Supplementary Information

Facile, scalable, eco-friendly fabrication of high-performance flexible all-solid-state supercapacitors

Jincy Parayangattil Jyothibasu [1,2] and Rong-Ho Lee [2,*]

[1] Department of Environmental Engineering, National Chung Hsing University, Taichung 402, Taiwan ; jincycusat@gmail.com

[2] Department of Chemical Engineering, National Chung Hsing University, Taichung 402, Taiwan; rhl@nchu.edu.tw

* Correspondence: Rong-Ho Lee—e-mail: rhl@dragon.nchu.edu.tw; Tel.: +886-4-22854308

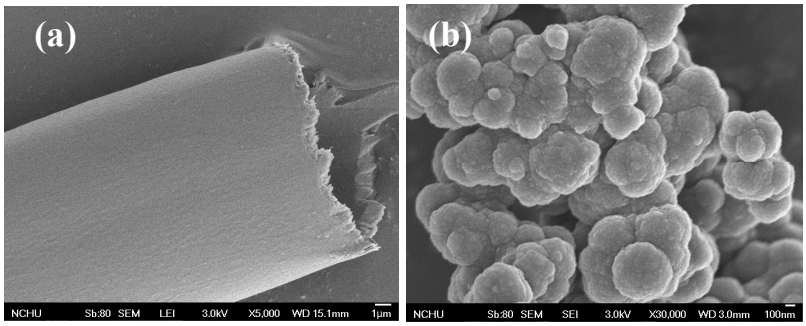

Fig. S1 SEM images of the (a) raw Kapok fiber and (b) PPy powder.

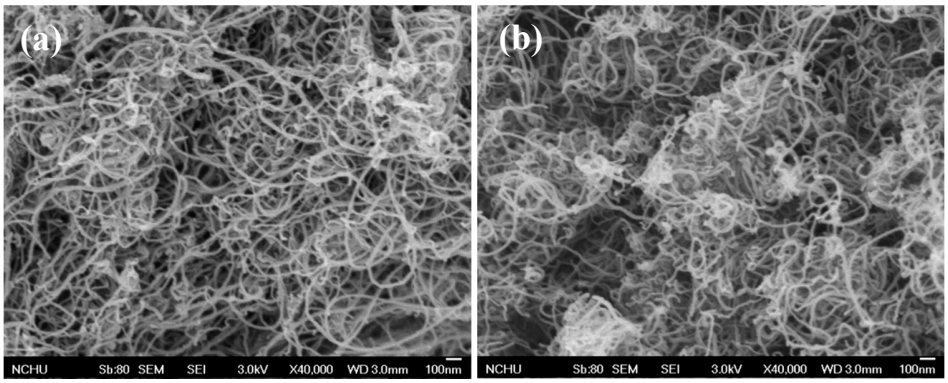

Fig. S2 SEM images of the (a) raw and (b) functionalized CNTs (*f*-CNTs).

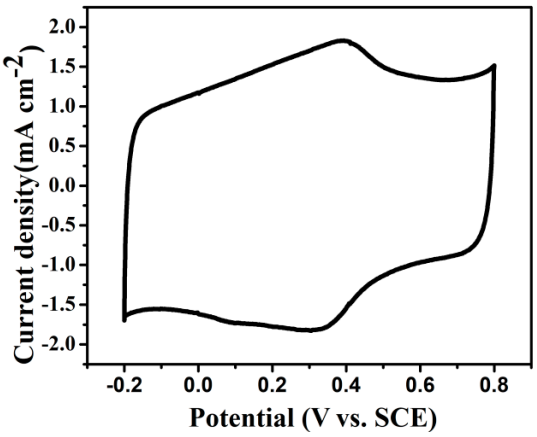

Fig. S3 CV curve of the pure *f*-CNT freestanding electrode, measured at 5 mV s^{-1}.

