Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.
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Supplementary Information

Pencil-drawing assembling to prepare graphite/MWNTs hybrids for high performance integrated paper supercapacitors

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Calculation

To achieve the Ragone plot, the power density (*P*) and energy density (*E*) can be calculated from the data of cyclic voltammetry measured at the scan rates of 0.01~150 V s^{-1}

The capacitance values of paper SCs were calculated from the CV data according to the following equation (1):

$$C_{cell} = I/(dV/dt) \qquad (1)$$

Where *I* refers to the mean current in the CV curves; *dV/dt* refers to the scan rate in CV curves

The area and stack capacitance values of paper SCs were calculated according to the following equation (2) and equation (3):

$$C_A = 2 \times C_{Cell}/A \qquad (2)$$

$$C_V = 2 \times C_{Cell}/V \qquad (3)$$

Where C_{cell} is the capacitance of the 2-electrode cell, *A* and *V* refer to the surface area and volume of the device at one electrode, respectively.

The energy density and power density were calculated according equation (4) and equation (5):

$$E = \frac{1}{2} \times \frac{C_V \times (\Delta V)^2}{3600} \qquad (4)$$

Where E is the energy density (Wh/cm^3), C_V is the stack capacitance and ΔV is the discharge

voltage range (V).

$$P = \frac{E}{\Delta t} \times 3600 \quad (5)$$

where P is the power density (W/cm^3), *E* is the volumetric energy density and *t* is the discharge time (s)

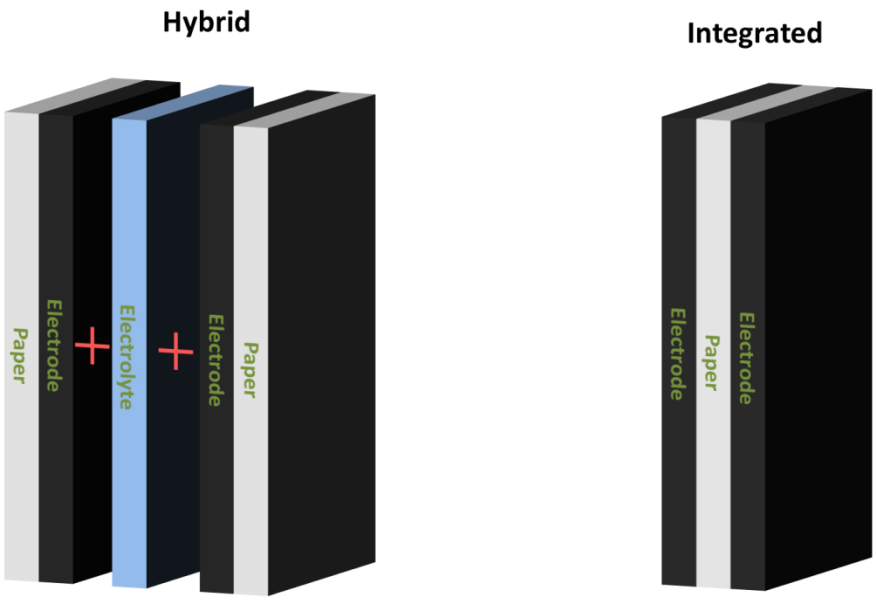

Fig. S1 The schematic pictures of paper SCs with hybrid and integrated structure.

