Supplementary Materials

Graphene/Reduced Graphene Oxide-Carbon Nanotubes Composite Electrodes: from Capacitive to Battery-type Behaviour

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Content

Table S1. Published details of capacitive G/rGO-CNT single electrodes measured in three-electrode configuration.

Electrode materials	Sub-strate	Processing details	Electrolyte	Capacitance	Ref.
rGO,CNT,PVDF	C-cloth	80%rGO+10%CNT+10%PVDF,180 °C	Na_2SO_4	129 F/g, 0.1 A/g	[1]
rGO,CNT	FS	VF, hydrozine-gas	KOH	265 F/g, 0.1 A/g	[2]
rGO,CNT,PDAA,CB,PTFE	Ni foam	Urea, $KMnO_4$, 80 °C	Na_2SO_4	80 F/g, 0.2 A/g	[3]
rGO,CNT,AB,PTFE	Ni foam	H_6N_2O, 95°C, $KMnO_4$	Na_2SO_4	91 F/g, 0.25 A/g	[4]
rGO,CNT	Ni foam	dried, 250 °C, pressed	KOH	200 F/g, 0.25 A/g	[5]
rGO,CNT	GCE	urea	KOH	10 F/g, 0.5 A/g	[6]
rGO,CNT	Ni foam	VF, dried, 250 °C, pressed	Na_2SO_4	151 F/g, 0.5 A/g	[7]
rGO,CNT,CB,PTFE	Ni foam	chem. oxidation, 200 °C	Na_2SO_4	202 F/g, 0.5 A/g	[8]
rGO,CNT,MC,Naf	C-paper	HT, 180 °C, aerogel 80%AM+15%MC+5% Naf	H_2SO_4	335 F/g, 0.5 A/g	[9]
G,CNT	Cu foil	CNT-G	Na_2SO_4	42 F/g, 1 A/g	[10]
rGO,CNT	GCE	H_6N_2O, 95 °C, in-situ polymerization	H_2SO_4	53 F/g, 1 A/g	[11]
rGO,CNT	fiber	vit. C, 80 °C, inject	Na_2SO_4	60 F/g, 1 A/g	[12]
rGO,CNT	st. steel	aerogel, 800 °C, urea, 70 °C	KOH	149 F/g, 1 A/g	[13]
rGO,CNT,pp-AC	FS	600 °C, VF 10%rGO+10%CNT+80%pp-AC	KOH	214 F/g, 1 A/g	[14]
rGO,CNT,SDBS,PVA,AB,PTFE	Ni foam	H_6N_2O, coating 85%AM+10%AB+5%PTFE	KOH	375 F/g, 1 A/g	[15]
rGO,CNT	Ni foam	VF, 300 °C, pressed	KOH	194 F/g, 2 A/g	[16]
rGO,CNT	ITO	LbL, into PEI-rGO/CNT-COOH, 150°C	H_2SO_4	120 F/g, 1 mV/s	[17]
rGO,CNT,AB,PTFE	Ni foam	400 °C, 800 °C, $KMnO_4$	Na_2SO_4	35 F/g, 5 mV/s	[18]
rGO,CNT	Gr-paper	MW, 150°C, EPD	KCl	87 F/g, 5 mV/s	[19]
rGO,CNT	Ti foil	200 °C	Na_2SO_4	272 F/g, 5 mV/s	[20]
CNT,Gr	Ni foil	VA CNT on/from HOPG	KOH	110 F/g, 10 mV/s	[21]
GO,CNT, Gr.powder, PVDF	Gr.-plates	H_6N_2O 80%AM+10%Gr.powder+10%PVDF	Na_2SO_4	150 F/g, 20 mV/s	[22]
rGO,CNT	ITO	LbL, transfer	H_2SO_4	157 F/g, 50 mV/s	[23]
rGO,CNT	Si	H_6N_2O	KOH	194 F/g, 50 mV/s	[24]
rGO,CNT,AB,PVDF	Ti plate	100 °C, H_6N_2O 40%rGO+40%CNT+10%AB+10%PVDF	H_2SO_4	250 F/g, 50 mV/s	[25]
rGO,CNT	GCE	110 °C	KOH	132 F/g, 100 mV/s	[26]
rGO,CNT	FS	VF, H_6N_2O, NH_4OH	KOH	294 F/cm^3, 5 mV/s	[27]
rGO,CNT	fiber	vit. C, 90 °C	LiCl	10.8 F/cm^3, 10 mV/s	[28]
rGO,CNT	fiber	vit. C, 200 °C	H_2SO_4 -PVA	36.7 F/cm^3, 1 A/cm^3	[29]

