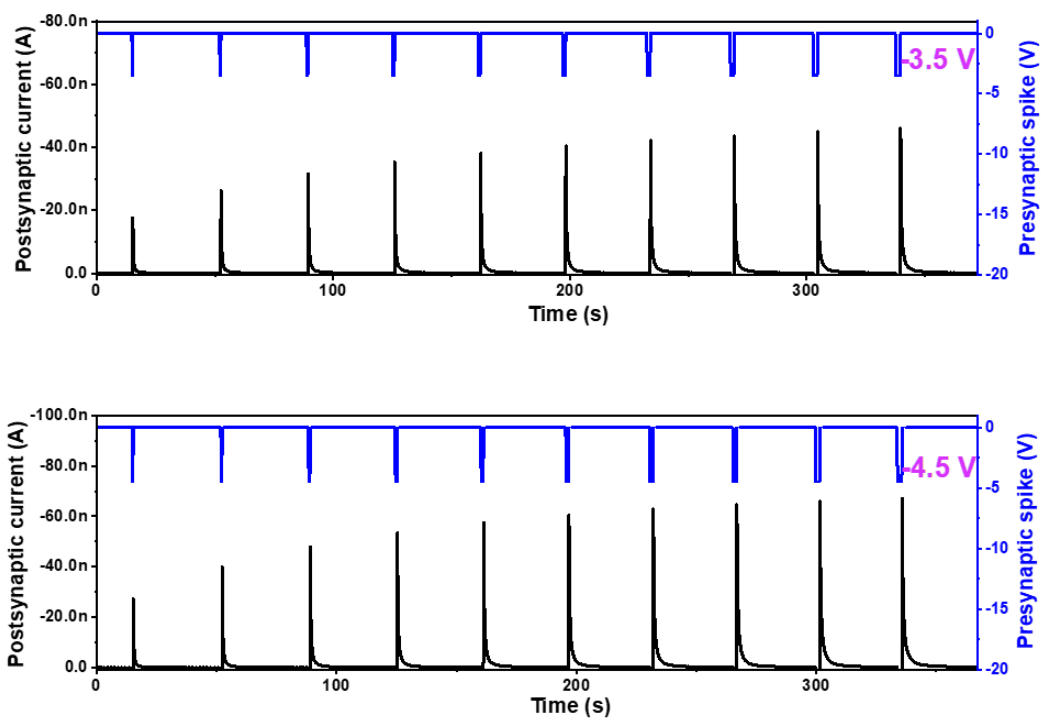


Fig. S5 SDDP at different pulse voltage (-3.5 and -4.5 V) in ECAS according to spike duration from 0.18 to 1.62 s.