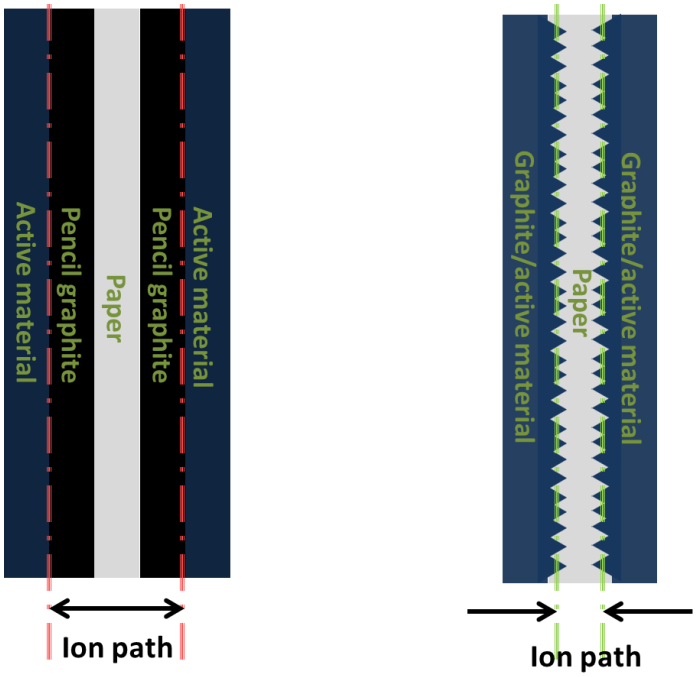

Fig. S2 The schematic picture of minimum ion path in SCs of two kinds.

Fig. S3 (a) and (b) The photograph of the flexible SC (c) The thickness test of SCs (d) Photograph showing the SCs soaked in electrolyte for 10 hours.