Table S2. Published details of N-doped G/rGO-CNT single electrodes measured in three-electrode configuration.

Electrode materials	Substrate	Processing details	Electrolyte	Capacitance after (before) N doping	Ref.
rGO,CNT,PDA,AB,PTFE	Ni foam	HT, 180 °C, coating 80%AM+10%PVDF+10%AB	KOH	176 (-) F/g, 0.5 A/g	[30]
rGO,CNT,LS	GCE	urea, LS, 800 °C	KOH	246 (10) F/g, 0.5 A/g	[6]

Table S3. Published details of single G/rGO-CNT electrodes modified by PPy measured in three-electrode configuration.

Electrode materials	Sub-strate	Processing details	Electrolyte	Capacitance with (without) PPy	Ref.
rGO,CNT,PPy	fiber	vit. C, PPy, twisted into springs, coated by	LiCl	25.9 (10.8) F/cm^3, 0.01 V/s	[28]
rGO,CNT,PPy	FS	VF, H_6N_2O, $(NH_4)_2S_2O_8$, 95 °C	KCl	211 (-) F/g, 0.2 A/g	[31]
rGO,CNT,PPy,PTFE	Gr.-sub	H_6N_2O 80%AM+15%CB+5%PTFE	KCl	361 (-) F/g, 0.2 A/g	[32]
G,CNT,PPy	FS	el.-chem. polymerization 0.05%G+0.05%CNT+99.9%PPy	H_2SO_4	453 (-) F/g, 5 mV/s	[33]

Table S4. Published details of G/rGO-CNT single electrodes modified by PANI measured in three-electrode configuration.

Electrode materials	Substrate	Processing details	Electrolyte	Capacitance with (without) PANI	Ref.
rGO,CNT,PANI	FS	VF, 200 °C	H_2SO_4	257 (-) F/g, 0.2 A/g	[34]
rGO,PANI,CNT	FS	VF, 250 °C	H_2SO_4	638 (-) F/g, 0.5 A/g	[35]
rGO,CNT,PANI,MC,Naf	C-paper	HT, 180 °C, aerogel. 80%AM+15%MC+5% Naf	H_2SO_4	987 (335) F/g, 0.5 A/g	[9]
rGO,CNT,PANI	GCE	H_6N_2O, 95 °C	H_2SO_4	359 (53) F/g, 1 A/g	[11]
rGO,CNT,PANI,CB,PTFE	Ni foam	H_6N_2O, 100 °C 75%AM+20%CB+5%PTFE	KOH	1035 (-) F/g, 1 mV/s	[36]
rGO,CNT,PANI	fiber	vit. C, 200 °C, PANI onto fiber by cycling voltammetry process	H_2SO_4-PVA	193 (36.7) F/cm^3, 1 A/cm^3	[29]

Table S5. Published details of G/rGO-CNT-based single electrodes prepared with metal catalysts measured in three-electrode configuration.

