SUPPORTING INFORMATION FOR

Resistive Random Access Memory Enabled by Carbon Nanotube Crossbar Electrodes

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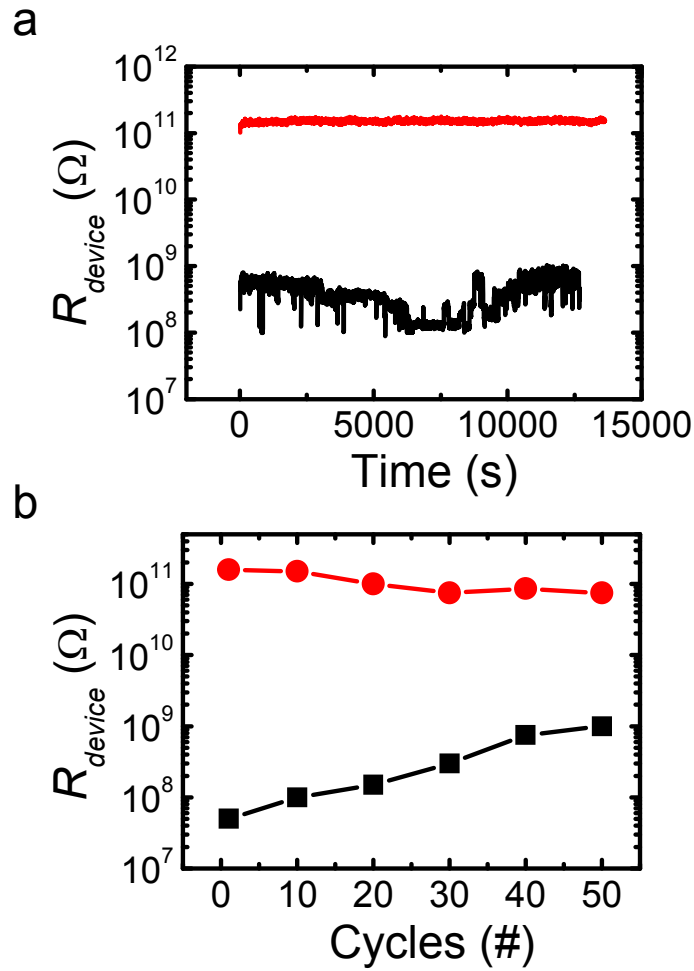
Figure S1. (a) Retention with top electrode voltage = 1.5 V and (b) endurance behavior of a metallic CNT (two CNTs on top)/AlO$_x$/metallic CNT (one CNT on bottom) RRAM at room temperature. The black squares represent LRS and the red circles represent HRS.
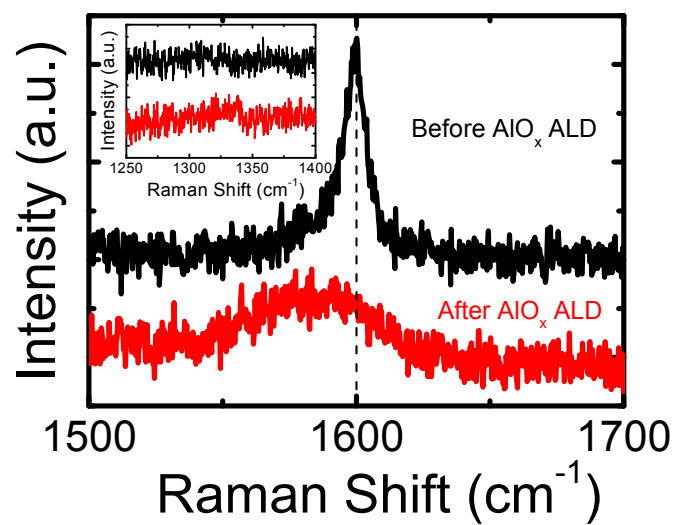
Figure S2. G-band and D-band (inset) regions of the Raman spectrum of a metallic CNT before (black) and after (red) atomic layer deposition of AlO_x. The Raman spectra are offset for clarity. The dash line is included as a guide.
