

Supplementary Information

Polypyrrole/carbon nanotube freestanding electrode with excellent electrochemical properties for high-performance all-solid-state supercapacitors

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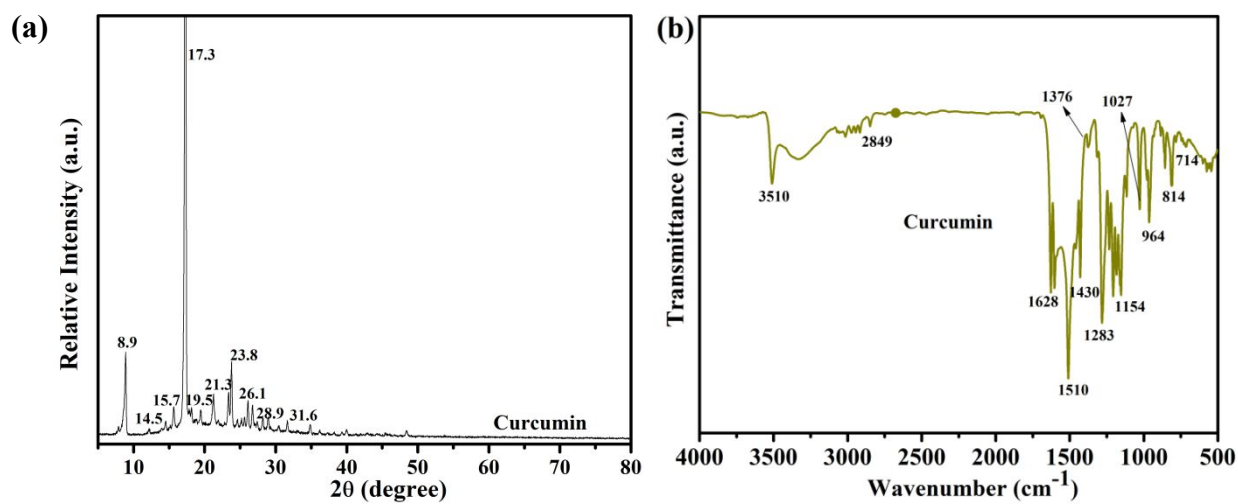


Figure S1. (a) XRD pattern and (b) FTIR spectrum of curcumin.

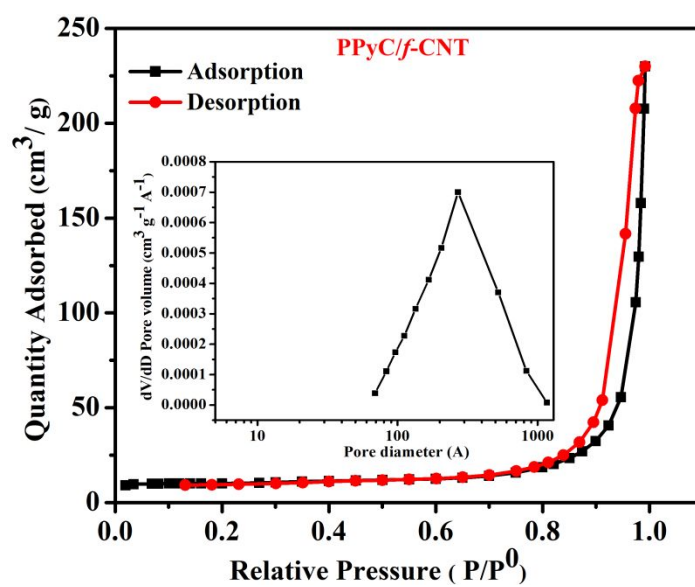


Figure S2. Nitrogen sorption isotherm and pore size distribution curve of PPyC/f-CNT freestanding film.