Electrode materials	Sub-strate	Processing details	Electrolyte	Capacitance in F/g	Ref.
G,CNT,Co,Mo	Gr-paper	VA G by plasma-assisted method from CNT by CVD with Co/Mo	Na_2SO_4	278, 10 mV/s	[37]
rGO,CNT,Co,Fe/Al_2O_3,CB,PTFE	Ni foam	GO with $Co(NO_3)_2 \times 6H_2O$ and urea, CNT by CVD with Fe/Al_2O_3, 750°C 75%AM+20%CB+5%PTFE	KOH	385, 10 mV/s	[38]
G,CNT,Au	Ni foam	Au on CNT, core-shell G on CNT by powder pressed	KOH-CMC	373, 1 mV/s	[39]

Table S6. Published details of G/rGO-CNT-based single electrodes modified by MnO_2 measured in three-electrode configuration.

Electrode materials	Sub-strate	Processing details	Electrolyte	Capacitance with (without) MnO_2	Ref.
rGO,CNT,MnO_2,PDAA,CB,PTF	Ni foam	Urea, $KMnO_4$, 80 °C	Na_2SO_4	193 (80) F/g, 0.2 A/g	[3]
rGO,CNT,MnO_2,AB,PTFE	Ni foam	H_6N_2O, 95°C, $KMnO_4$	Na_2SO_4	126 (91) F/g, 0.25 A/g	[4]
rGO,CNT,MnO_2,AB,PTFE	Ni foam	HT,150 °C, $KMnO_4$	Na_2SO_4	336 (-) F/g, 0.5 A/g	[40]
rGO,CNT,MnO_2,AB,PTFE	Ni foam	400 °C, 800 °C, $KMnO_4$	Na_2SO_4	133 (35) F/g, 5 mV/s	[18]
rGO,CNT,MnO_2	FS	VF, H_6N_2O, NH_4OH, $KMnO_4$	Na_2SO_4	372 (-) F/g, 10 mV/s	[41]
rGO,CNT,MnO_2,Gr.powder,PV	Gr. paper	H_6N_2O, 95°C, $KMnO_4$	Na_2SO_4	367 (150) F/g, 20 mV/s	[22]
G,CNT,MnO_2	Cu foil	LbL, CVD, 1000 °C thermal decomposition, 410 °C	Na_2SO_4	365 (42) F/g, 1 A/g	[10]

Table S7. Published details of G/rGO-CNT-based single electrodes modified by other metal oxides measured in three-electrode configuration.

Electrode materials	Substrate	Processing details	Electrolyte	Capacitance, F/g	Ref.
rGO,CNT,Cel.,Co_3O_4,SnO_2,AB,PTFE	Ni foam	NH_4OH, HCl, $CoCl_2 \times 6H_2O$, $SnCl_2 \times 2H_2O$, urea,150 °C, coating 70%AM+20%AB+10%PTFE	KOH	215, 0.2 A/g	[42]
rGO,CNT,Fe_2O_3,CB,PTFE	Ni foam	75%AM+20%CB+5%PTFE	KOH	657, 1 A/g	[43]
G,CNT,$LiMn_2O_4$,AB,PTFE	Ni foam	85%AM+10%AB+5%PTFE	Li_2SO_4	676, 0.2 mV/s	[44]

Table S8. Published details of G/rGO-CNT-based single electrodes modified by $Ni(OH)_2$ measured in three-electrode configuration.

Electrode materials	Sub-strate	Processing details	Electrolyte	Capacitance with (without) $Ni(OH)_2$	Ref.
rGO,CNT,$Ni(OH)_2$	st. steel	GO-CNT aerogel, 800 °C $Ni(NO)_3\times6H_2O$, urea, 70 °C, pressed	KOH	1208 (149) F/g, 1 A/g	[13]
rGO,CNT,$Ni(OH)_2$,AB,PTFE	Ni foam	GO,CNT, urea, $NiCl_2\times6H_2O$, autoclave at 120 °C	KOH	1320 (-) F/g, 6 A/g	[45]
G,CNT,$Ni(OH)_2$	Ni foam	VA CNT on/from HOPG, 1200 °C, G by pyrolysis of FePc, 1000 °C, $Ni(OH)_2$ coating by ECD	KOH	1384 (110) F/g, 5 mV/s	[21]