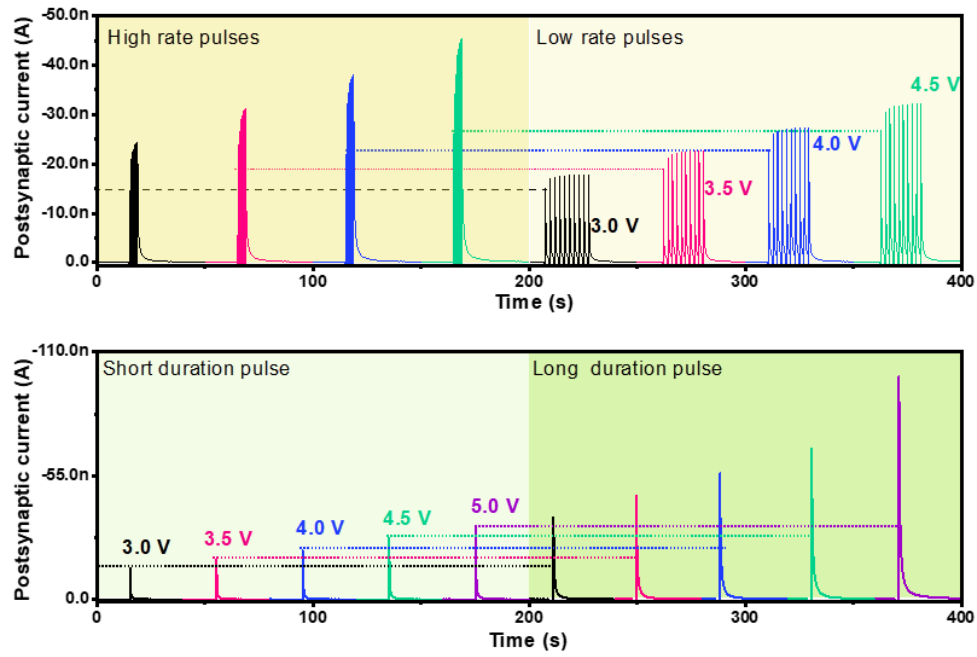


Fig. S6 Synaptic connectivity was tunable by varying amplitudes at different frequencies (high and low) or for different duration (short and long) inputs.

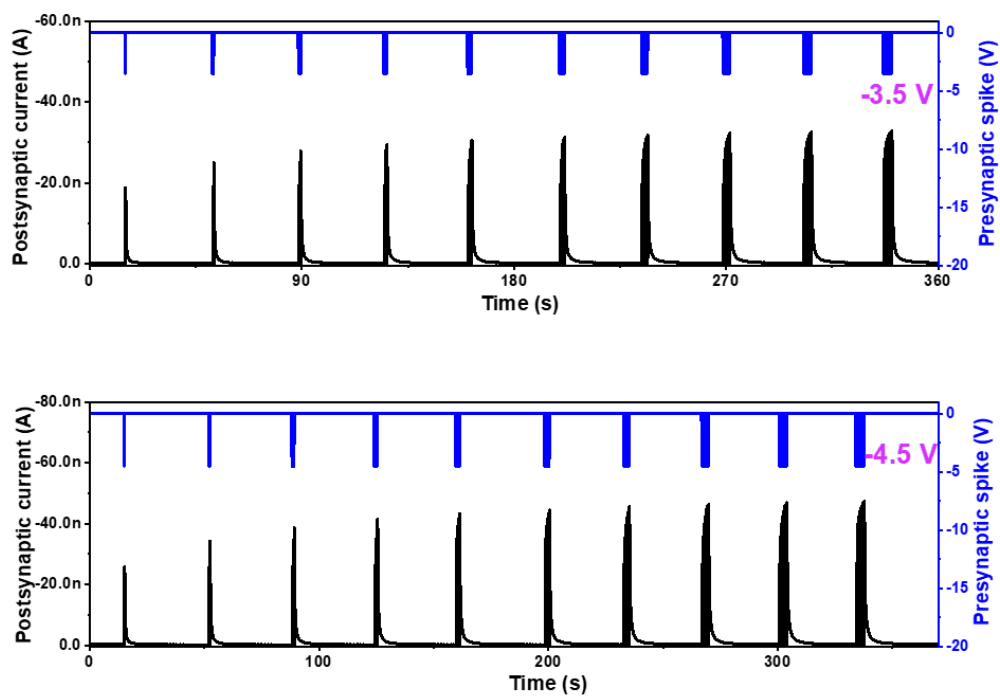


Fig. S7 SNDP at different pulse voltage (-3.5 and -4.5 V) in ECAS according to the spike number from 1 to 10.

