Supporting information

Ultralight Supercapacitors Utilizing waste cotton pads for Wearable Energy Storage

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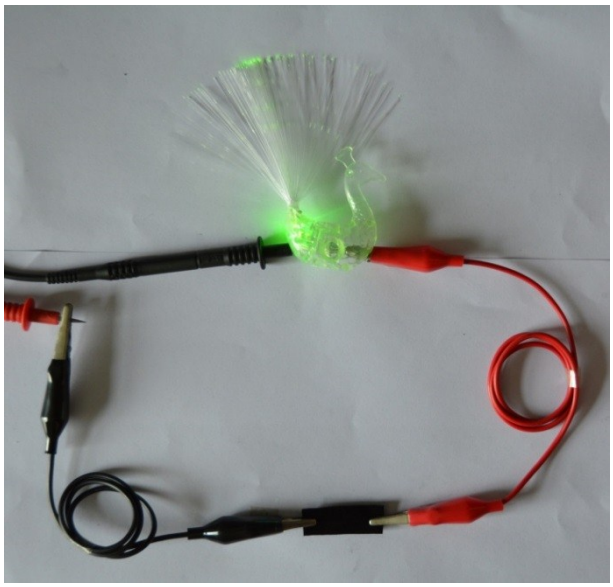

Fig. S1 Optical image of PCPs as a part of the electric circuits to light the colorful LEDs.

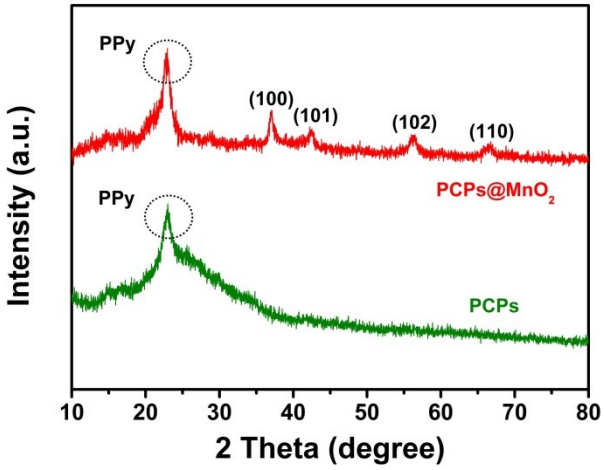

Fig. S2 XRD spectra of precursor PCPs and PCPs@MnO_2.

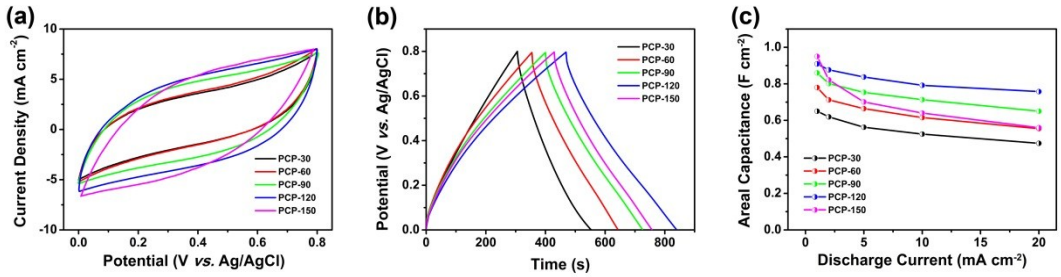

Fig. S3 (a) CV and (b) GCD curves of the PCPs electrodes at different polymerization times under a scan rate of 10 mV s^{-1} and current density of 2 mA cm^{-2}. (c) The areal capacitance of the PCPs electrodes calculated from GCD curves, respectively.

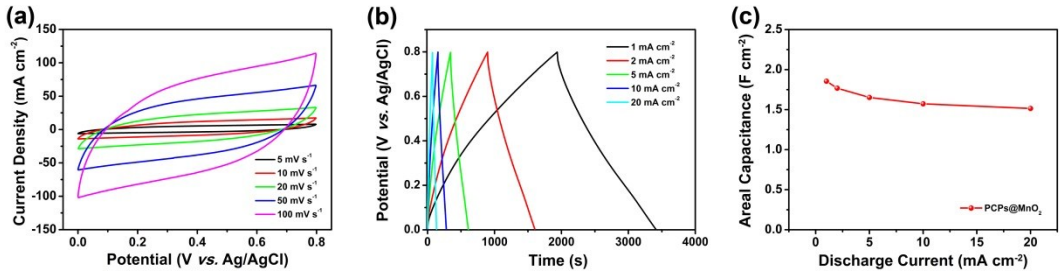

Fig. S4 (a) CV and (b) GCD curves of the PCPs@MnO_2 electrodes at different testing parameters. (c) The areal capacitance of the PCPs@MnO_2 electrodes calculated from GCD curves.

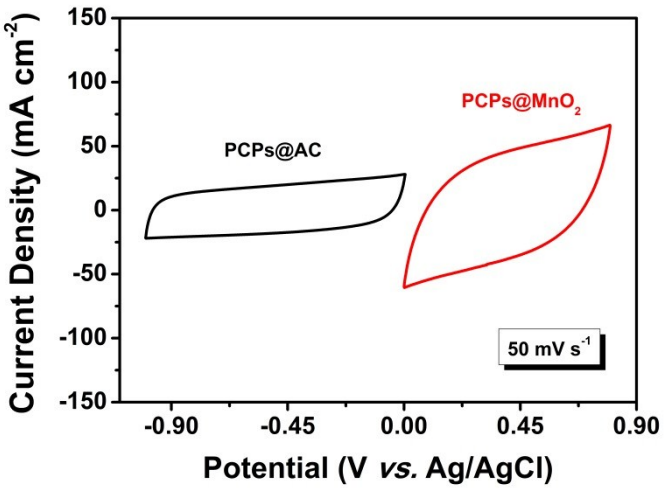

Fig. S5 CV curves of PCPs@MnO_2 electrode and PCPs@AC electrode at a scan rate of 50 mV s^{-1}.