Glossary

FS	freestanding
G	graphene
GCE	glassy carbon electrode
Gr	graphite
GO	graphene oxide
ITO	indium tin oxide
HCl	hydrochloric acid
HOPG	highly ordered pyrolytic graphite
HT	hydrothermal method
H_6N_2O	hydrazine hydrate or hydrazine solution
H_2SO_4	sulfuric acid
HNO_3	nitric acid
$KMnO_4$	potassium permanganate
KOH	potassium hydroxide
KCl	potassium chloride
LbL	layer-by-layer
LiCl	lithium chloride
$LiClO_4$	lithium perchlorate
$LiMn_2O_4$	lithium mangan dioxide
Li_2SO_4	lithium sulfate
LS	lignosulfonate
MC	mesoporous carbon
AB	acetylene black
AC	active carbon
Al_2O_3	aluminium oxide
AM	active material
Au	gold
C-paper	carbon paper
CB	carbon black
C-cloth	carbon cloth
Cell.	ethyl cellulose
chem. oxida-tion	chemical oxidation
CMC	carboxymethyl cellulose
CNT	carbon nanotubes
CNT-COOH	carboxylic acid functionalized CNT by concentrated H_2SO_4/HNO_3
Co	cobalt
Co_3O_4	cobalt oxide
$CoCl_2\times6H_2O$	cobalt chloride hexahydrate
$Co(NO_3)_2\times6H_2O$	cobaltous nitrate hexahydrate
Cu	copper
CVD	chemical vapor deposition
ECD	electrochemical deposition
EPD	electrophoretic deposition
Fe	iron
FePc	iron phthalocyanines

pp-AC	porous AC fabricated by pyrolysis, pre-carbonization, and alkali activation of biomass of pomelo peels
PPy	polypyrrole
PTFE	polytetrafluoroethylene
PVA	polyvinyl alcohol
PVDF	polyvinylidene fluoride
rGO	reduced graphene oxide
Si	silicon
SnO_2	tin oxide
$SnCl_2{\times}2H_2O$	
st. steel	stainless steel
Ti	titanium
VA	vertically aligned
VF	vacuum filtration
vit. C	vitamin C

MnO_2	manganese dioxide
Mo	
MW	microwave
Na_2SO_4	sodium sulfate
Naf	Nafion
$(NH_4)_2S_2O_8$	ammonium persulfate
NH_4OH	ammonia hydroxide or ammonia solution
Ni	nickel
$NiCl_2{\times}6H_2O$	nickel chloride hexahydrate
$Ni(NO)_3{\times}6H_2O$	nickel nitrate hexahydrate
$Ni(OH)_2$	nickel hydroxide
PANI	polyaniline
PDA	polydopamine
PDAA	poly(1,5-diaminoanthraquinone)
PEI-rGO	reduced GO and poly(ethyleneimine) solution after removing by centrifugation of excess polymer and hydrazine hydrate

