

## **Supplementary Information to “Magnetism Modulation and Conductance Quantization in a Gadolinium Oxide Memristor”**

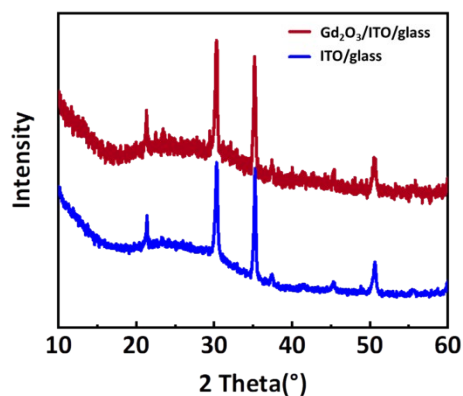
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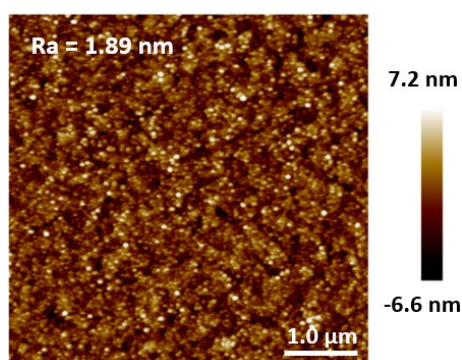
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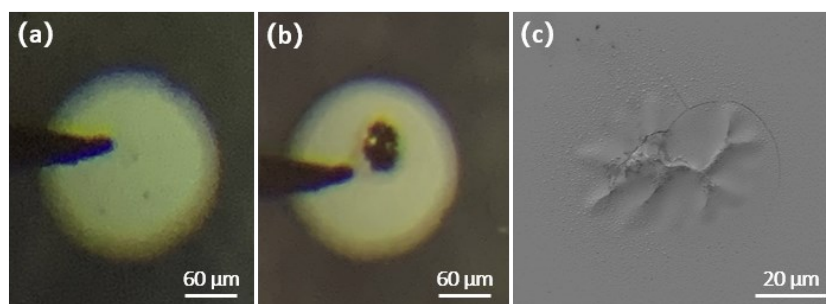
**Fig. S1** XRD pattern of the as-deposited  $\text{Gd}_2\text{O}_3$  film on an ITO-coated glass substrate.



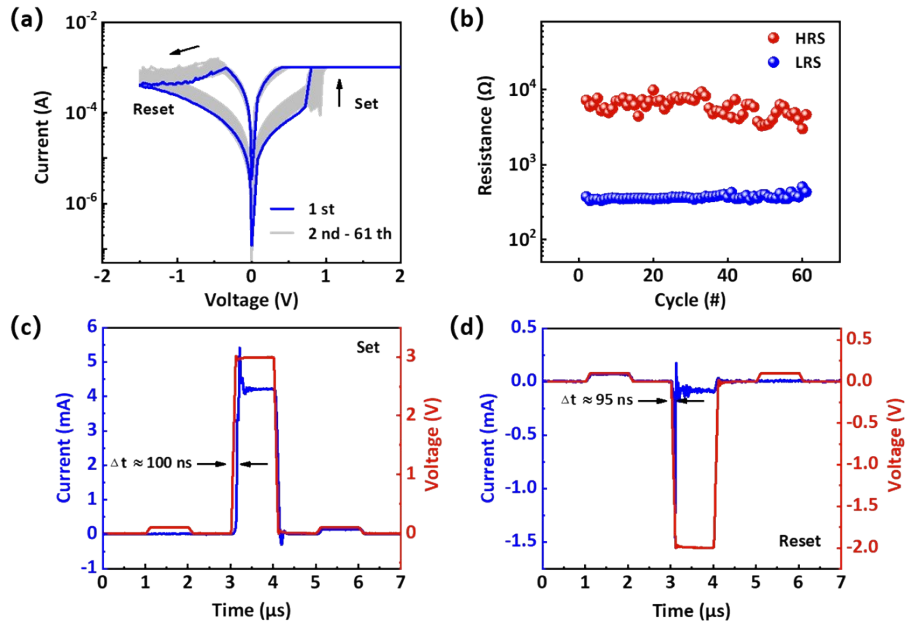
**Fig. S2** Surface morphology of the as-deposited  $\text{Gd}_2\text{O}_3$  film on the ITO substrate.



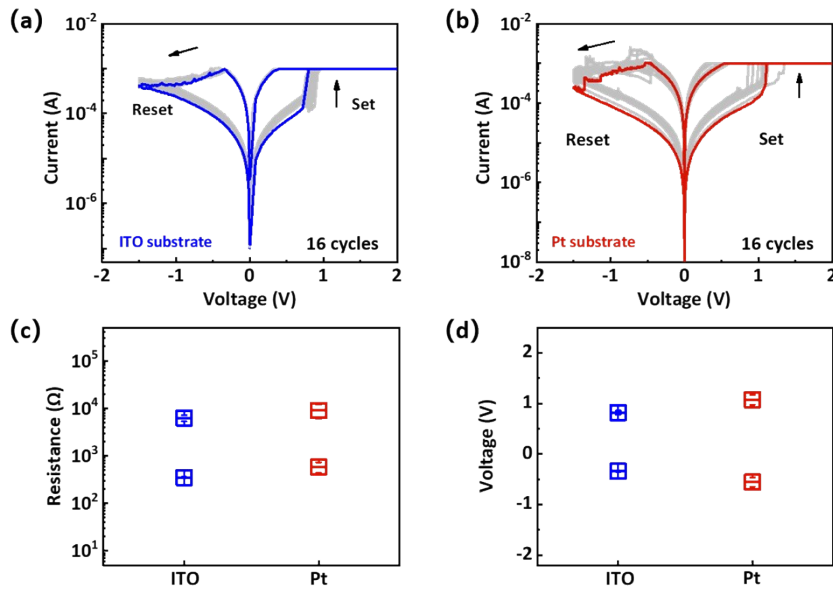
**Fig. S3** (a,b) Optical microscope images of the Pt TE in original state and after device operation. (c) Scanning electron microscope (SEM) image of the bubble region of the Pt TE after device operation.



**Fig. S4** (a,b) Switching endurance and (c,d) operation speed of the Pt/Gd<sub>2</sub>O<sub>3</sub>/ITO memristor.



**Fig. S5** Comparison in (a,b)  $I-V$  curves and (c,d) switching parameters of the Pt/Gd<sub>2</sub>O<sub>3</sub>/ITO and Pt/Gd<sub>2</sub>O<sub>3</sub>/Pt memristors.



**Fig. S6**  $I$ - $V$  curves of the Pt/Gd<sub>2</sub>O<sub>3</sub>/ITO memristor with gradually changing stop voltages from -0.5 to -1 V with the increment of -0.05 V.