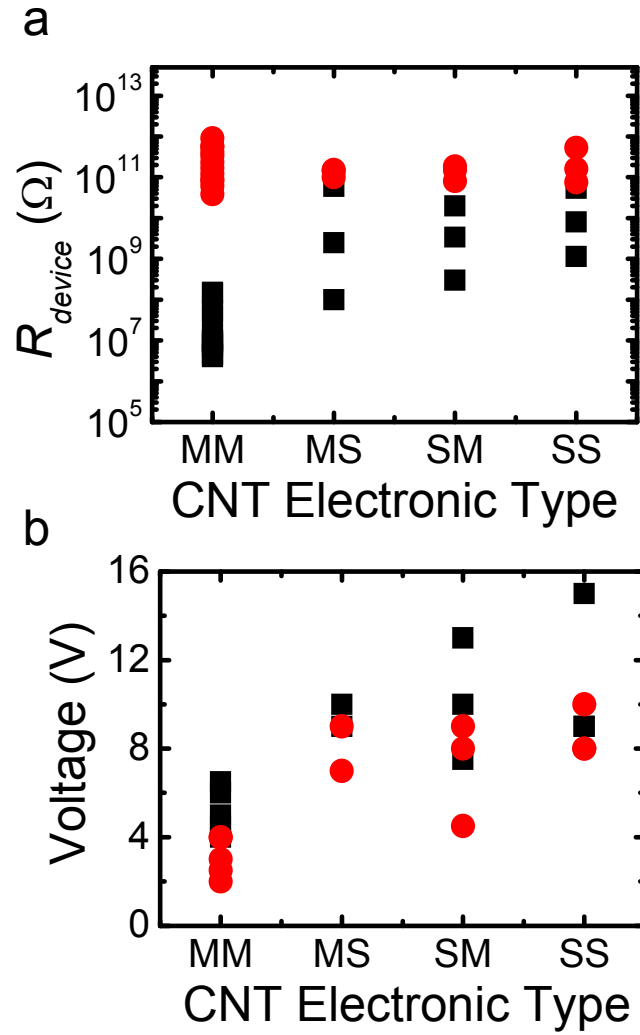
Figure S3. (a) Resistive Random Access Memory (RRAM) device resistance of high-resistance state (HRS) (red circles) and low-resistance state (LRS) (black squares). (b) Set (black squares) and reset (red circles) voltages as a function of CNT electronic type. Only devices that can undergo multiple switching cycles are plotted in (b). The letters M and S stand for metallic and semiconducting, respectively with the first letter representing the electronic type of the top CNT electrode and the second letter representing that of the bottom CNT electrode (*e.g.*, "MS" refers to metallic top CNT electrode and semiconducting bottom CNT electrode).
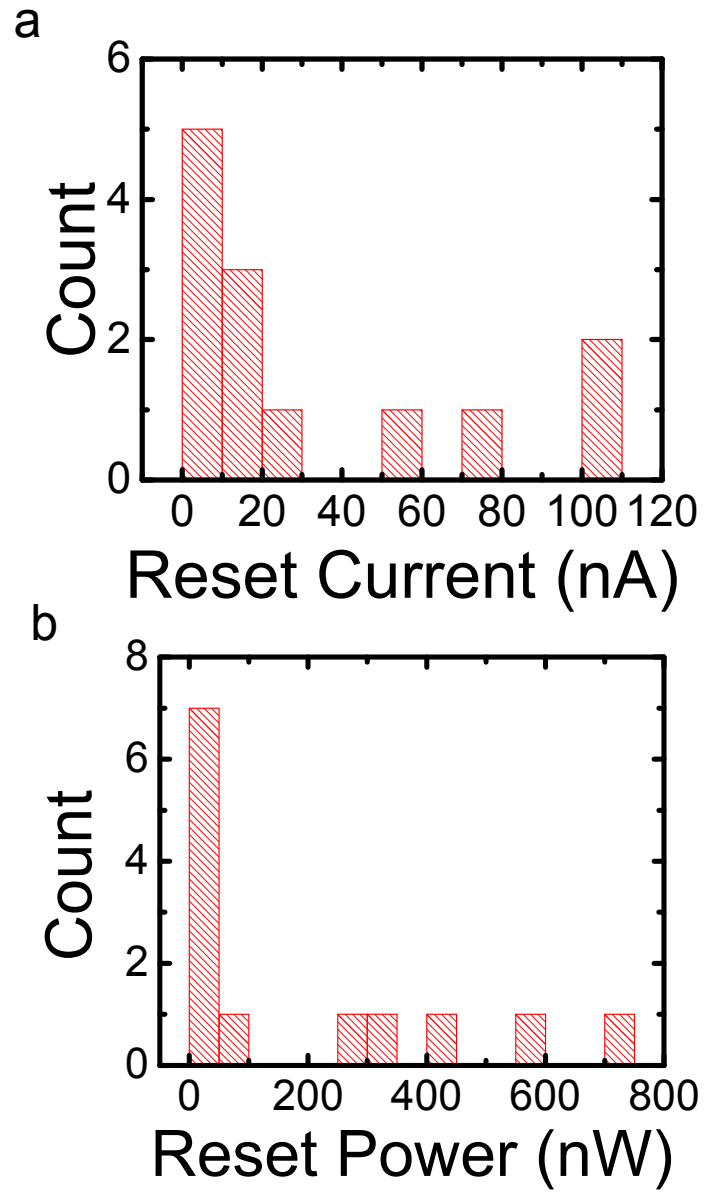
Figure S4. Histogram of (a) reset current (bin size of 10 nA) and (b) reset power (bin size of 50 nW) of AlO$_x$/CNT crossbar RRAMs.