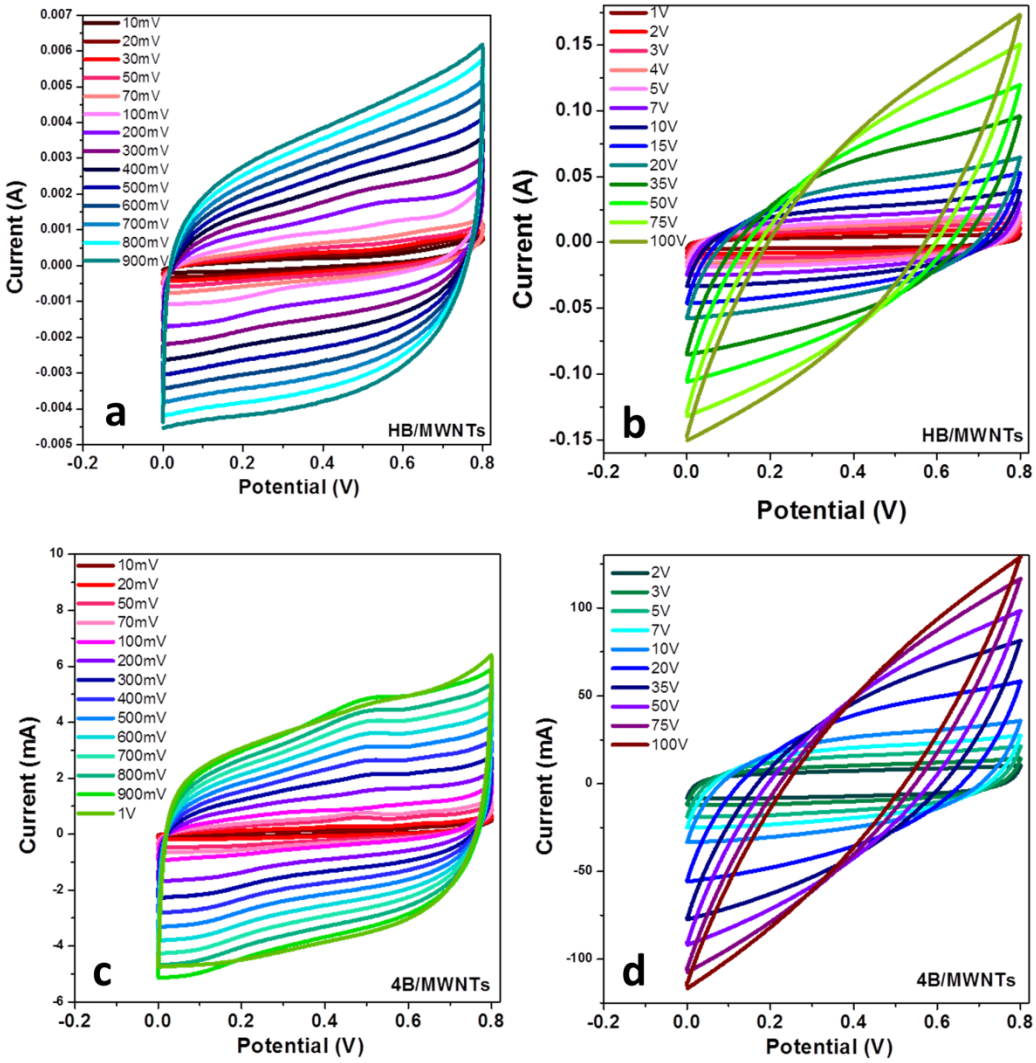

Fig. S4 A comparison of CV curves with HB and 4B/MWNTs SCs.

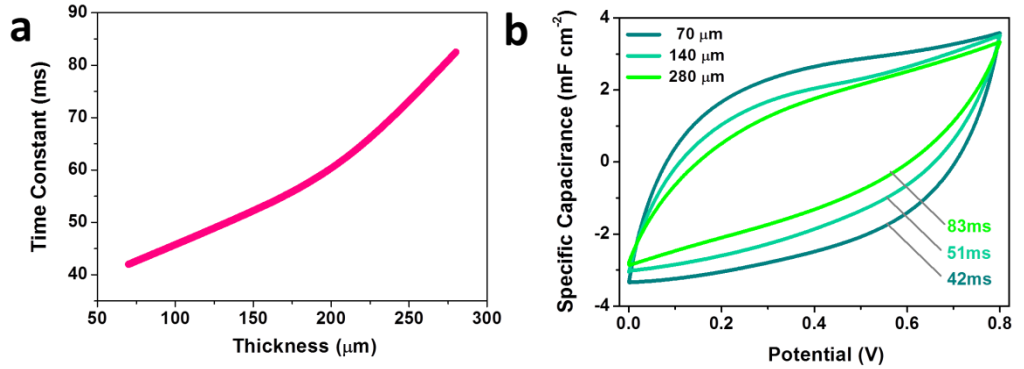

Fig. S5 A comparison of CV curves with HB and 4B/MWNTs SCs.