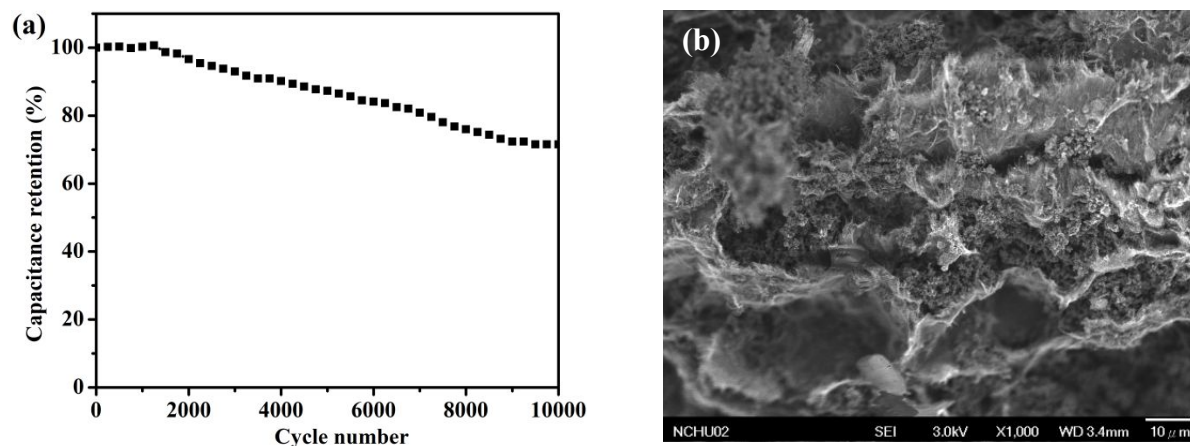


Figure S3. (a) Cyclic performance of the PPyNP/*f*-CNT freestanding electrode recorded at a current density of 60 mA cm⁻² for 10,000 charge/discharge cycles, and (b) SEM image of PPyNP/*f*-CNT electrode freestanding electrode after cycling test.

Table S1 Capacitive performances of PPy-based composite electrodes reported previously in the literature and in this present study

Electrode materials	Active material loading	Current collector	Specific capacitance of electrode (C_s)	Reference
PPyNP/f-CNT	14.0 mg cm ⁻²	Freestanding electrode	4585 mF cm ⁻² (327.5 F g ⁻¹ , 176.35 F cm ⁻³) at a current density of 2 mA cm ⁻²	This study
PPy-coated air-laid paper	–	Freestanding electrode	3100 mF cm ⁻² at a current density of 1 mA cm ⁻²	Advanced Energy Materials 7(21) (2017) 1701247
Polypyrrole/nylon membrane composite film	5 mg cm ⁻²	Freestanding electrode without current collector	2911.4 mF cm ⁻² at a current density of 1 mA cm ⁻²	<i>Journal of Materiomics</i> , 2019, DOI: https://doi.org/10.1016/j.jmat.2019.11.004 .
ECNT/PPy	3.89 mg cm ⁻²	Freestanding electrode	965.3 mF cm ⁻² at a current density of 1 mA cm ⁻²	Chemical Engineering Journal 337 (2018) 552-559
PPy-coated knitted fabric	12.3 mg cm ⁻²	Freestanding electrode	4117 mF cm ⁻² at a current density of 2 mA cm ⁻²	Journal of Materials Chemistry A 4(33) (2016) 12981-12986
Polypyrrole/graphene/bacterial cellulose paper electrode	8.93 mg cm ⁻²	Freestanding electrode	2100 mF cm ⁻² at a current density of 2 mA cm ⁻²	Composites Science and Technology 137 (2016) 87-93
BC/PPy nanofibres/MWCNTs electrode	11.23 mg cm ⁻²	Freestanding electrode	2.43 F cm ⁻² at a discharge current of 2 mA cm ⁻²	Nano Energy 9 (2014) 309-317
PPy nanofiber–MWCNT electrodes	30 mg cm ²	Ni foam	4.62 F cm ² at a scan rate of 2 mV s ⁻¹	Journal of Materials Chemistry A 1(38) (2013) 11614-11622
Free-standing reduced graphene oxide/polypyrrole/cell	–	Freestanding electrode	1.20 F cm ⁻² at 2 mA cm ⁻²	Journal of Materials Chemistry A 5(8) (2017)

ulose hybrid papers				3819-3831
PPy-coated cotton fabrics	9.9 mg cm ⁻²	Freestanding electrode	3090.6 mF cm ⁻² at 2 mA cm ⁻²	RSC Advances 7(77) (2017) 48934-48941
Graphene/activated carbon/polypyrrole (GN/AC/PPy)	2.75 mg cm ⁻²	Freestanding electrode	906 mF cm ⁻² at a current density of 0.5 mA cm ⁻²	RSC Advances 7(50) (2017) 31342-31351
PPy/paper composite electrode	3.54 mg cm ⁻²	Freestanding electrode	1.5 F cm ⁻² at 1 mA cm ⁻²	Energy & Environmental Science 6(2) (2013) 470-476
rGO/PPy NT paper	2.46 mg cm ⁻²	Carbon paper	807 mF cm ⁻² at 1 mA cm ⁻²	Journal of Power Sources 302 (2016) 39-45
Carbon fiber paper-supported polypyrrole (CFP/PPy)	0.6 mg cm ⁻²	Carbon fiber paper	198.5 mF cm ⁻² at 1 mA cm ⁻²	Journal of Materials Chemistry A 2(5) (2014) 1458-1464
Polypyrrole on vertically aligned carbon nanotube arrays/carbon fiber paper (PPy/VA-CNTs/CFP)	0.84 mg cm ⁻²	Carbon fiber paper	0.78 F cm ⁻² at 2 mV s ⁻¹	Journal of Materials Chemistry A 3(44) (2015) 22043-22052