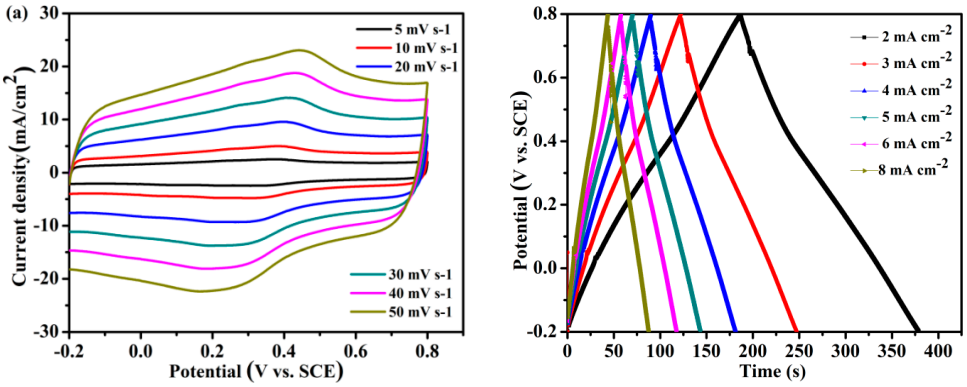

Fig. S4 (a) CV curves recorded at various scan rates and (b) GCD curves recorded at various current densities of the pure *f*-CNT freestanding hybrid electrode.

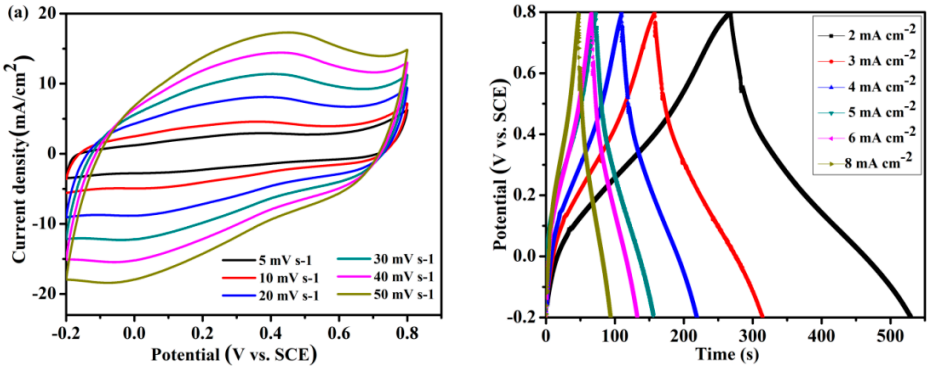

Fig. S5 (a) CV curves recorded at various scan rates and (b) GCD curves recorded at various current densities for the KF@PPy/*f*-CNT12 freestanding hybrid electrode.

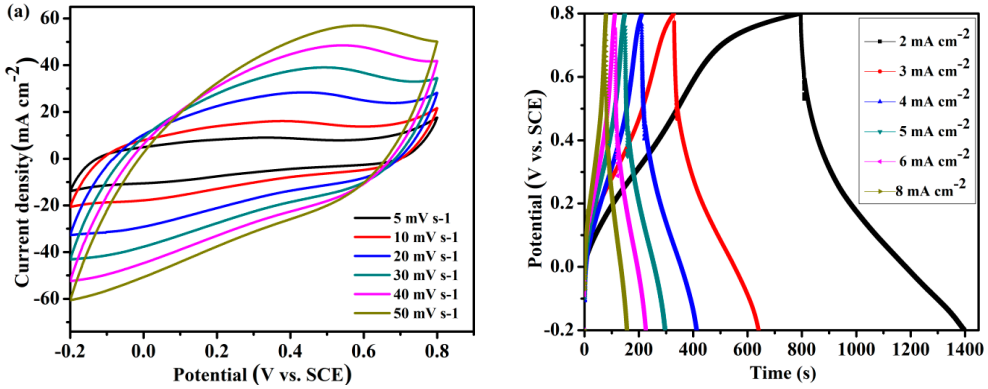

Fig. S6 (a) CV curves recorded at various scan rates and (b) GCD curves recorded at various current densities for the KF@PPy/*f*-CNT21 freestanding hybrid electrode.

TABLE S1 Capacitive performances of freestanding electrodes reported in the literature and in this present study

