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Supplementary information

DNA strands assisted conductive filament mechanism for improved resistive switching memory

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1. Additional data

1.1 *The I-V characteristics curve of Au/CuO/Au/Si device*

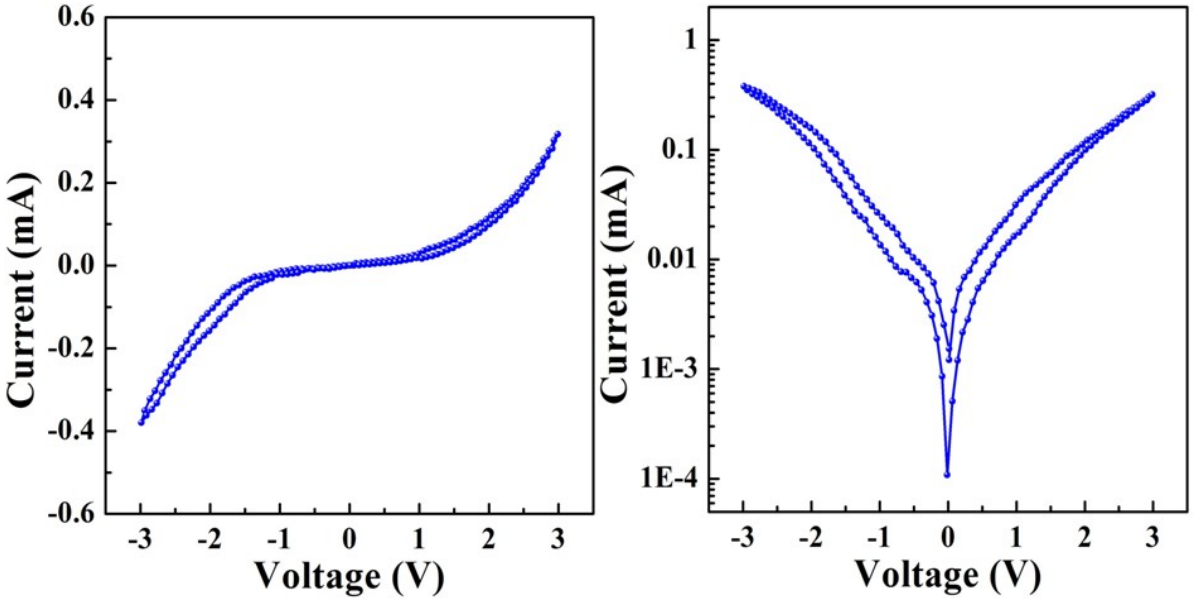

Figure S1. (a) The typical current-voltage (I-V) characteristics curve of Au/CuO/Au/Si structure. (c) The corresponding I–V curves on a logarithmic scale.

1.2 *The sequential write-read-erase-read operations*

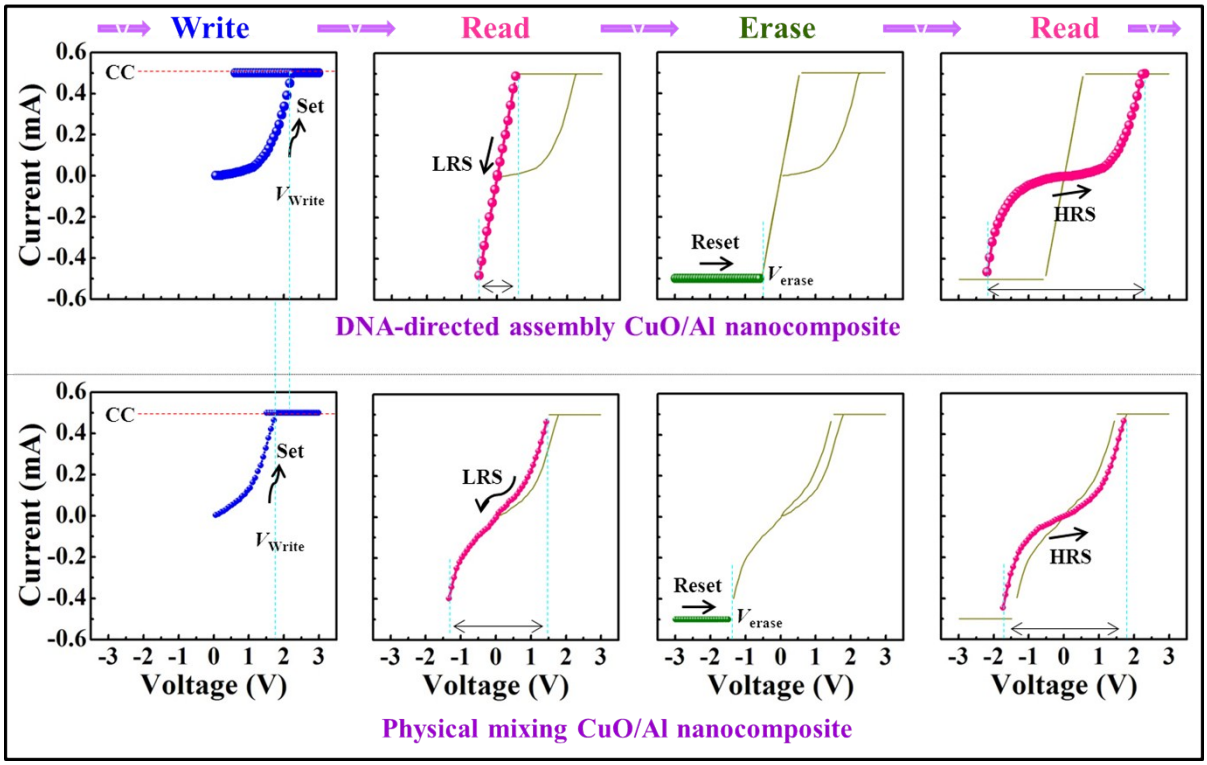

Figure S2. The sequential write-read-erase-read operations yielded the corresponding current-voltage (I–V) behaviours of the Au/CuO-DNA-Al/Au/Si and Au/CuO-Al/Au/Si devices respectively.

	V_{Write}	V_{Read}	V_{Erase}
CuO-DNA-Al	2.25 V	0.60 V ~ -0.60 V (LRS) -2.25 V ~ 2.25 V (HRS)	-0.60 V
CuO-Al	1.75 V	1.50 V ~ -1.40 V (LRS) -1.75 V ~ 1.75 V(HRS)	-1.40 V

Table S1. The sequential write-read-erase-read operation voltages for the Au/CuO-DNA-Al/Au/Si and Au/CuO-Al/Au/Si devices respectively. For Au/CuO-DNA-Al/Au/Si device, it display a well resistive switching behavior with an abrupt written voltage V_{write} of 2.25 V under the compliance current (CC) of 0.5 mA. Then it displays a single LRS state with read behavior with operating voltage range from 0.6 V to -0.6 V. Next, this device can erase the storage information with an obvious erase voltage of

-0.6 V, which is called V_{erase}. Finally, this device exhibit a correspondent HRS state with read behavior with operating voltage range from -2.25 V to 2.25 V again. If we call the LRS is logic “0”, then HRS is logic “1” for this device. Thus the device exhibit memristive switching. However, for Au/CuO-Al/Au/Si device, it is greatly obvious that the V_{write} and V_{erase} is become smaller, and the voltage range of LRS and HRS state is become close. Therefore, the resistive switching behaviors of Au/CuO-DNA-Al/Au/Si device is more practical application in data storage technologies because their logic states have obvious differences, which allow information to be written to the device once, and the data may be subsequently erased or deleted from the device.