https://doi.org/10.1007/s11467-022-1173-2

RESEARCH ARTICLE

Brain-like synaptic memristor based on lithium-doped silicate for neuromorphic computing

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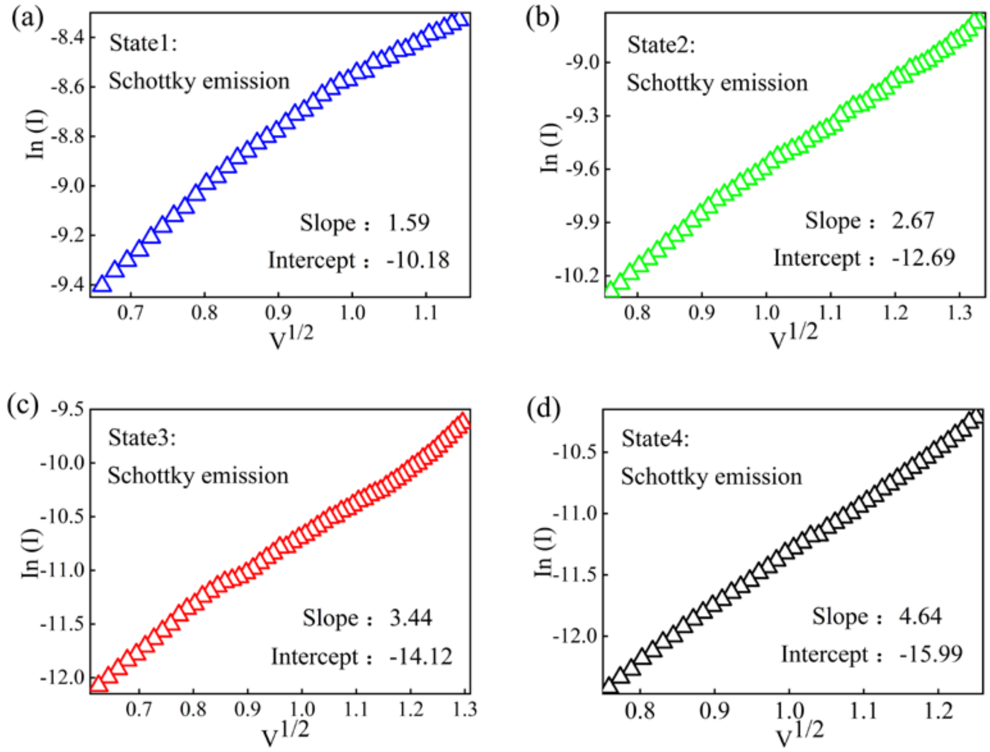
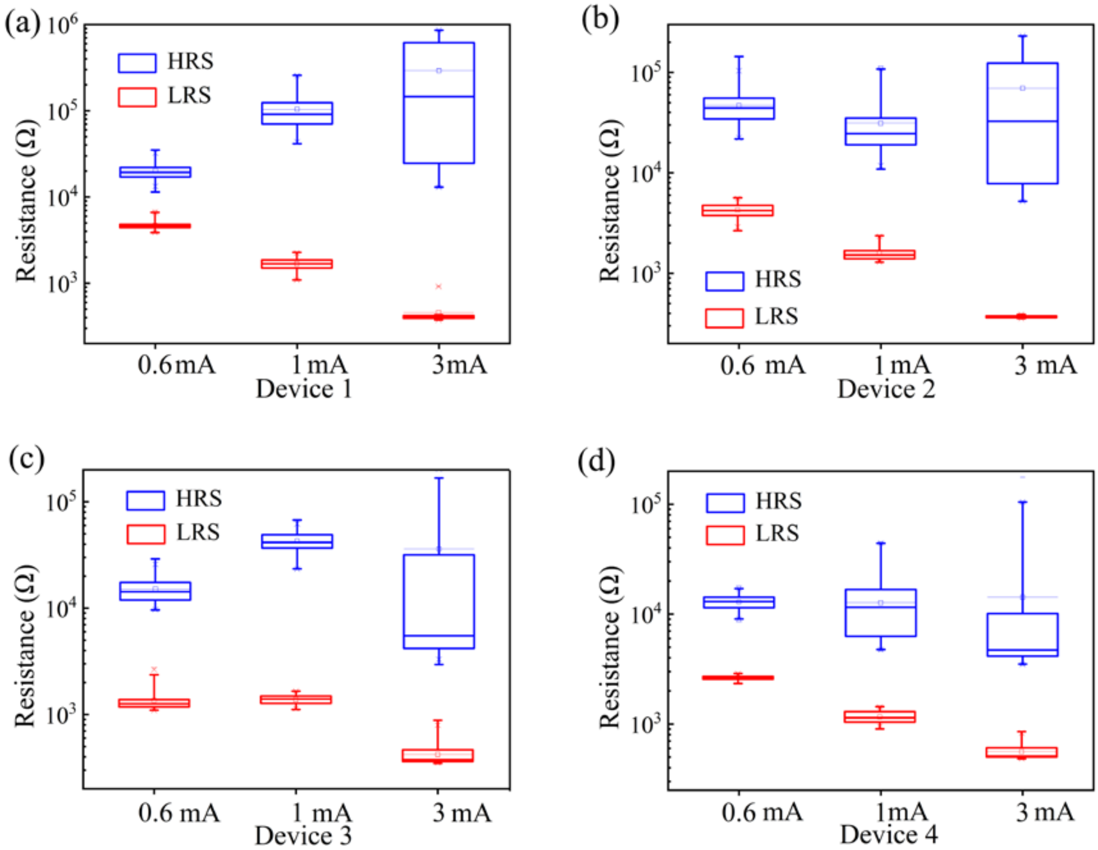
Received March 29, 2022; accepted May 12, 2022

