Supporting Information

Fabrication of high performance memristor device by metallization of Ag^+ inside a solution processed Li_5AlO_4 thin film

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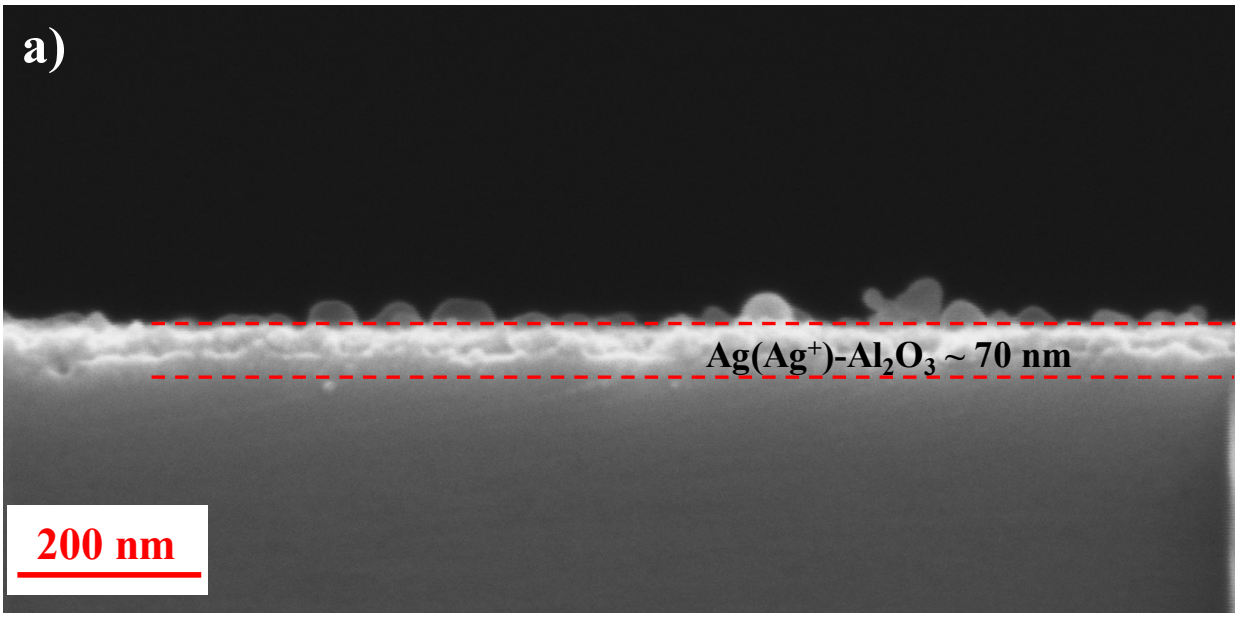

Figure S1. Cross-sectional SEM image for a) p^+-Si/Ag(Ag^+)-Al_2O_3.

