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Supplementary materials

Knitted strain sensor with carbon fiber and aluminum-coated yarn, for wearable electronics

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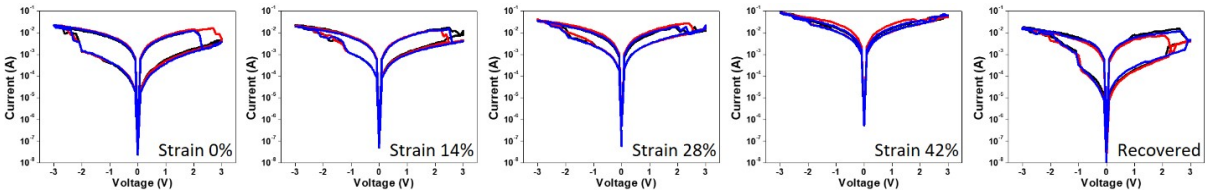

Figure S1. Variation of I-V curve of Textile-type RRAM depending on strain with horizontal stretching

The device was horizontally stretched from (35 mm) to (50 mm) at intervals of (5 mm) and then released to be recovered to (35 mm). Horizontal stretching test was performed through pulling both horizontal ends of the device. During the stretching process, the on/off current ratio gradually decreases, and when the device was recovered, the current values were recovered.

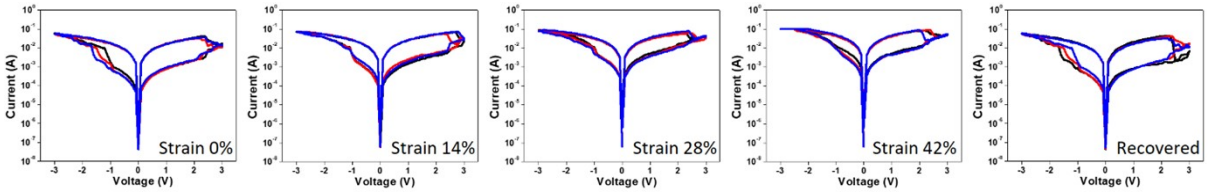

Figure S2. Variation of I-V curve of Textile-type RRAM depending on strain with vertical stretching

The variation with vertical stretching was also checked. The device was vertically stretched from (35 mm) to (50 mm) at intervals of (5 mm) and then recovered to (35 mm). During the stretching process, the current ratio tends to gradually decrease. When the device was recovered, the current ratio recovered similar to the horizontal stretching test.

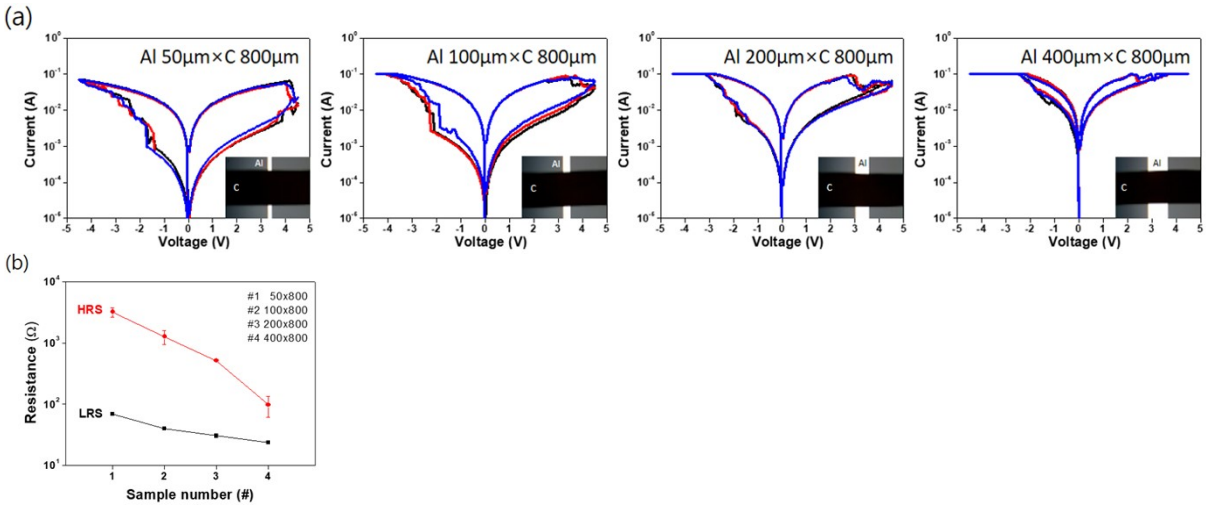

Figure S3. Variation of On/off current and resistance depends on aluminum-carbon contact area along the resistive switching: a) I-V curve depends on contact area; size of 50×800, 100×800, 200×800 and Al 400μm × C 800μm in order, b) Decrease of HRS/LRS resistance depending on aluminum-carbon contact area.

Changes in current and resistance switching of the RRAM device according to the aluminum-carbon contact area were verified. The sample was fabricated in the form of a crossbar with aluminum film and carbon fiber yarn, and the contact area was controlled by setting the fixed width of the carbon fiber yarn(800μm) and increasing the width of the aluminum film. As a result, it was confirmed that the on/off ratio of current & resistance decreased along the increase of aluminum-carbon contact area by increase of the width of the aluminum film.