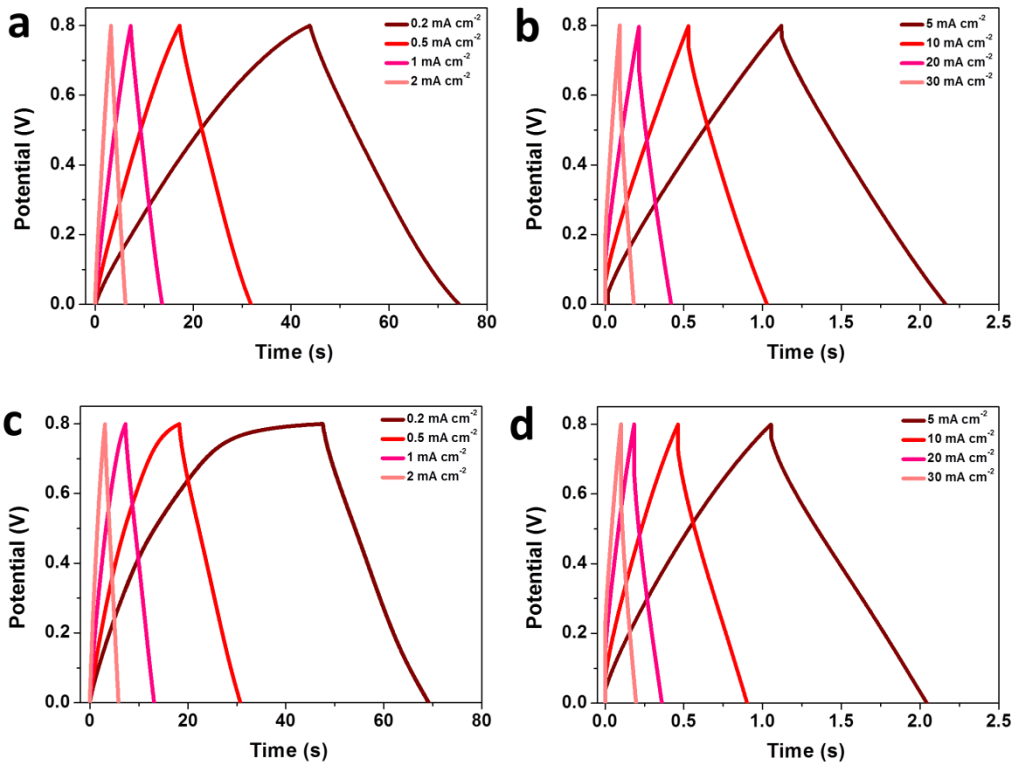

Fig. S6 A comparison of CP curves (a) (b) with 4B and (c) (d) HB/MWNTs SCs.

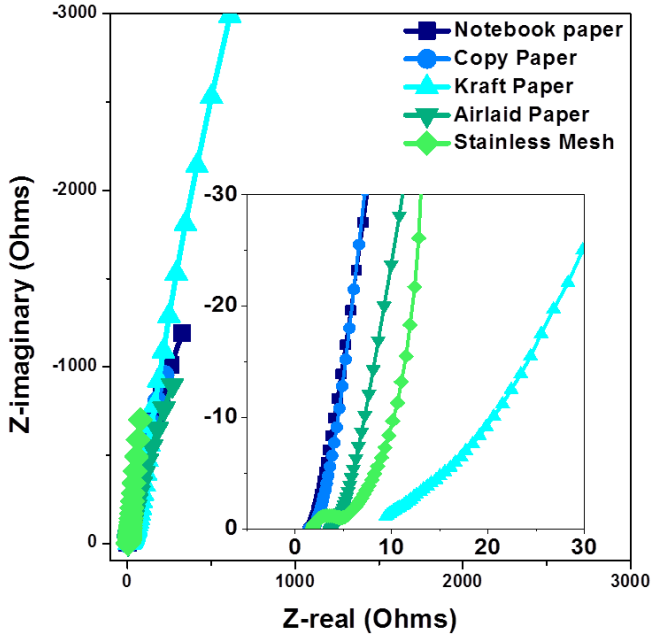

Fig. S7 Nyquist plots with SCs on different substrates.

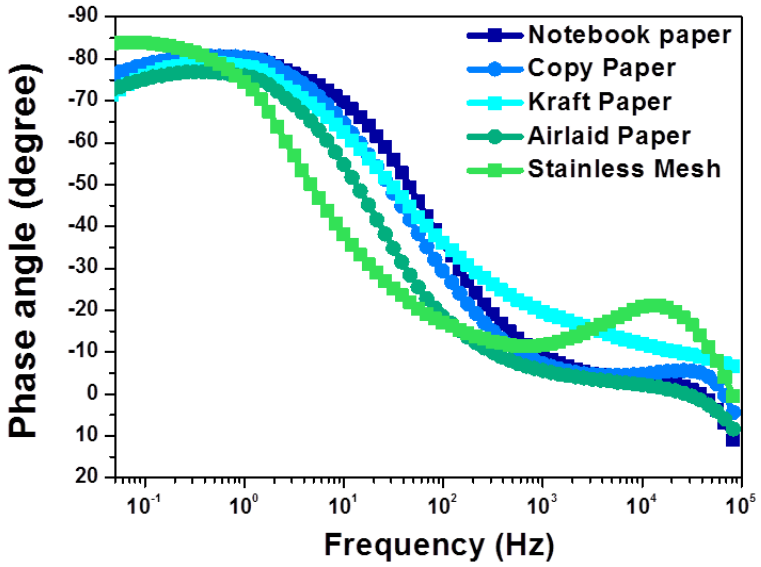

Fig. S8 Bode plots with SCs on different substrates.

