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Solution-Processed Threshold Switching Selectors Based on Highly Flexible, Transparent and Scratchable Silver Nanowires Conductive Films

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Abstract : With the flash memory approaching its physical limit, the emerging resistive random-access memory (RRAM) has been considered as one of the most promising candidates for the next-generation non-volatile memory. One selector-one resistor configuration has shown the most promising way to resolve the crosstalk issue without affecting the scalability and high-density integration of the RRAM array. By comparison with other candidates of selectors (such as diodes and nonlinear devices), threshold switching selectors dominated by formation/spontaneous rupture of fragile conductive filaments have been proved to possess low voltages, high selectivity, and ultra-low current leakage. However, the flexibility and transparency of selectors are barely mentioned. Therefore, it is a matter of urgency to develop a selector with highly flexible and transparent properties to assist the application of RRAM for a diversity of memory devices. In this work, threshold switching selectors were designed using a facilely solution-processed fabrication on AgNWs@PDMS composite films, which show high flexibility, transparency and scratch resistance. As-fabricated threshold switching selectors also have revealed relatively high selectivity (~107), low operating voltages (Vth < 1 V) and good switching performance.

Keywords : flexible and transparent, resistive random-access memory, silver nanowires, threshold switching selector
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