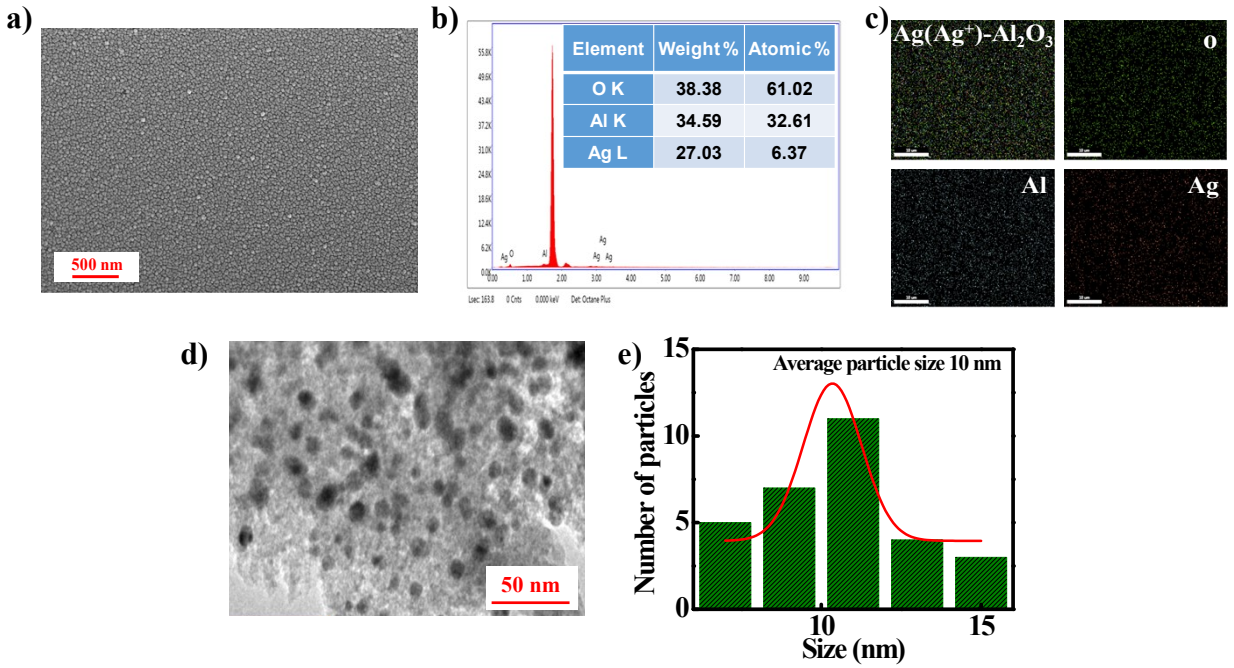

Figure S2. a) HR-SEM image of the $Ag(Ag^{+})$-Al_2O_3 thin film. b) EDX studies. c) Color mapping analysis of $Ag(Ag^{+})$-Al_2O_3. d) $Ag(Ag^{+})$-Al_2O_3 thin film image captured by TEM. e) Ag (NPs) particle size distribution inside an Al_2O_3 matrix as seen in a TEM image.

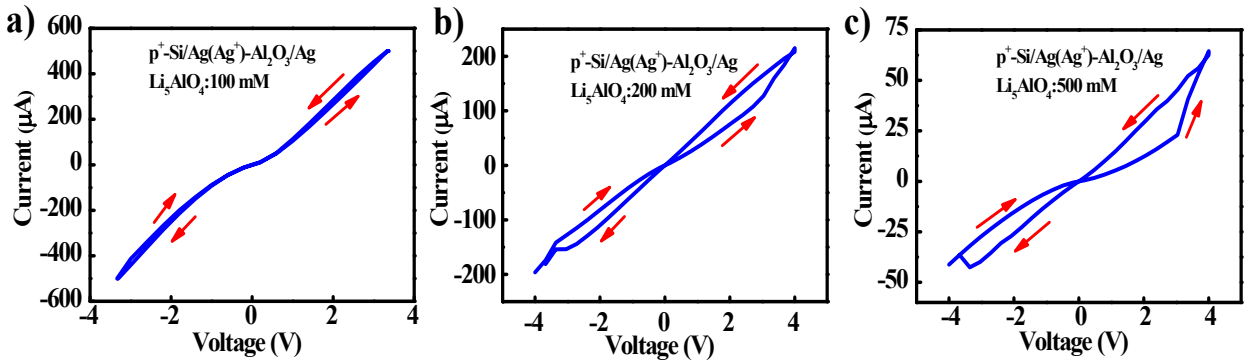

Figure S3. Current & Voltage curve of device p^{+}-Si/$Ag(Ag^{+})$-Al_2O_3/Ag with concentrations of a)100 mM b) 200 mM and, c) 500 mM of Li_5AlO_4 ion conducting dielectric.

