

## Supplementary Material

### Nanoscale mapping of temperature-dependent conduction in an epitaxial VO<sub>2</sub> film grown on Al<sub>2</sub>O<sub>3</sub> substrate

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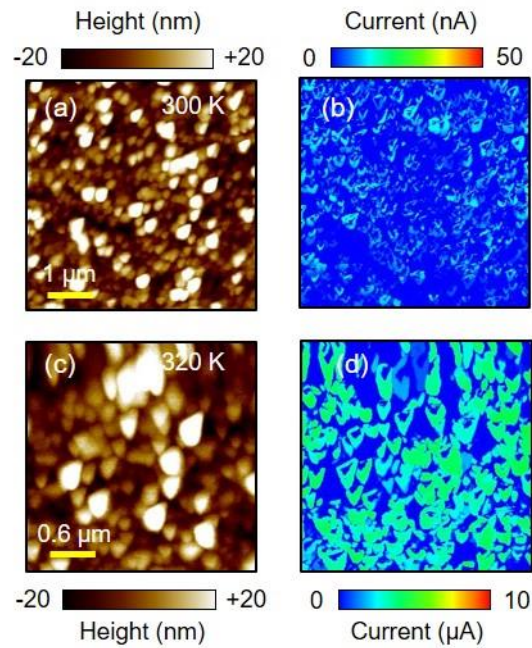
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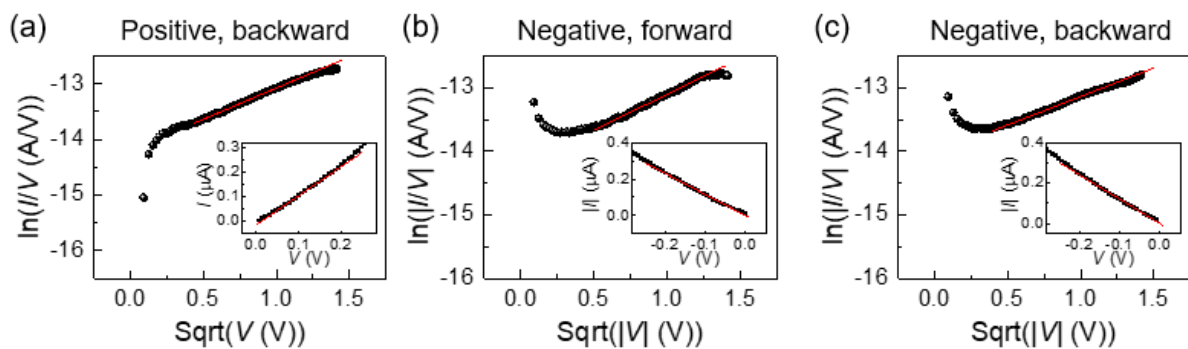
Supplementary Figs. S1 – S3

## 1. C-AFM measurements under the nitrogen gas environment



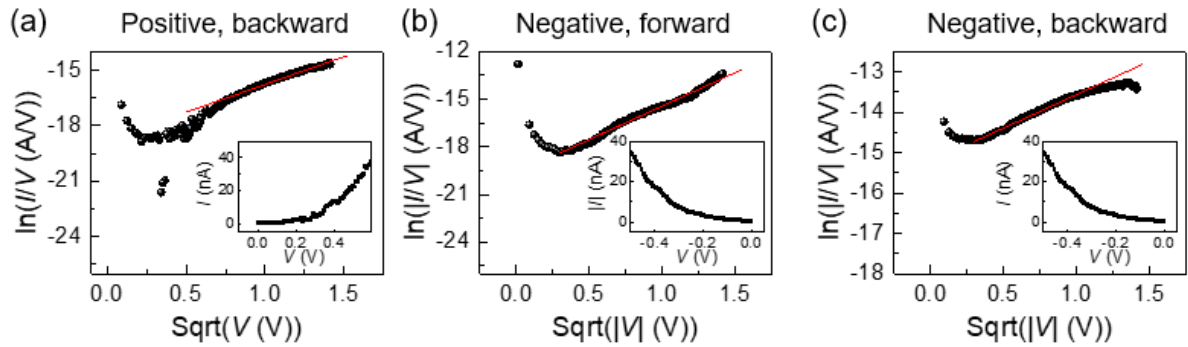
**FIG. S1.** Simultaneously obtained (a), (c) topography images and (b), (d) conductance maps under the nitrogen gas environment. The measured temperatures were (a), (b) 300 K and (c), (d) 320 K. The scan sizes were (a), (b)  $5 \times 5 \mu\text{m}^2$  and (c), (d)  $3 \times 3 \mu\text{m}^2$ . Note that similar donut patterns and their temperature-dependent evolution (i.e., the increases of current level and conductive region) were observed without any noticeable differences under the nitrogen gas environment.

## 2. $I$ - $V$ curves in the first Bayesian endmember



**FIG. S2.** The plots of  $\ln(I/V)$  versus  $\sqrt{V}$  of (a) the backward  $I$ - $V$  curve in the positive voltage region and (b) the forward and (c) backward  $I$ - $V$  curves in the negative voltage region of the first Bayesian endmembers. The insets in (a) – (c) show the current responses for the small voltage regions. The solid red lines in (a) – (c) correspond to the linear fitting results.

### 3. $I$ - $V$ curves in the second Bayesian endmember



**FIG. S3.** The plots of  $\ln(I/V)$  versus  $\sqrt{V}$  of (a) the backward  $I$ - $V$  curve in the positive voltage region and (b) the forward and (c) backward  $I$ - $V$  curves in the negative voltage region of the second Bayesian endmembers. The insets in (a) – (c) show the current responses for the small voltage regions. The solid red lines in (a) – (c) are the linear fitting results.