Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A. This journal is © The Royal Society of Chemistry 2019

Supporting Information

Block Copolymer-based Porous Carbons for Supercapacitors

Tianyu Liu,¹ Guoliang Liu^{*,1,2,3}

¹Department of Chemistry, ²Macromolecules Innovation Institute, and ³Academy of Integrated Science-Division of Nanoscience, Virginia Tech, Blacksburg, Virginia 24061, USA

Email: gliu1@vt.edu

Electrode	Precursor	Mass Loading ¹⁾ (mg cm ⁻²)	Electrolyte ²⁾	Gravimetric Capacitance (F g ⁻¹)	Rate Capability	Cycling Stability	Ref.
		Zero-Dim	ensional Porous Carl	oon Powders			
Partially-graphitized ordered mesoporous carbon	F127+Phenolic Resin	_3)	6 M KOH	175 (2 mV s ⁻¹)	64% (2–1000 mV s ⁻¹)	~95% (4000 cycles)	1
3D ordered mesoporous carbon/CNT	F127+Phenolic Resin	0.9-1.2	6 M KOH	338.1 (1 A g ⁻¹)	38.5% (1-50 A g ⁻¹)	91.6% (4000 cycles)	2
N-doped mesoporous/microporous carbon	F127+Phenolic Resin	-	1 M H ₂ SO ₄	325 (0.2 A g ⁻¹)	54.2% (0.2–20 A g ⁻¹)	100% (2000 cycles)	3
Hollow core/mesoporous shell carbon	F127+Phenolic Resin	_	0.1 M KOH	125 (50 mV s ⁻¹)	_	_	4
Ordered mesoporous carbon	F127+Phenolic Resin	_	1 M H ₂ SO ₄	231 (0.5 A g ⁻¹)	75.8% (0.5–20 A g ⁻¹)	98% (5000 cycles)	5
Nanocast ordered mesoporous carbon	F127+Mimosa tannin	_	1 M H ₂ SO ₄	277 (0.5 mV s ⁻¹)	53% (0.5–100 mV s ⁻¹)	80.6% (5000 cycles)	6
Ordered mesoporous carbon sphere	F127+Resorcinol	_	l-ethyl-3- methylimidazoli um tetrafluoroborate (ionic liquid)	140.2 (0.5 A g ⁻¹)	71.3% (0.5–20 A g ⁻¹)	_	7
N-doped carbon sphere	F127+Melamine- formaldehyde	3.0	6 М КОН	204 (1 A g ⁻¹)	64% (1-30 A g ⁻¹)	84.5% (5000 cycles)	8
N-doped porous carbon	F127+Pyrrole	_	$1 \text{ M H}_2 \text{SO}_4$	156 (0.1 A g ⁻¹)	86.5% (0.1–5 A g ⁻¹)	~100% (10000 cycles)	9

Table S1. Summary of capacitive performances of block copolymer-derived porous carbons.