References

1. Okhay, O.; Tkach, A.; Gallo, M.J.H.; Otero-Irurueta, G.; Mikhalev, S.; Staiti, P.; Lufrano, F. Energy storage of supercapacitor electrodes on carbon cloth enhanced by graphene oxide aerogel reducing conditions. *J. Energy Storage* **2020**, *32*, 101839. http://dx.doi.org/10.1016/j.est.2020.101839.
2. Lu, X.; Dou, H.; Gao, B.; Yuan, C.; Yang, S.; Hao, L.; Shen, L.; Zhang, X. A flexible graphene/multiwalled carbon nanotube film as a high performance electrode material for supercapacitors. *Electrochim. Acta* **2011**, *56*, 5115–5121. http://dx.doi.org/10.1016/j.electacta.2011.03.066.
3. Lei, Z.; Shi, S.; Lu, L. Incorporation of MnO_2-coated carbon nanotubes between graphene sheets as supercapacitor electrode. *ACS Appl. Mater. Interfaces* **2012**, *4*, 1058–1064. http://dx.doi.org/10.1021/am2016848.
4. Deng, L.; Hao, Z.; Wang, J.; Zhu, G.; Kang, L.; Liu, Z.-H.; Yang, Z.; Wang, Z. Preparation and capacitance of graphene/multiwall carbon nanotubes/MnO_2 hybrid material for high-performance asymmetrical electrochemical capacitor. *Electrochim. Acta* **2013**, *89*, 191–198. http://dx.doi.org/10.1016/j.electacta.2012.10.106.
5. Kumar, A.; Kumar, N.; Sharma, Y.; Leu, J.; Tseng, T.Y. Synthesis of free-standing flexible rGO/MWCNT films for symmetric supercapacitor application. *Nanoscale Res. Lett.* **2019**, *14*, 266. http://dx.doi.org/10.1186/s11671-019-3100-1.
6. Lin, T.T.; Lai, W.H.; Lü, Q.F.; Yu, Y. Porous nitrogen-doped graphene/carbon nanotubes composite with an enhanced supercapacitor performance. *Electrochim. Acta* **2015**, *178*, 517–524. http://dx.doi.org/10.1016/j.electacta.2015.08.048.
7. Huang, Z.D.; Zhang, B.; Liang, R.; Zheng, Q.B.; Oh, S.W.; Lin, X.Y.; Yousefi, N.; Kim, J.K. Effects of reduction process and carbon nanotube content on the supercapacitive performance of flexible graphene oxide papers. *Carbon* **2012**, *50*, 4239–4251. http://dx.doi.org/10.1016/j.carbon.2012.05.006.
8. Ding, B.; Guo, D.; Wang, Y.; Wu, X.; Fan, Z. Functionalized graphene nanosheets decorated on carbon nanotubes networks for high performance supercapacitors. *J. Power Sources* **2018**, *398*, 113–119. http://dx.doi.org/10.1016/j.jpowsour.2018.07.063.
9. Tran, V.C.; Nguyen, V.H.; Nguyen, T.T.; Lee, J.H.; Huynh, D.C.; Shim, J.J. Polyaniline and multi-walled carbon nanotube-intercalated graphene aerogel and its electrochemical properties. *Synth. Met.* **2016**, *215*, 150–157. http://dx.doi.org/10.1016/j.synthmet.2016.02.017.
10. Bi, T.; Fang, H.; Jiang, J.; He, X.X.; Zhen, X.; Yang, H.; Wei, Z.; Jia, Z. Enhance supercapacitive performance of MnO_2/3D carbon nanotubes graphene as a binder-free electrode. *J. Alloys Compd.* **2019**, *787*, 759–766. http://dx.doi.org/10.1016/j.jallcom.2019.02.117.

