

Influence of atmosphere on textile resistive switching memory woven with Al and carbon fibers

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Resistive switching memory is one of the most promising future memories in terms of excellent advantages such as non-volatile property, simple structure and low power consumption. Recently, researches to apply resistive switching memory for wearable electronics have been presented using simple structure solely composed with aluminum and carbon fibers.[1] In this work, we fabricate textile type resistive switching memory of which structure is Al wire/ carbon yarn. Bipolar characteristic as shown in Fig. 1 (inset shows schematic device structure) of memory device were observed as well as good endurance and retention property. We also found this is related with formation of metal carboxide phase at the interface through XPS and Gibbs free energy calculation. Also conducting paths of memory were detected using conductive atomic force microscopy (CAFM) as shown in Fig. 2.[2] Then we check this resistive switching characteristic is influenced by external environment variables to see application as woven sensors on clothes.

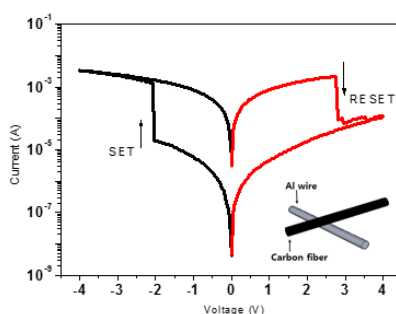


Fig. 1. Bipolar characteristic of Al/ carbon fiber ReRAM

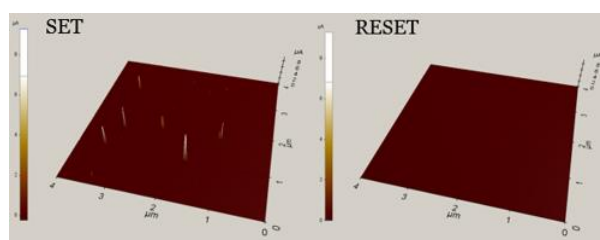


Fig. 2. Both set and reset CAFM result of Al/ carbon fiber ReRAM

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References

1. Young Dae Seo, Mi Jung Lee, IMID August, 2014, P2-15 Display substrates, components and materials (2014)
2. Lin Yang et al (2009). "The influence of copper top electrodes on the resistive switching effect in TiO₂ thin films studied by conductive atomic force microscopy." Applied Physics Letters 95, 013109.