$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Activated lignin-derived	E107 Linnin		6 M КОН	102.3	95.8%		10	
Starch-derived mesoporous carbon F127+Starch - e^{6} M KOH 144 72.4% 88.2% 10000 cycles N-doped flower-shaped ordered mesoporous F127+Fructose - e^{A} M KOH -240 -75% 90% 12 ordered mesoporous carbon F127+Fructose - -240 -75% 90% 12 N-doped mesoporous carbon F127+Fructose - -212 $$ $$ 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 10000 100000 100000 100000 100000 1000000000 $1000000000000000000000000000000000000$	mesoporous carbon	F127+Lignin	_		(1 mV s ⁻¹)	(1–10 mV s ⁻¹)	—	10	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Starch-derived	E127 Storeh			144	72.4%	88.2%		
N-doped, flower-shaped ordered mesoporous carbon F127+Fructose F127+Fructose - 6 M KOH ~ 240 $(0.2 A g^1)$ $\sim -75\%$ $(0.2 A g^1)$ 90% $(1000 cycles)$ ~ -120 $(1000 cycles)$ ~ -120 $(1 m V s^1)$ ~ -120 	mesoporous carbon	F12/+Starch	_	6 M KOH	(0.05 A g ⁻¹)	(0.05–1 A g ⁻¹)	(1000 cycles)	11	
ordered mesoporous carbon F127+Fructose carbon - 6 M KOH $^{-240}$ $^{-240}$ $^{-1576}$ 5076 12 N-doped mesoporous carbon F127+Fructose - - 212 - - 13 Bowl-shaped, N-doped carbon hollow particle PS-b-PEO - I M H ₂ SO ₄ $0(1 A g^{-1})$ $(0.1-2 A g^{-1})$ (1000 cycles) 14 N-doped hierarchical porous carbon PS-b-PAVP 3.0 6 M KOH 284 67% 96% 16 Structure-controllable mesoporous carbon PAN-b-PMMA - 2 M KOH 254 78% 96% 16 N-doped hierarchical porous carbon PS-b-PAN 2.6 6 M KOH 257 49.8% 90.4% 17 Vell-defined N/S co- doped hierarchical porous carbon PAN-b-PBA 2.6 6 M KOH 236 53.6% 89% 18 Mesoporous carbon nanoparticle PAN-b-PMMA $ 2 \text{ M KOH}$ $(10.5 \text{ A g^{-1})$ (10000 cycles) 17 Mesoporous carbon nanoparticle PAN-b-PMMA $ 2 \text{ M KOH}$ $(0.5 $	N-doped, flower-shaped				240	750/	0.00/		
$ \begin{array}{c crbon \\ \begin{tabular}{ cr2 A g^{1.5} } & (0.2 A g^{1.5}) & (1000 \ cycles) \\ \hline \end{tabular} \\ t$	ordered mesoporous	F127+Fructose	_	6 M KOH	~ 240	$\sim /5\%$	90%	12	
$ \begin{array}{c c c c c c } & & & & & & & & & & & & & & & & & & &$	carbon				(0.2 A g^{-1})	$(0.2-10 \text{ A g}^{-1})$	(1000 cycles)		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	N-doped mesoporous				212			10	
$ \begin{array}{c c c c c c } & & & & & & & & & & & & & & & & & & &$	carbon	F12/+Fructose	_	_	(1 mV s ⁻¹)	_	_	13	
$ \begin{array}{c} {\operatorname{carbon hollow particle}} & \operatorname{PS-b-PEO} & - & \operatorname{IM H_SO_4} & (0.1 \mathrm{A \ g^{1}}) & (0.1 - 2 \mathrm{A \ g^{1}}) & (10000 \mathrm{cycles}) & (10000 $	Bowl-shaped, N-doped				385	51.9%	100%		
N-doped hierarchical porous carbon $Ps-b-P4VP$ 3.0 e^{HKOH} 284 67% 96% 1 Structure-controllable mesoporous carbon $PAn-b-PMMA$ $ 2MKOH$ 254 78% 96% 0 N-doped hierarchical porous carbon $PAn-b-PMMA$ $ 2MKOH$ 254 $0.5 A g^{-1}$) (10000 cycles) 0^{-1} N-doped hierarchical porous carbon $PS-b-PAN$ 2.6 e^{HKOH} 257 49.8% 90.4% 0.4% Well-defined N/S co- doped nanocarbon $PAn-b-PBA$ 15 e^{HKOH} 236 53.6% 89% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8% 8%	carbon hollow particle	PS- <i>b</i> -PEO	_	$I M H_2 SO_4$	(0.1 A g ⁻¹)	(0.1–2 A g ⁻¹)	(10000 cycles)	14	