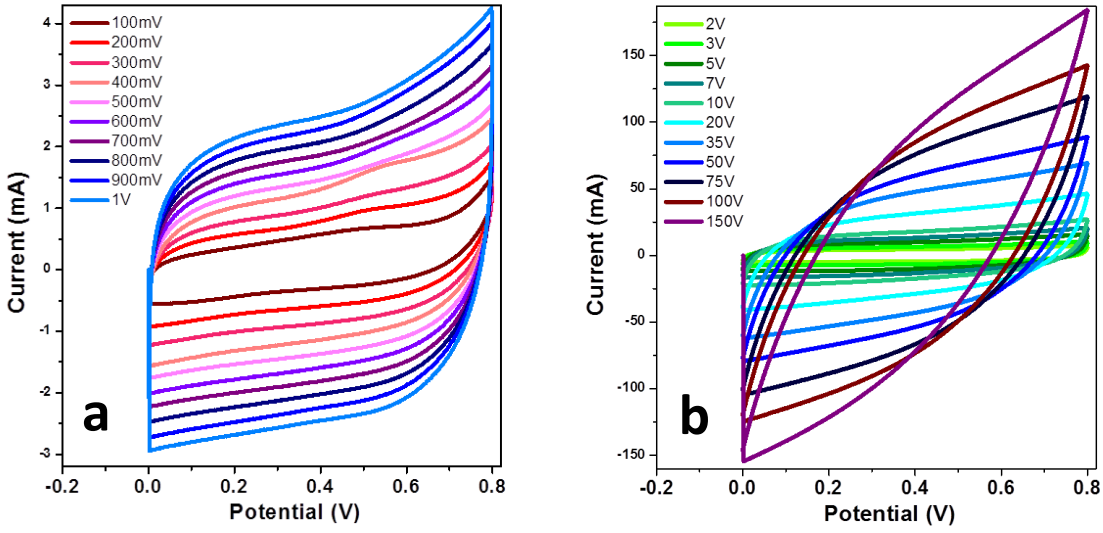

Fig. S9 A comparison of CV curves with SC on Notebook paper.

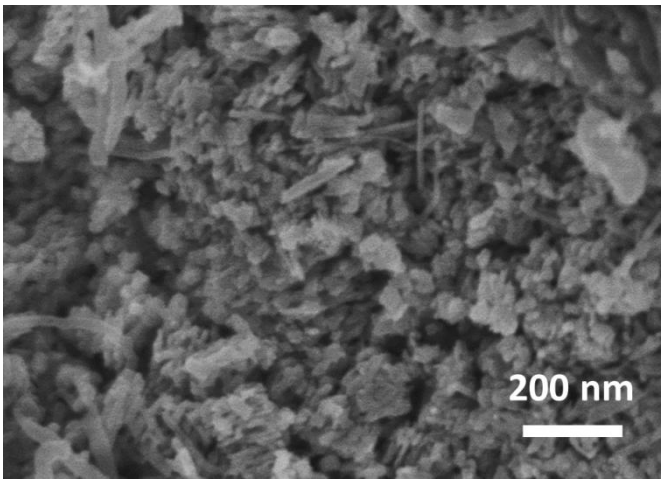

Fig. S10 SEM picture of MnO_2/MWNTs.

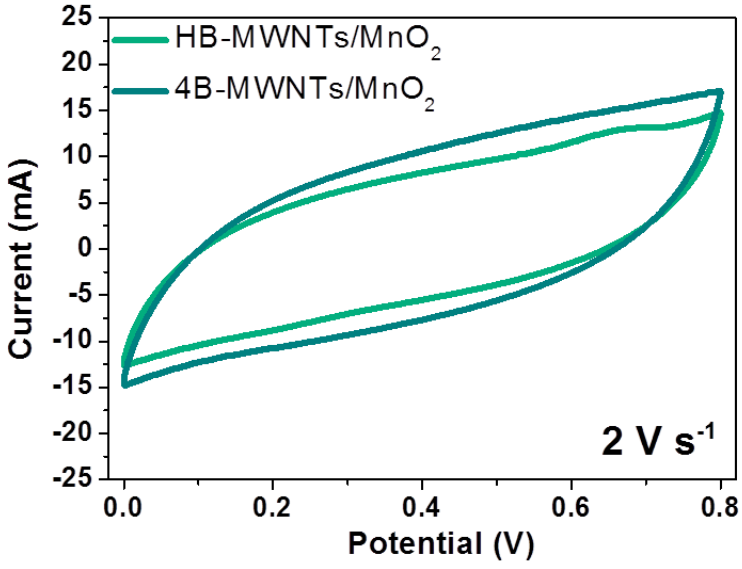

Fig. S11 A comparison of CV curves with pseudocapacitance graphite/MWNTs hybrid.

