## **Supplementary Information**

## Resistive Switching of Sn-doped In<sub>2</sub>O<sub>3</sub>/HfO<sub>2</sub> core–shell nanowire: Geometry Architecture Engineering for Nonvolatile Memory

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**Figure S1** (a) A TEM image of an ITO NW gown from a Au catalyst. (b) Corresponding selected area diffraction pattern. (c)High resolution TEM image is taken from (a).



**Figure S2** (a) A high resolution TEM image of the  $HfO_2/ITO$  core-shell nanowire. (b)The corresponding fast Fourier transform image of the ITO NW. (c) The corresponding fast Fourier transform image of the  $HfO_2$  shell.



Figure S3 XRD spectra of ITO/HfO<sub>2</sub> core-shell NWs.



Figure S4 Chemical components of In, Sn, Hf and O on ITO/HfO<sub>2</sub> core-shell nanowires *via* XPS analysis.



**Figure S5** (a) Typical *I-V* characteristics of an ITO NW in semi-log scale. (b) Typical *I-V* characteristics of an ITO NW in linear scale.



Figure S6 (a) Typical *I-V* characteristics of the Au/Ti/ITO-HfO<sub>2</sub> (10 nm) NW/Ti/Au device operated at the forming process. (b) Typical *I-V* characteristics of resistive switching behavior for the Au/Ti/ITO-HfO<sub>2</sub> (10 nm) NW/Ti/Au in semi-log scale. (c) Endurance test of the Au/Ti/ITO-HfO<sub>2</sub> (10 nm) NW/Ti/Au device under the DC switching sweep mode at the read voltage of 0.1 V.