$ \begin{array}{c} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	N-doped hierarchical		2.0		284	67%	96%		
$ \frac{{\rm Structure-controllable}}{{\rm mesoporous carbon}} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	porous carbon	PS- <i>b</i> -P4VP	3.0	6 M KOH	(0.2 A g ⁻¹)	(0.2–30 A g ⁻¹)	(5000 cycles)	15	
$ \begin{array}{c c c c c c c c } & \ \mbox{PAN-b-PMMA} & - & 2 \ \mbox{M KOH} & (0.5 \ \mbox{G}^{-1}) & (0.5 \ \mbox{S} \ \mbox{G}^{-1}) & (10000 \ \mbox{cycles}) & 1 \\ \hline \mbox{Medped hierarchical} & \ \mbox{PS-b-PAN} & 2.6 & 6 \ \mbox{M KOH} & 257 & 49.8\% & 90.4\% & 17 \\ \hline \mbox{Well-defined N/S co-} & \ \mbox{PAN-b-PBA} & 15 & 6 \ \mbox{M KOH} & 236 & 53.6\% & 89\% & 18 \\ \hline \mbox{doped hierarchical} & \ \mbox{PAN-b-PBA} & 15 & 6 \ \mbox{M KOH} & (0.1 \ \mbox{G}^{-1}) & (0.2 \ \mbox{I O A g}^{-1}) & (5000 \ \mbox{cycles}) & 18 \\ \hline \mbox{Medped hierarchical} & \ \mbox{PAN-b-PMMA} & - & 2 \ \mbox{M KOH} & 314 & 67.8\% & 90\% & 19 \\ \hline \mbox{Mesoporous carbon} & \ \mbox{PAN-b-PMMA} & - & 2 \ \mbox{M KOH} & (0.5 \ \mbox{G}^{-1}) & (0.5 \ \mbox{Co}^{-1}) & (10000 \ \mbox{cycles}) & 19 \\ \hline \mbox{Mesoporous carbon} & \ \mbox{PAN-b-PMMA} & - & 6 \ \mbox{M KOH} & 220 & 91\% & (10000 \ \mbox{cycles}) & 19 \\ \hline \mbox{Mesoporous carbon} & \ \mbox{PAN-b-PMMA} & - & 6 \ \mbox{M KOH} & 220 & 91\% & (10000 \ \mbox{cycles}) & 19 \\ \hline \mbox{Mesoporous carbon} & \ \mbox{PAN-b-PMMA} & - & 6 \ \mbox{M KOH} & 220 & - & (10000 \ \mbox{cycles}) & 19 \\ \hline \mbox{Mesoporous carbon} & \ \mbox{PAN-b-PS-b-PAN} & 8 \ \mbox{mg} & 2 \ \mbox{M KOH} & 185 & 67.5\% & 97.5\% & 97.5\% & 21 \\ \hline \mbox{Hierarchical porous carbon} & \ \mbox{PVDC-b-PS} & 8 \ \mbox{mg} & 2 \ \mbox{M KOH} & 241.9 & 70.7\% & 93.3\% & 22 \\ \hline \mbox{Hierarchical porous carbon framework} & \ \mbox{DOne-Dimensional Porous Carbon Fibers} & \ \ \mbox{DOne-Dimensional Porous Carbon Fibers} & \ \mbox{DOne-Dimensional Porous Carbon Fibers} & \ \mbox{M Hierarchical porous carbon} & \ \mbox{M Hierarchical porous carbon} & \ \mbox{M Hierarchical porous carbon} & \ \mbox{M C-b-PS} & \ \mbox{M Hierarchical porous Carbon Fibers} & \ \mbox{M Hierarchical porous carbon} & \ \mbox{M Hierarchical porous carbon} & \ \mbox{M Hierarchical porous Carbon Fibers} & \ \ \mbox{M Hierarchical porous Carbon} & \ \mbox{M Hierarchical porous Carbon} & \ \mbox{M Hierarchical porous Carbon} & \ \mbox{M Hierarchical porous Carbon} $	Structure-controllable			A M M O M	254	78%	96%		
N-doped hierarchical porous carbon PS-b-PAN 2.6 6 M KOH 257 49.8% 90.4% 17 Well-defined N/S co- doped nanocarbon PAN-b-PBA 15 6 M KOH 236 53.6% 89% 18 N-doped hierarchical porous carbon PAN-b-PBA 15 6 M KOH (0.1 A g ⁻¹) (0.2-10 A g ⁻¹) (5000 cycles) 18 N-doped hierarchical porous carbon PAN-b-PMMA - 2 M KOH 314 67.8% 90%	mesoporous carbon	PAN- <i>b</i> -PMMA	_	2 M KOH	(0.5 A g ⁻¹)	(0.5–5 A g ⁻¹)	(10000 cycles)	16	