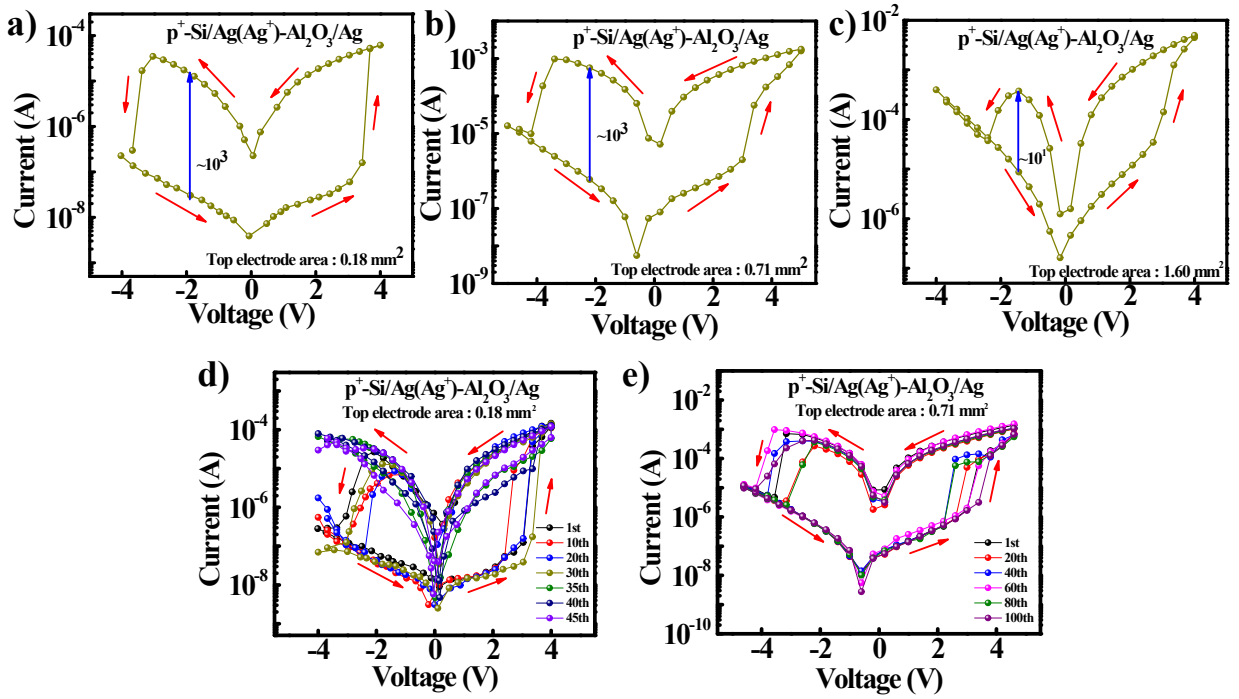

Figure S4. Current & Voltage curve of device p^+-Si/Ag(Ag^+)-Al_2O_3/Ag with top electrode area of a) 0.18 mm^2 b) 0.71 mm^2 and, c) 1.60 mm^2. Current vs. Voltage curve of p^+-Si/Ag(Ag^+)-Al_2O_3/Ag on a semi-logarithmic scale for continuous measurement with top electrode area d) 0.18 mm^2 and e) 0.71 mm^2.

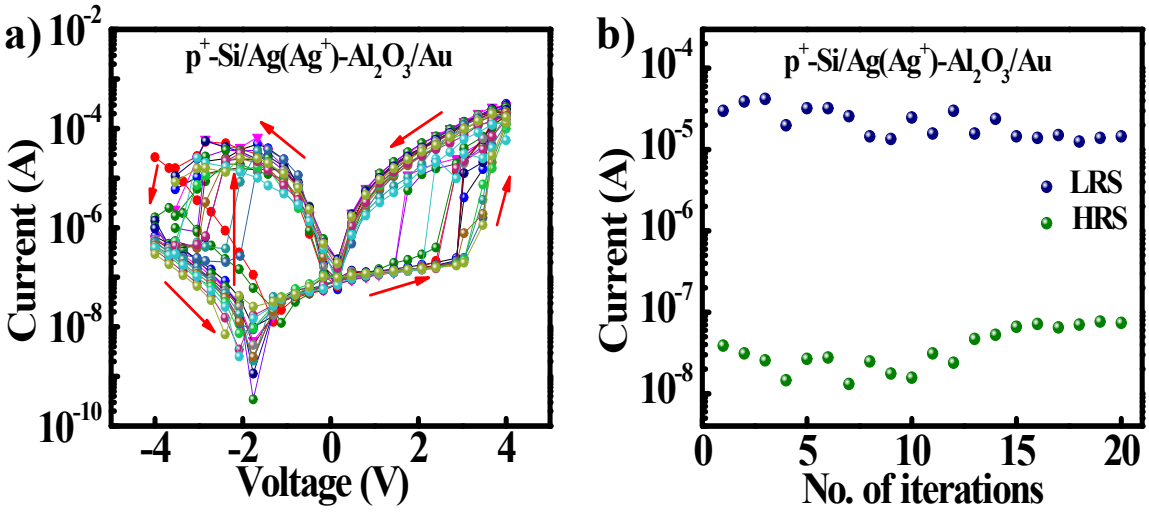

Figure S5. a) Current vs. Voltage curve of p^+-Si/Ag(Ag^+)-Al_2O_3/Au on a semi-logarithmic scale, b) Endurance property of p^+-Si/ Ag(Ag^+)-Al_2O_3/Au for 20 cycles of continuous measurement.