11. Huang, Y.; Zhou, J.; Gao, N.; Yin, Z.; Zhou, H.; Yang, X.; Kuang, Y. Synthesis of 3D reduced graphene oxide/unzipped carbon nanotubes/polyaniline composite for high-performance supercapacitors. *Electrochim. Acta* **2018**, *269*, 649–656. http://dx.doi.org/10.1016/j.electacta.2018.03.071.
12. Jiang, N.; Huang, F.; Xia, W.; Wei, J.; Zhou, L.; Huo, Z.; Pang, Q. Facile fabrication of rGO/CNT hybrid fibers for high performance flexible supercapacitors. *J. Mater. Sci.: Mater. Electron.* **2017**, *28*, 12147–12157. http://dx.doi.org/10.1007/s10854-017-7029-9.
13. Fan, W.; Shi, Y.; Gao, W.; Sun, Z.; Liu, T. Graphene-carbon nanotube aerogel with a scroll-interconnected-sheet structure as an advanced framework for a high-performance asymmetric supercapacitor electrode. *ACS Appl. Nano Mater.* **2018**, *1*, 4435–4441. http://dx.doi.org/10.1021/acsanm.8b00605.
14. Wu, K.; Fu, J.; Zhang, X.; Peng, X.; Gao, B.; Chu, P.K. Three-dimensional flexible carbon electrode for symmetrical supercapacitors. *Mater. Lett.* **2016**, *185*, 193–196. http://dx.doi.org/10.1016/j.matlet.2016.08.135.
15. Zhou, Y.; Hu, X.C.; Guo, S.; Yu, C.; Zhong, S.; Liu, X. Multi-functional graphene/carbon nanotube aerogels for its applications in supercapacitor and direct methanol fuel cell. *Electrochim. Acta* **2018**, *264*, 12–19. http://dx.doi.org/10.1016/j.electacta.2018.01.009.
16. Yang, Z.G.; Liu, N.N.; Dong, S.; Tian, F.S.; Gao, Y.P.; Hou, Z.Q. Supercapacitors based on free-standing reduced graphene oxides/carbon nanotubes hybrid films. *SN Appl. Sci.* **2019**, *1*, 47. http://dx.doi.org/10.1007/s42452-018-0059-y.
17. Yu, D.; Dai, L. Self-assembled graphene/carbon nanotube hybrid films for supercapacitors. *J. Phys. Chem. Lett.* **2010**, *1*, 467–470, http://dx.doi.org/10.1021/jz9003137.
18. Liu, Y.; He, D.; Duan, J.; Wang, Y.; Li, S. Synthesis of MnO_2/graphene/carbon nanotube nanostructured ternary composite for supercapacitor electrodes with high rate capability. *Mater. Chem. Phys.* **2014**, *147*, 141–146. http://dx.doi.org/10.1016/j.matchemphys.2014.04.020.
19. Lu, T.; Pan, L.; Li, H.; Nie, C.; Zhu, M.; Sun, Z. Reduced graphene oxide-carbon nanotubes composite films by electrophoretic deposition method for supercapacitors. *J. Electroanal. Chem.* **2011**, *661*, 270–273. http://dx.doi.org/10.1016/j.jelechem.2011.07.042.
20. Cui, X.; Lv, R.; Sagar, R.U.R.; Liu, C.; Zhang, Z. Reduced graphene oxide/carbon nanotube hybrid film as high performance negative electrode for supercapacitor. *Electrochim. Acta* **2015**, *169*, 342–350. http://dx.doi.org/10.1016/j.electacta.2015.04.074.
21. Du, F.; Yu, D.; Dai, L.; Ganguli, S.; Varshney, V.; Roy, A.K. Preparation of tunable 3D pillared carbon nanotube-graphene networks for high-performance capacitance. *Chem. Mater.* **2011**, *23*, 4810–4816. http://dx.doi.org/10.1021/cm2021214.
22. Ramezani, M.; Fathi, M.; Mahboubi, F. Facile synthesis of ternary MnO_2/graphene nanosheets/carbon nanotubes composites with high rate capability for supercapacitor applications. *Electrochim. Acta* **2015**, *174*, 345–355. http://dx.doi.org/10.1016/j.electacta.2015.05.155.