Electrode materials	Specific capacitance of electrode	Electrolyte	Capacitance retention	Ref.
KF@PPy/*f*-CNT11	**1289 mF cm^{-2} (5 mV s^{-1})** **1138 mF cm^{-2} (2 mA cm^{-2})** **52 F cm^{-3} (5 mV s^{-1})**	**1 M H_2SO_4**	**86.5% (1000 cycles)**	**This work**
rGO/PPy NT paper	807 mF cm^{-2} (1 mA cm^{-2})	1 M H_2SO_4	78.0% (2000 cycles)	**1**
GO-PPy paper	440 mF cm^{-2} (0.5 A g^{-1})	1 M H_2SO_4	81%	**2**
rGO/PPy paper	468 mF cm^{-2} (1 mA cm^{-2})	1 M H_2SO_4	–	**3**
PPy/MnO_2 composite	240 mF cm^{-2} (5 mV s^{-1})	1.0 M Na_2SO_4	62.3%	**4**
lCNT-GO/PPy	202.3 mF cm^{-2} (10 mV s^{-1})	1.0 M KCl	–	**5**
PPy/l-Ti_3C_2 film (l-Ti_3C_2, a MXene material)	203 mF cm^{-2}	0.5 M H_2SO_4	100% (20,000 cycles)	**6**
CNT/PANI hydrogel film	680 mF cm^{-2} (1 mA cm^{-2})	1 M H_2SO_4	–	**7**
CNT/PPy electrode	0.28 F cm^{-2} (1.4 mA cm^{-2})	0.05 M Na_2SO_4	–	**8**
RGO/PPy CCFs paper	363 mF cm^{-2} (0.5 mA cm^{-2})	PVA/H_3PO_4	–	**9**
Reduced graphene oxide/polypyrrole/cellulose hybrid papers	1.20 F cm^{-2} (2 mA cm^{-2})	1 M NaCl	89.5% (5000 cycles)	**10**
rGO/PPy films	411 mF cm^{-2} (0.2 mA cm^{-2})	1 M KCl	80% (5000 cycles)	**11**
Graphite/polyaniline hybrid electrodes on printing paper	355.6 mF cm^{-2} (0.5 mA cm^{-2})	1 M H_2SO_4	–	**12**
PPy-coated cotton fabrics	1325 mF cm^{-2} at 2 mA cm^{-2}	1 M Na_2SO_4	87% capacitance	**19**

			retention after 1000 charge/discharge cycles	
Polypyrrole/reduced graphene oxide coated fabric electrodes (Py–RGO-fabric)	265 F g^{-1} (5 mV s^{-1})	2.0 M NaCl	64% capacitance retention after 500 cycles	**20**
PANI/Au/paper electrode	800 mF cm^{-2} (1 mA cm^{-2})	1 M H_2SO_4	-	**21**

TABLE S2 Capacitive performances of all-solid-state supercapacitors reported in the literature and in this study

Electrode material	Specific capacitance of supercapacitor	Energy density	Power density	Ref.
KF@PPy/*f*-CNT11	**258 mF cm^{-2} (5 mV s^{-1}) 219.4 mF cm^{-2} (0.5 mA cm^{-2}) 3.44 F cm^{-3} (5 mV s^{-1})**	**22.3 μW h cm^{-2} 297.3 μW h cm^{-3}**	**2.1 mW cm^{-2} 28 mW cm^{-3}**	**This work**
lCNT-GO/PPy	70.0 mF cm^{-2} (10 mV s^{-1})	6.3 μW h cm^{-2}	3.7 mW cm^{-2}	5
CNT/PANI hydrogel film	184.6 F cm^{-2} (1 mA cm^{-2})	–	–	7
RGO/PPy CCFs paper	–	0.28 mW h cm^{-3}	20.9 mW cm^{-3}	9
rGO/PPy films	222 mF cm^{-2}	20 μW h cm^{-2}	5 mW cm^{-2}	11
Graphite/polyaniline hybrid electrodes on printing paper	77.8 mF cm^{-2} (0.1 mA cm^{-2})	0.32 mW h cm^{-3}	0.054 W cm^{-3}	12
CNT/PPy	4.9 F cm^{-3}	0.26 mW h cm^{-3}	0.15 W cm^{-3}	8
PPy/CNT/cotton fabric	50.9 mF cm^{-2} (10 mV s^{-1})	64.64 W h kg^{-1}	5.14 kW kg^{-1}	13
3D-graphene/graphite-paper	11 mF cm^{-2}	1.24 μW h cm^{-2}	1 mW cm^{-2}	14
PEDOT-GO/U–C electrode	30 mF cm^{-2} (10 mV s^{-1})	0.0022 mW h cm^{-2}	0.2 mW cm^{-2}	15
PANI-ZIF-67-CC	35 mF cm^{-2}	0.0161 mW h cm^{-3}	0.833 W cm^{-3}	16
PEDOT/H-15G-CNTF	37.8 mF cm^{-2} (5 mV s^{-1})	0.051 mW h cm^{-3}	2.1 mW cm^{-3}	17
MoS2@CNT/RGO electrode	29.7 mF cm^{-2} (0.1 mA cm^{-2})	4.13 μW h cm^{-2}	3.2 mW cm^{-2}	18

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