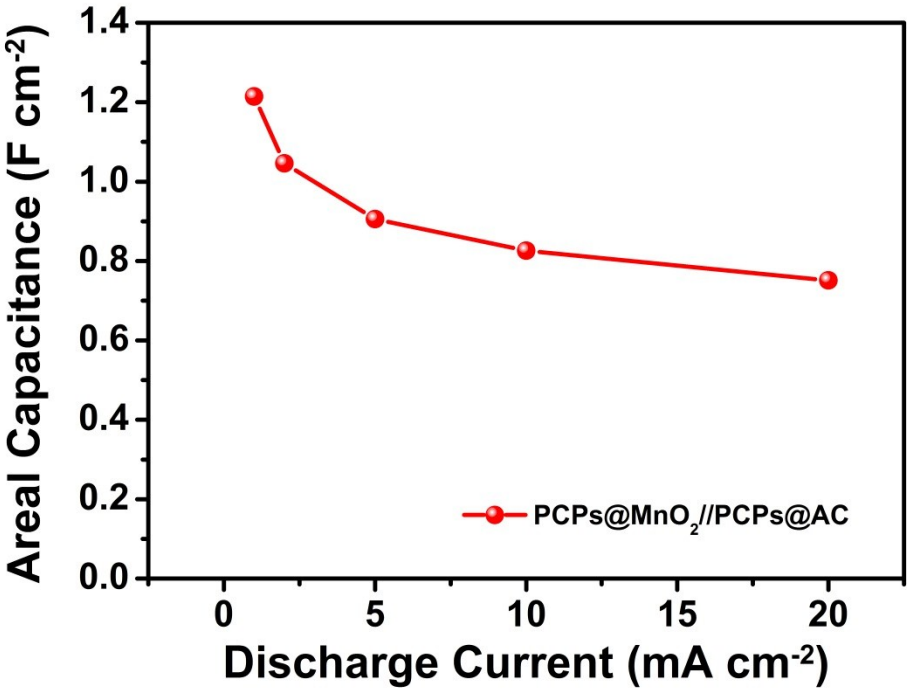

Fig. S6 The areal capacitance of the PCPs@MnO_2//PCPs@AC ASC device calculated from the GCD curves.

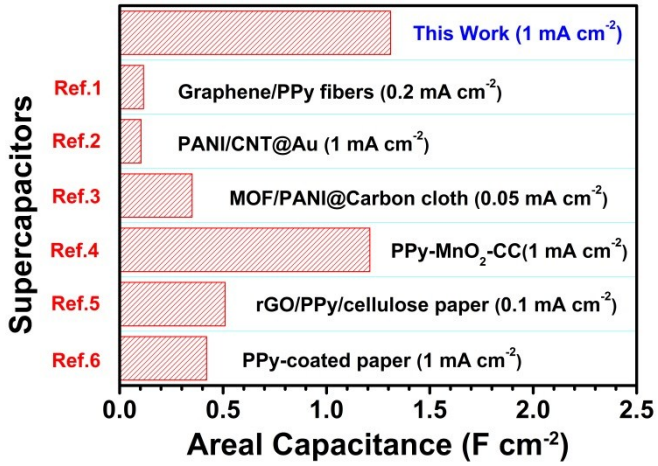

Fig. S7 Comparison of the areal capacitance of PCPs@MnO_2//AC ASC against those of different free-standing electrodes for supercapacitors.

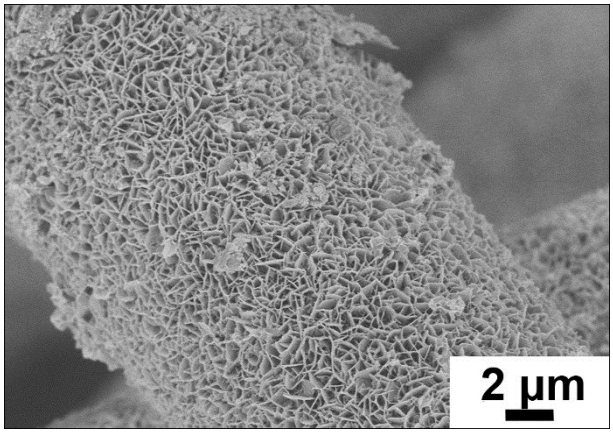

Fig. S8 SEM image of PCPs@MnO_2 electrode after 5000 cycles.

Table S1 Comparison of the key performance characteristics of different conductive polymer-based electrodes

Sample	Conductivity	Sheet resistance	Ref.
RGO/PPy/ cellulose papers (PPy/cellulose papers)	980 S m^{-1}	1.7 Ω sq^{-1} (4.5 Ω sq^{-1})	5
PPy-coated paper	15 S cm^{-1}	4.5 Ω sq^{-1}	6
Flexible Polypyrrole Films	6.6 S cm^{-1}	8.2 Ω sq^{-1}	7
PPy/TiO_2- cotton fabrics （PPy - cotton fabrics）	6.3 S cm^{-1}（7 S cm^{-1}）	---	8
Polymer Paper	1 S cm^{-1}	---	9
Polypyrrole Films	1.14 S cm^{-1}	---	10
polypyrrole membranes	3.9 S cm^{-1}	---	11
(CCS+CNF)@PANI	167.1 S m^{-1}	---	12
MCF/N-CS/PANI	65 S m^{-1}	---	13
PCP-120	**7.9 S cm^{-1}**	**3.7 Ω sq^{-1}**	**This work**

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