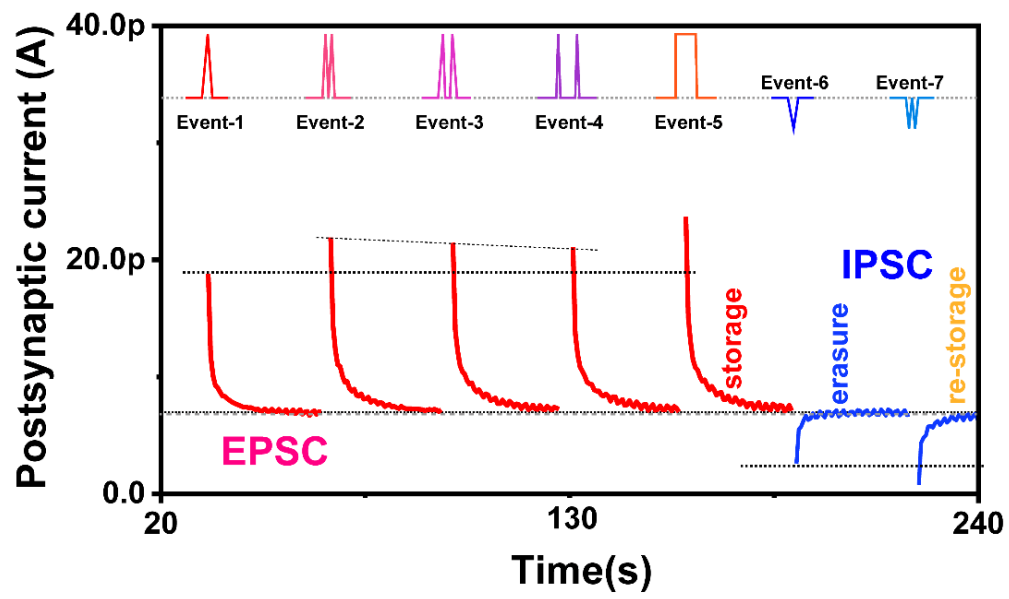


Fig. S8 Excitatory and inhibitory postsynaptic currents triggered by various pulses (5, -2 mV) for an analog information update from storage (Event-1 to Event-5) to erasure (Event-6) to re-storage (Event-7).

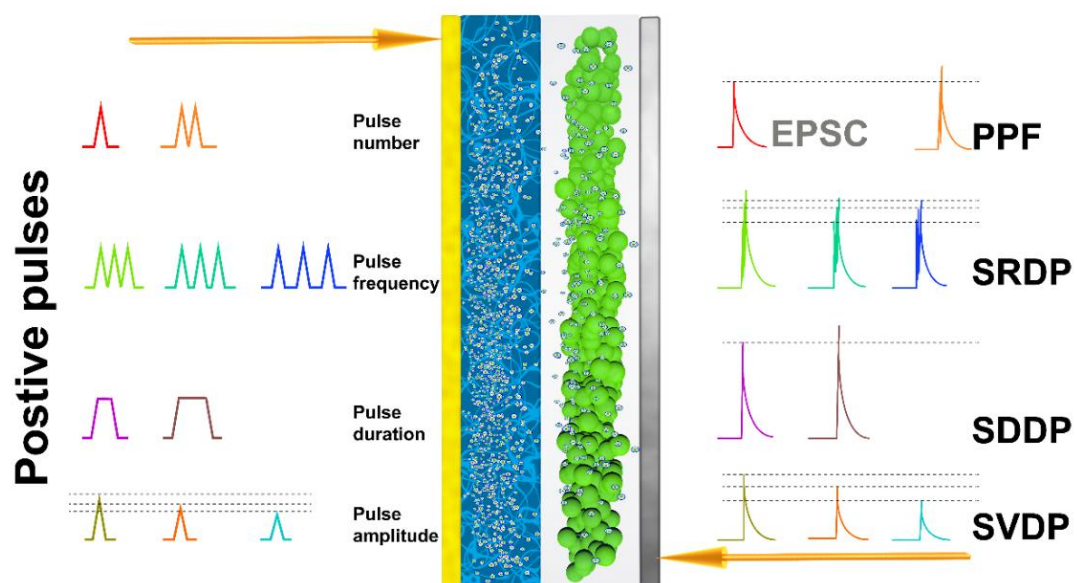


Fig. S9 Excitatory and inhibitory postsynaptic currents triggered by various pulses for an analog information update from storage (Event-1 to Event-5) to erasure (Event-6) to re-storage (Event-7).