Supporting Information

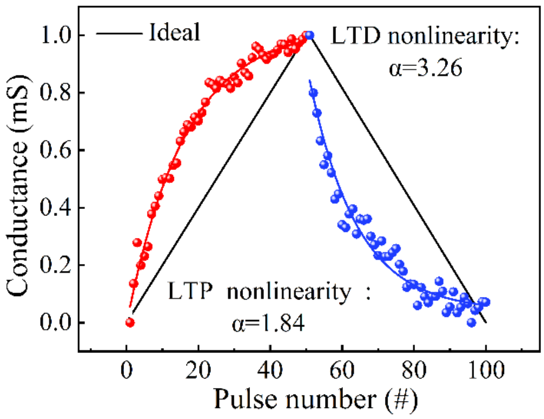
Supporting Information S1 (a)-(d) Four states *I-V* curves in the RESET process of HRS at 3 mA C. C..



Supporting Information S2 (a)-(d) The HRS and LRS distributions of four devices.



Supporting Information S3 Nonlinearity of LTP and LTD, and conductance adjustment curves under ideal condition(α=0).



To analyze the impact of nonlinear weight on recognition accuracy, the conductance change of LTP (G_{LTP}) and LTD (G_{LTD}) with the number of pulses (P) can be fitted by the following equations: [1]

$$B = \frac{G_{max} - G_{min}}{1 - \exp(\frac{-P_{max}}{A})} \tag{1}$$

$$G_{LTP} = B\left(1 - \exp\left(\frac{-P}{A}\right)\right) + G_{min} \tag{2}$$

$$G_{LTD} = -B\left(1 - \exp\left(\frac{P - P_{max}}{A}\right)\right) + G_{max} \tag{3}$$

$$\alpha = \frac{1.726}{A+0.162} \quad (4)$$

where G_{max}, G_{min} and P_{max} represent the maximum conductance, minimum conductance and pulse number in the experimental data. A is the parameter that controls the nonlinear behavior of the weight update, and B is simply a function of A that fits the functions(1). The experimental results show that the nonlinear factors of LTP and LTD are 1.84 and 3.26, respectively, which is better than the pure SiO_2 memristor in these paper [2-4].

References

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