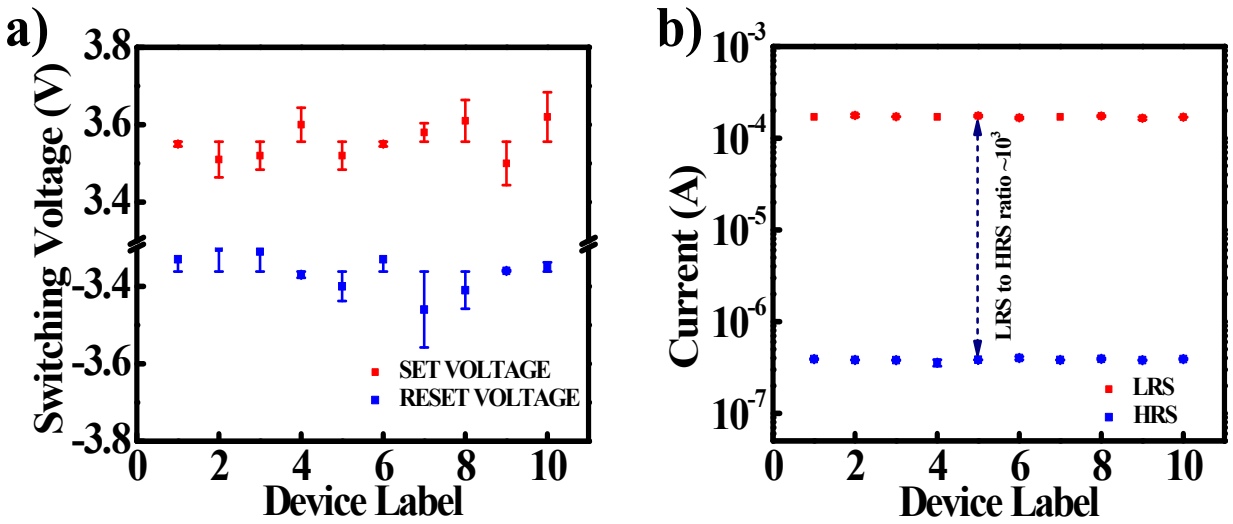

Figure S6. a) Measured device-to-device variation of switching voltage distribution. b) Measured device-to-device variation of HRS and LRS distributions.

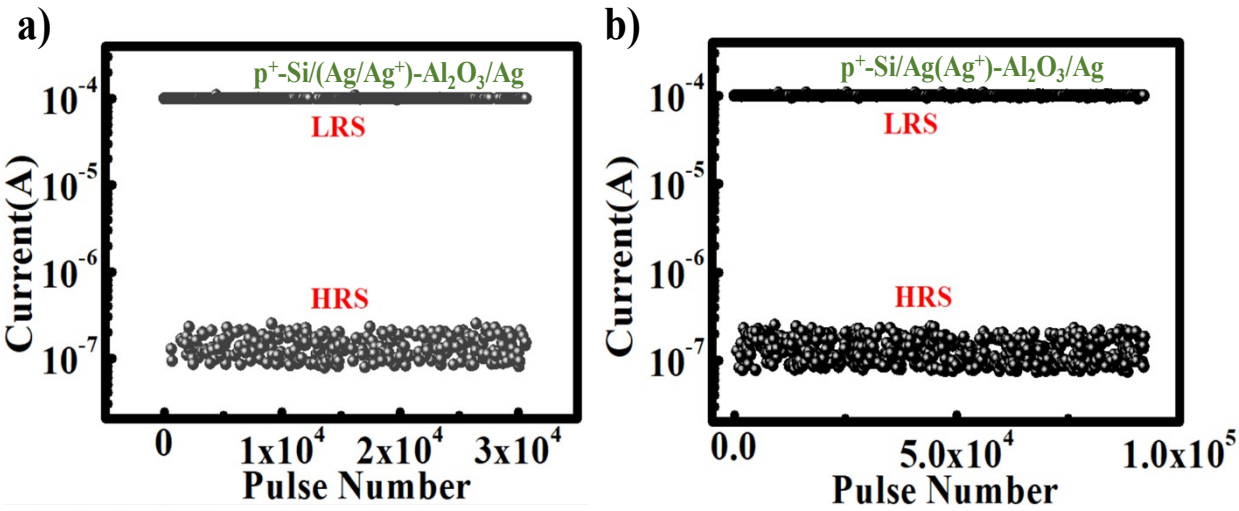

Figure S7. Pulse switching endurance for two resistance states of a) p^+-Si/ (Ag/Ag^+)-Al_2O_3/Ag, and b) p^+-Si/Ag(Ag^+)-Al_2O_3/Ag, respectively.

