Supporting Information

Thin TiO$_x$ layer as a voltage divider layer located at the quasi-Ohmic junction in the Pt/Ta$_2$O$_5$/Ta resistance switching memory

Xiang Yuan Li,[a] Xing Long Shao,[b] Yi Chuan Wang,[a] Hao Jiang,[a] Cheol Seong Hwang,[*,b] and Jin Shi Zhao[#,a]

[a] School of Electronics Information Engineering, Tianjin Key Laboratory of Film Electronic & Communication Devices, Tianjin University of Technology, No. 391, Binshuixi Road, Xiqing District, Tianjin, 300384, China

[b] Department of Materials Science and Engineering and Inter-university Semiconductor Research Center, Seoul National University, Gwanak-ro 1, Daehag-dong, Gwanak-gu, Seoul, 151-744, Republic of Korea

[*] Author to whom correspondence should be addressed: jinshi58@163.com

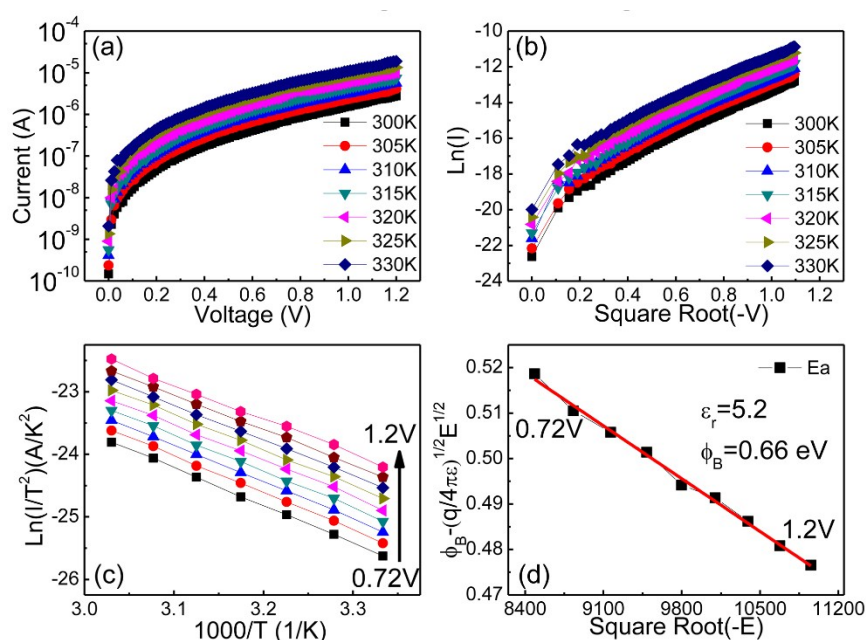[#] Author to whom correspondence should be addressed: cheolsh@snu.ac.kr

Fig. S1 (a) The I-V curves of the pristine w/Ti sample in the positive bias region, which were measured at temperatures ranging from 300 K to 330 K. (b) The replotted data in (a) according to Schottky emission formula. (c) The $Ln (I/T^2)$ was plotted as a function of $1000/T$ at various

voltages that ranged from 0.72 V to 1.2 V to calculate the E_a, and the results are summarized
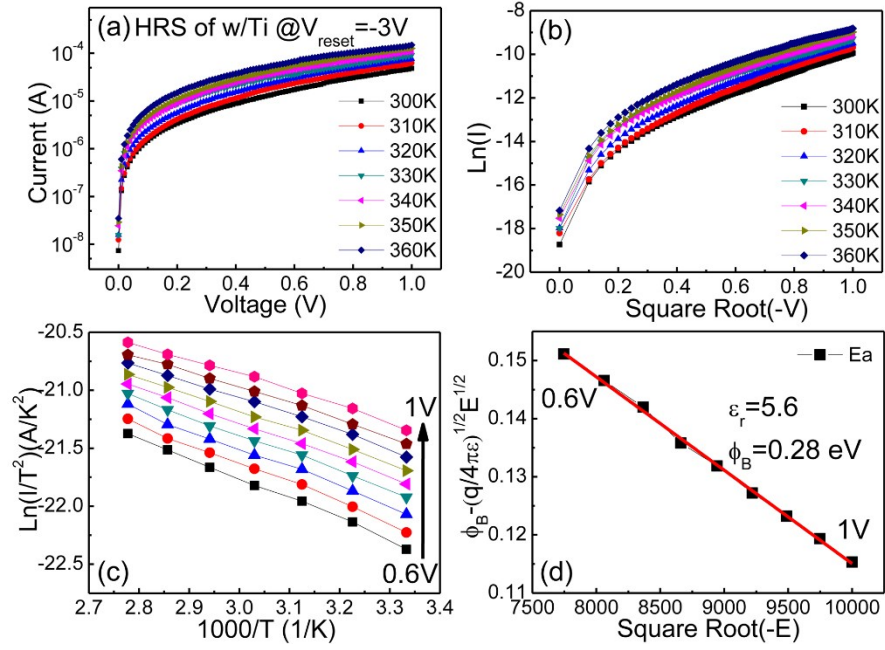
in (d).

Fig. S2 (a) The I-V curves of the HRS for the w/Ti sample in the positive bias region, which

were measured at temperatures ranging from 300K to 360 K. (b) The replotted data in (a)

according to Schottky emission formula. (c) The *Ln (I/T²)* was plotted as a function of *1000/T*

at various voltages that ranged from 0.6 V to 1.0 V to calculate the E_a, and the results are

summarized in (d).