Electronic Supplementary Material (ESI) for RSC Advances.

Conductive nanocomposite hydrogels with self-healing property

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Supplementary movie 1:

To demonstrate that the highly elasticity and good mechanical properties of the rGO/SAP composite hydrogel, an SRB sample (SRB 1.00 with 140 % water content) is able to withstand at least 5-times elongation and maintain the ability to restore its original conformation. Meanwhile, the SRB sample shows free standing/self-supporting properties during the whole process (before, during and after elongation), which indicates good mechanical properties of the sample.

Supplementary movie 2:

To demonstrate the electrical healing ability of the rGO/SAP composite hydrogel, a battery-powered circuit with an SRB sample (SRB 1.00 with 140 % water content) connected to an illuminated light-emitting diode (LED) was fabricated. After the SRB sample was completely cut off, the circuit became open and the LED went off. Then the two fractured free-cut surfaces were brought together with gentle pressure for 20 s and the LED lit up again. Moreover, the composite became self-supporting and self-healing, as the two parts of the sample remained attached even when gently stretched.

Supplementary movie 3:

To demonstrate the moisture sensitivity of the rGO/SAP composite hydrogel as a good candidate for soft moisture-related resistors/sensor systems, a battery-powered circuit with an SRB sample (SRB 1.00, completed dried) connected to an illuminated light-emitting diode (LED) was fabricated. The LED was off at beginning which mean the dried SRB is non-conductive. When a drop of Milli-Q water (around 30 μl) drops on the surface of the SRB sample, the LED lit up immediately and the light intensity gradually increased. The recorded current increased as shown in Figure S1.

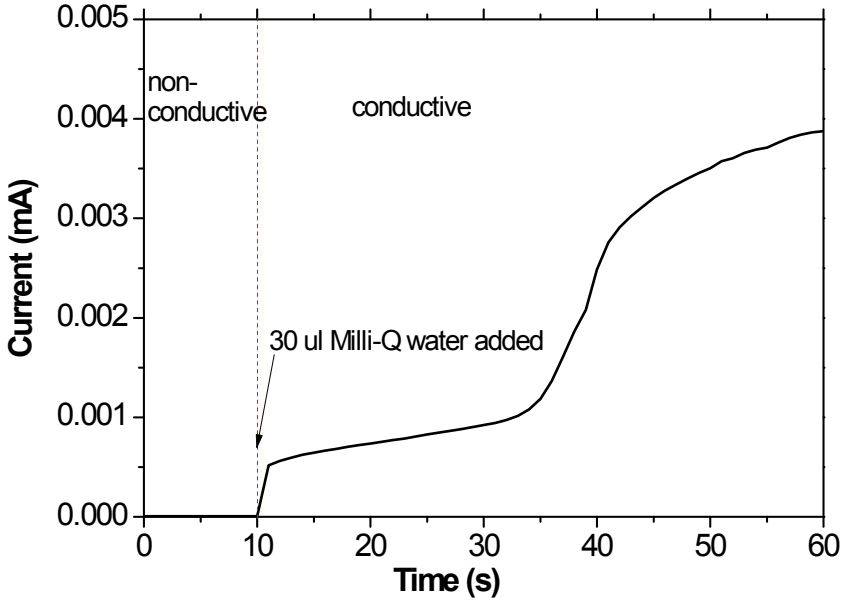

Figure S1: Recorded current changes due to the adding of a drop of water in SRB sample.