23. Byon, H.R.; Lee, S.W.; Chen, S.; Hammond, P.T.; Shao-Horn, Y. Thin films of carbon nanotubes and chemically reduced graphenes for electrochemical micro-capacitors. *Carbon* **2011**, *49*, 457–467. http://dx.doi.org/10.1016/j.carbon.2010.09.042.
24. Dong, X.; Xing, G.; Chan-Park, M.B.; Shi, W.; Xiao, N.; Wang, J.; Yan, Q.; Sum, T.C.; Huang, W.; Chen, P. The formation of a carbon nanotube–graphene oxide core–shell structure and its possible applications. *Carbon* **2011**, *49*, 5071–5078. http://dx.doi.org/10.1016/j.carbon.2011.07.025.
25. Zeng, F.; Kuang, Y.; Zhang, N.; Huang, Z.; Pan, Y.; Hou, Z.; Zhou, H.; Yan, C.; Schmidt, O.G. Multilayer super-short carbon nanotube/reduced graphene oxide architecture for enhanced supercapacitor properties. *J. Power Sources* **2014**, *247*, 396–401. http://dx.doi.org/10.1016/j.jpowsour.2013.08.122.
26. Lee, B.R.; Chang, D.W. Graphene/multi-walled carbon nanotubes hybrid materials for supercapacitors. *Clean Technol.* **2015**, *21*, 62–67. http://dx.doi.org/10.7464/ksct.2015.21.1.062.
27. Jiang, L.; Sheng, L.; Long, C.; Fan, Z. Densely packed graphene nanomesh-carbon nanotube hybrid film for ultra-high volumetric performance supercapacitors. *Nano Energy* **2015**, *11*, 471–480. http://dx.doi.org/10.1016/j.nanoen.2014.11.007.
28. Wang, S.; Liu, N.; Su, J.; Li, L.; Long, F.; Zou, Z.; Jiang, X.; Gao, Y. Highly stretchable and self-healable supercapacitor with reduced graphene oxide based fiber springs. *ACS Nano* **2017**, *11*, 2066–2074. http://dx.doi.org/10.1021/acsnano.6b08262.
29. Liu, D.; Du, P.; Wei, W.; Wang, H.; Wang, Q.; Liu, P. Skeleton/skin structured (RGO/CNTs)@PANI composite fiber electrodes with excellent mechanical and electrochemical performance for all solid-state symmetric supercapacitors. *J. Colloid. Interface Sci.* **2018**, *513*, 295–303. http://dx.doi.org/10.1016/j.jcis.2017.11.027.
30. Zeng, R.; Deng, H.; Xiao, Y.; Huang, J.; Yuan, K.; Chen, Y. Cross-linked graphene/carbon nanotube networks with polydopamine "glue" for flexible supercapacitors. *Compos. Commun.* **2018**, *10*, 73–80. http://dx.doi.org/10.1016/j.coco.2018.07.002.
31. Lu, X.; Dou, H.; Yuan, C.; Yang, S.; Hao, L.; Zhang, F.; Shen, L.; Zhang, L.; Zhang, X. Polypyrrole/carbon nanotube nanocomposite enhanced the electrochemical capacitance of flexible graphene film for supercapacitors. *J. Power Sources* **2012**, *197*, 319–324. http://dx.doi.org/10.1016/j.jpowsour.2011.08.112.
32. Lu, X.; Zhang, F.; Dou, H.; Yuan, C.; Yang, S.; Hao, L.; Shen, L.; Zhang, L.; Zhang, X. Preparation and electrochemical capacitance of hierarchical graphene/polypyrrole/carbon nanotube ternary composites. *Electrochim. Acta* **2012**, *69*, 160–166. http://dx.doi.org/10.1016/j.electacta.2012.02.107.
33. Aphale, A.; Maisuria, K.; Mahapatra, M.K.; Santiago, A.; Singh, P.; Patra, P. Hybrid electrodes by in-situ integration of graphene and carbon-nanotubes in polypyrrole for supercapacitors. *Sci. Rep.* **2015**, *5*, 14445. http://dx.doi.org/10.1038/srep14445.
34. Huang, Z.D.; Liang, R.; Zhang, B.; He, Y.B.; Kim, J.K. Evolution of flexible 3D graphene oxide/carbon nanotube/polyaniline composite papers and their supercapacitive performance. *Compos. Sci. Technol.* **2013**, *88*, 126–133. http://dx.doi.org/10.1016/j.compscitech.2013.08.038.