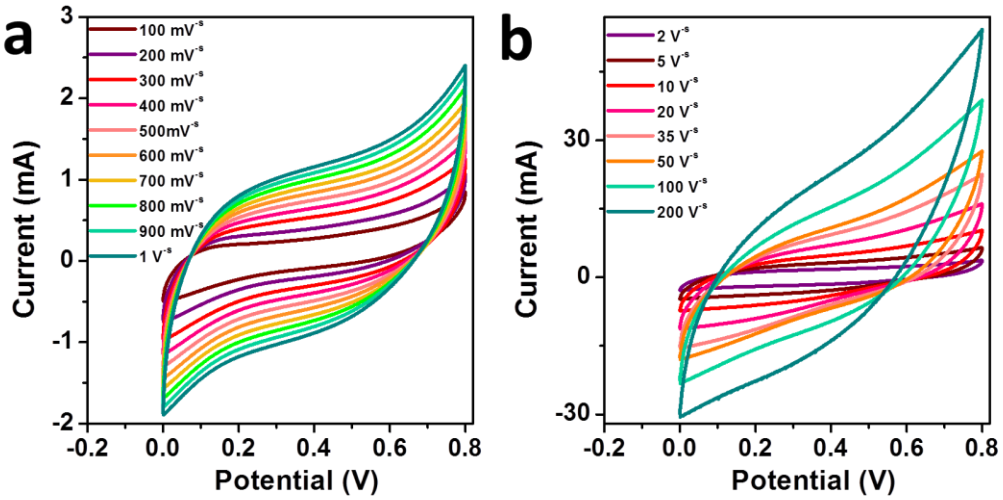

Fig. S12 A comparison of CV curves with 4B/graphene SCs.

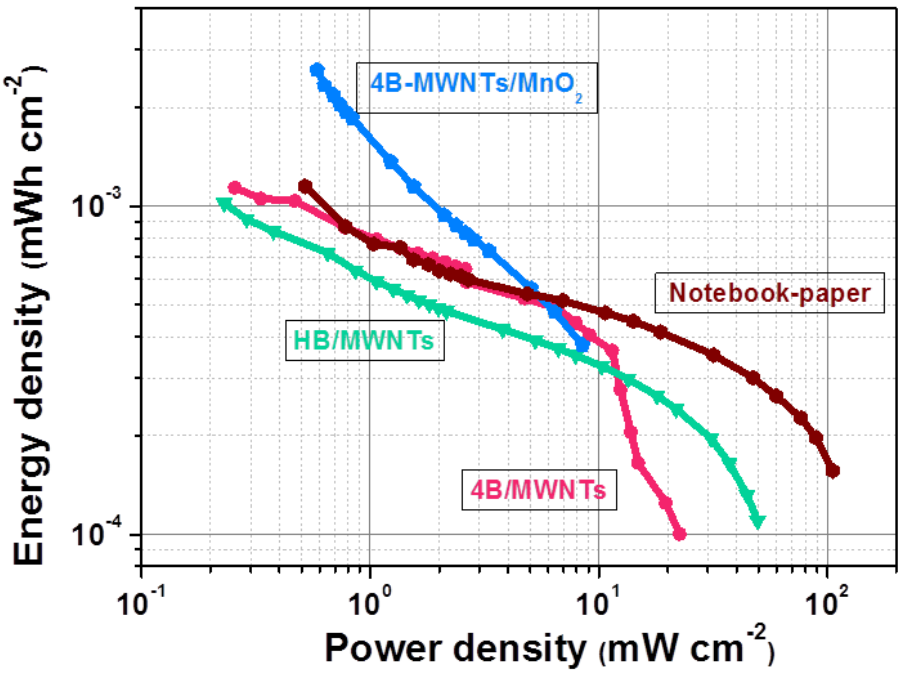

Fig. S13 Ragone plot for the paper SCs in this paper

Fig. S14 The screenshot picture of cell phone which received the message.