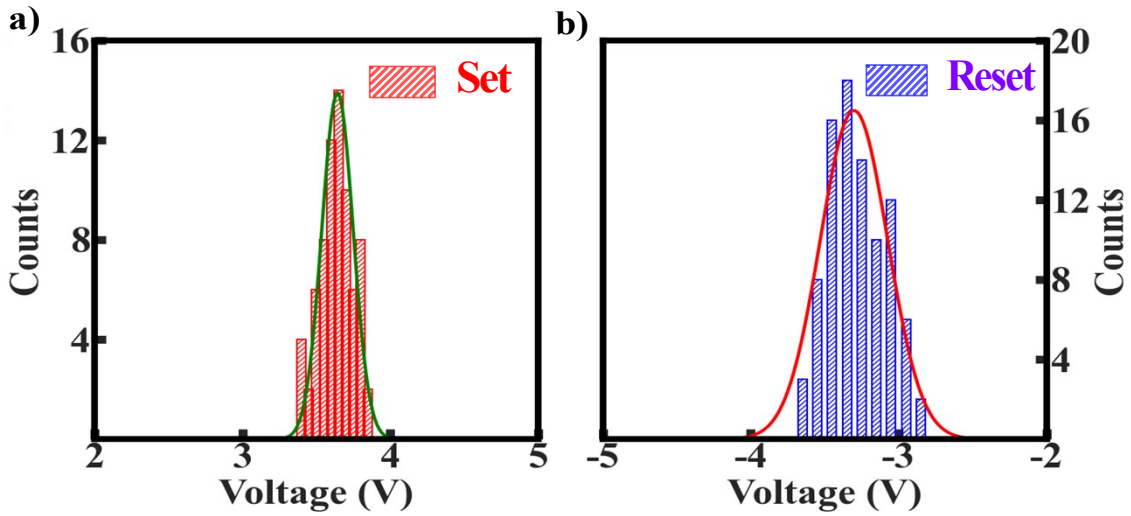

Figure S8. The statistic histograms of set and reset voltage over 100 consecutive cycles of p^+-Si/(Ag/Ag^+)-Al_2O_3/Ag. Lines are obtained by fitting to the Gaussian distribution.

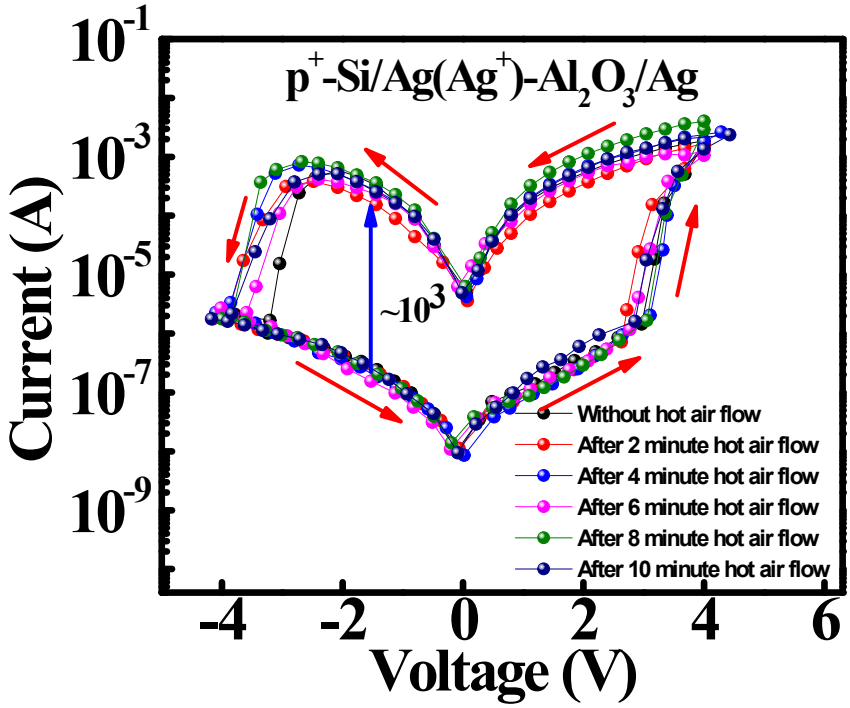

Figure S9. Current vs. Voltage curve for the device p^+-Si/Ag(Ag^+)-Al_2O_3/Ag under hot air treatment.