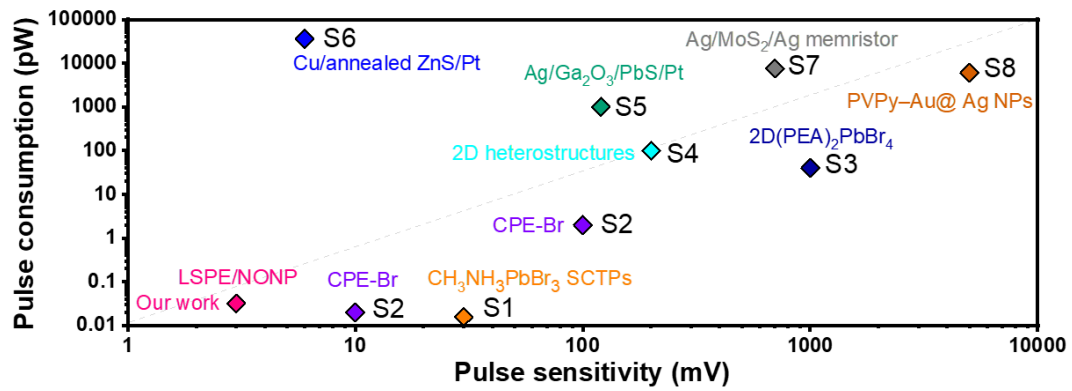


Fig. S10 Comparison of synaptic device pulse-amplitude sensitivity and power consumption with values in the literatures.

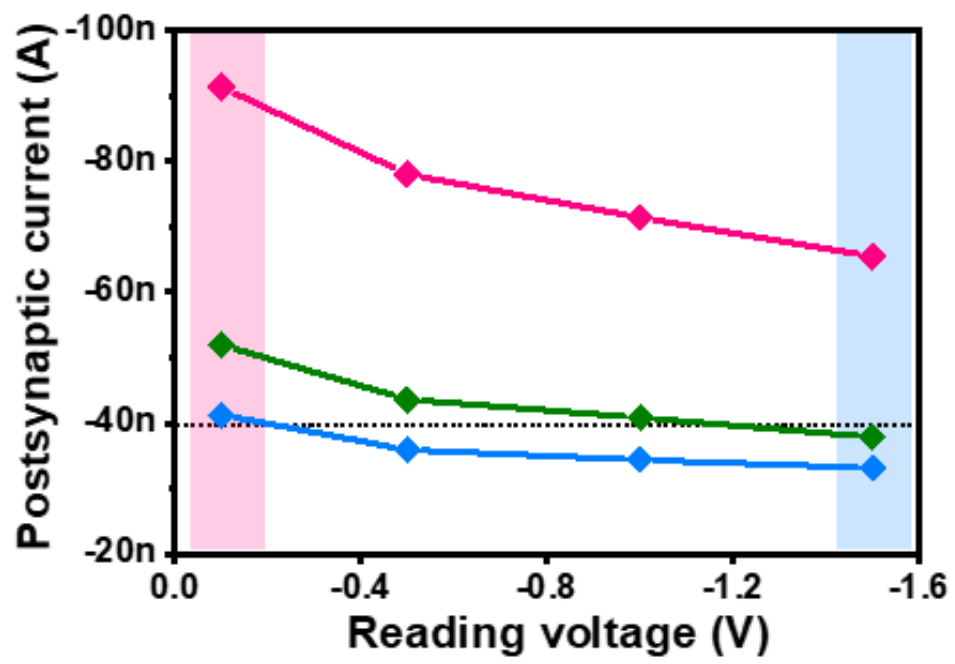


Fig. S11 Postsynaptic currents triggered by two synapses for an analog logical operation by controlling the reading voltage.

References

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