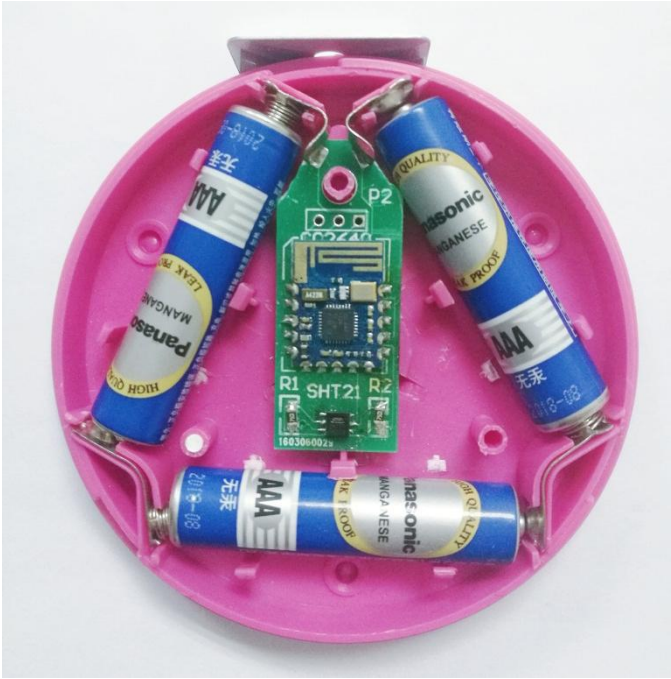

Fig. S15 The photograph of the bluetooth sensor which is driven by 3 AAA batteries

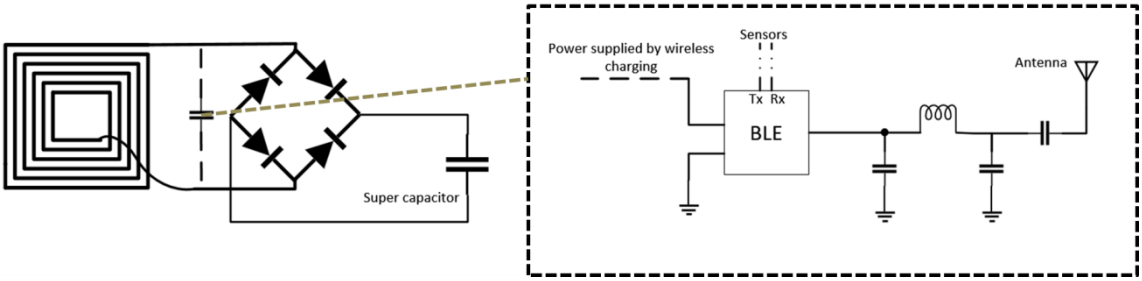

Fig. S16 The schematic picture of practical wireless chip.

Electrode	Power density	Scan rate	References	Substrate
Graphite/PANI	0.054 W cm^{-3}	5 mV s^{-1}	6	Paper
MnO_2/Ni/graphite	0.048 W cm^{-3}	100 mV s^{-1}	7	Paper
PEDOT/PEDOT:PSS	0.35 W cm^{-3}	100 mV s^{-1}	19	Paper
PANI/PEDOT	2.8 W cm^{-3}	200 mV s^{-1}	20	Paper
MPG-SSCs	1.6 W cm^{-3}	200 V s^{-1}	23	Si wafer
LSG-EC	2 W cm^{-3}	10 V s^{-1}	27	PET
PEDOT	1.52 W cm^{-3}	100 mV s^{-1}	28	Paper
PANI	0.33W cm^{-3}	100 mV s^{-1}	29	PET
Graphite/MWNTs	15.1 W cm^{-3}	150 V s^{-1}	**This Work**	Paper

Table S1 Comparative literature survey about SCs performances.