35. Liu, P.; Yan, J.; Gao, X.; Huang, Y.; Zhang, Y. Construction of layer-by-layer sandwiched graphene/polyaniline nanorods/carbon nanotubes heterostructures for high performance supercapacitors. *Electrochim. Acta* **2018**, *272*, 77–87. http://dx.doi.org/10.1016/j.electacta.2018.03.198.
36. Yan, J.; Wei, T.; Fan, Z.; Qian, W.; Zhang, M.; Shen, X.; Wei, F. Preparation of graphene nanosheet/carbon nanotube/polyaniline composite as electrode material for supercapacitors. *J. Power Sources* **2010**, *195*, 3041–3045. http://dx.doi.org/10.1016/j.jpowsour.2009.11.028.
37. Seo, D.H.; Yick, S.; Han, Z.J.; Fang, J.H.; Ostrikov, K. Synergistic fusion of vertical graphene nanosheets and carbon nanotubes for high-performance supercapacitor electrodes. *Chem. Sus. Chem.* **2014**, *7*, 2317–2324. http://dx.doi.org/10.1002/cssc.201402045.
38. Fan, Z.; Yan, J.; Zhi, L.; Zhang, Q.; Wei, T.; Feng, J.; Zhang, M.; Qian, W.; Wei, F. A three-dimensional carbon nanotube/graphene sandwich and its application as electrode in supercapacitors. *Adv. Mater.* **2010**, *22*, 3723–3728. http://dx.doi.org/10.1002/adma.201001029.
39. Li, K.; Li, H.; Li, M.; Li, C.; Su, L.; Qian, L.; Yang, B. Carbon-nanotube@graphene core-shell nanostructures as active material in flexible symmetrical supercapacitors. *Compos. Sci. Technol.* **2019**, *175*, 92–99. http://dx.doi.org/10.1016/j.compscitech.2019.03.013.
40. Li, W.; Xu, H.; Cui, M.; Zhao, J.; Liu, F.; Liu, T. Synthesis of sulfonated graphene/carbon nanotubes/manganese dioxide composite with high electrochemical properties. *Ionics* **2019**, *25*, 999–1006. http://dx.doi.org/10.1007/s11581-018-2767-0.
41. Cheng, Y.; Lu, S.; Zhang, H.; Varanasi, C.V.; Liu, J. Synergistic effects from graphene and carbon nanotubes enable flexible and robust electrodes for high-performance supercapacitors. *Nano Lett.* **2012**, *12*, 4206–4211. http://dx.doi.org/10.1021/nl301804c.
42. Ramesh, S.; Khandelwal, S.; Rhee, K.Y.; Hui, D. Synergistic effect of reduced graphene oxide, CNT and metal oxides on cellulose matrix for supercapacitor applications. *Comp. B: Eng.* **2018**, *138*, 45–54. http://dx.doi.org/10.1016/j.compositesb.2017.11.024.
43. Tian, Y.; Hu, X.; Wang, Y.; Li, C.; Wu, X. Fe_2O_3 nanoparticles decorated on graphene-carbon nanotubes conductive networks for boosting the energy density of all-solid-state asymmetric supercapacitor. *ACS Sustainable Chem. Eng.* **2019**, *7*, 9211–9219. http://dx.doi.org/10.1021/acssuschemeng.8b06857.
44. Chen, L.; Li, D.; Zheng, X.; Chen, L.; Zhang, Y.; Liang, Z.; Feng, J.; Si, P.; Lou, J.; Ci, L. Integrated nanocomposite of $LiMn_2O_4$/graphene/carbon nanotubes with pseudocapacitive properties as superior cathode for aqueous hybrid capacitors. *J. Electroanal. Chem.* **2019**, *842*, 74–81. http://dx.doi.org/10.1016/j.jelechem.2019.04.056.
45. Chen, X.; Chen, X.; Zhang, F.; Yang, Z.; Huang, S. One-pot hydrothermal synthesis of reduced graphene oxide/carbon nanotube/α-$Ni(OH)_2$ composites for high performance electrochemical supercapacitor. *J. Power Sources* **2013**, *243*, 555–561. http://dx.doi.org/10.1016/j.jpowsour.2013.04.076.