PS-b-PAN 2.6 6 M KOH $(0.5 A g^{-1})$ $(0.5 - 20 A g^{-1})$ (10000 cycles) 17 Well-defined N/S co- doped nanocarbon PAN-b-PBA 15 6 M KOH 236 53.6% 89% 18 N-doped hierarchical porous carbon PAN-b-PMMA - 2 M KOH $(0.1 A g^{-1})$ $(0.2-10 A g^{-1})$ (5000 cycles) 19 Mesoporous carbon nanoparticle PAN-b-PMMA - 2 M KOH 220 $(0.5 - 20 A g^{-1})$ (10000 cycles) 19 Mesoporous carbon nanoparticle PAN-b-PMMA - $6 M KOH$ 220 $ 91\%$ 20 Mesoporous carbon nanoparticle PAN-b-PS-b-PAN 8 mg $2 M KOH$ 185 67.5% 97.5% 21 Mesoporous carbon nanoparticle PAN-b-PS-b-PAN 8 mg $2 M KOH$ 185 67.5% 97.5% 21 Mesoporous carbon PAN-b-PS-b-PAN 8 mg $2 M KOH$ 185 $(0.625 - 6.25 A g^{-1})$ (10000 cycles) 21 Hierarchical porous carbon framework PVDC-b-PS $1-2$ $6 M KOH$ $(0.5 A g^{-1})$ $(0.5-20 A g^{-1})$	N-doped hierarchical		2 (257	49.8%	90.4%		
Well-defined N/S co- doped nanocarbon PAN-b-PBA 15 6 M KOH 236 53.6% 89% 18 N-doped hierarchical porous carbon PAN-b-PMMA - 2 M KOH (0.1 A g ⁻¹) (0.2-10 A g ⁻¹) (5000 cycles) 19 Mesoporous carbon nanoparticle PAN-b-PMMA - 2 M KOH 314 67.8% 90% 19 Mesoporous carbon nanoparticle PAN-b-PMMA - 0.05 A g ⁻¹) (0.05-20 A g ⁻¹) (10000 cycles) 19 Mesoporous carbon nanoparticle PAN-b-PS-PAN 8 mg 2 M KOH 185 67.5% 97.5% 10 Mesoporous carbon nanoparticle PAN-b-PS-b-PAN 8 mg 2 M KOH 185 67.5% 97.5% 10 Hierarchical porous carbon framework PVDC-b-PS 1-2 6 M KOH 241.9 70.7% 93.3% 2 One-Dimensional Porous Carbon Fibers 0.05-2.0 A g ⁻¹ (10000 cycles) 10 2	porous carbon	PS- <i>b</i> -PAN	2.6	6 M KOH	(0.5 A g ⁻¹)	(0.5–20 A g ⁻¹)	(10000 cycles)	17	
Adoped nanocarbon PAN-b-PBA 15 6 M KOH (0.1 A g^{-1}) $(0.2-10 \text{ A g}^{-1})$ (5000 cycles) 18 N-doped hierarchical porous carbon PAN-b-PMMA $ 2 \text{ M KOH}$ 314 67.8% 90% 90% 19 Mesoporous carbon nanoparticle PAN-b-PMMA $ 0.5 \text{ A g}^{-1}$ $(0.5-20 \text{ A g}^{-1})$ (10000 cycles) 19 Mesoporous carbon nanoparticle PAN-b-PMMA $ 0 \text{ M KOH}$ 220 $ 91\%$ 20 Mesoporous carbon nanoparticle PAN-b-PS-b-PAN 8 mg 2 M KOH 185 67.5% 97.5% 21 Hierarchical porous carbon framework PVDC-b-PS 8 mg 2 M KOH 185 67.5% 97.5% 21 Hierarchical porous carbon framework PVDC-b-PS $1-2$ 6 M KOH 241.9 70.7% 93.3% 22 One-Dimensional Porous Carbon Fibers $(0.5-20 \text{ A g}^{-1})$ (10000 cycles) 21	Well-defined N/S co-				236	53.6%	89%		
N-doped hierarchical porous carbon PAN-b-PMMA - $2 M KOH$ 314 67.8% 90% 19 Mesoporous carbon nanoparticle PAN-b-PMMA - $20 KOH$ $(0.5 A g^{-1})$ $(0.5 - 20 A g^{-1})$ $(10000 cycles)$ 19 Mesoporous carbon nanoparticle PAN-b-PMMA - $6 M KOH$ 220 - 91% 20 $10000 cycles$ $10000 cycles$ 20 $1000 cycles$ $10000 cycles$ $10000 cycles$ $10000 cycles$ <	doped nanocarbon	PAN- <i>b</i> -PBA	15	6 M KOH	(0.1 A g ⁻¹)	(0.2–10 A g ⁻¹)	(5000 cycles)	18	
PAN-b-PMMA - 2 M KOH (0.5 A g ⁻¹) (0.5-20 A g ⁻¹) (10000 cycles) Mesoporous carbon nanoparticle PAN-b-PMMA - 6 M KOH 220 - 91% 20 Mesoporous carbon nanoparticle PAN-b-PMMA - 6 M KOH - (0.05 A g ⁻¹) (10000 cycles) 20 Mesoporous carbon nanoparticle PAN-b-PS-b-PAN 8 mg 2 M KOH - - 91% 20 Mesoporous carbon nanoparticle PAN-b-PS-b-PAN 8 mg 2 M KOH - - (0.625 A g ⁻¹) (10000 cycles) 21 Hierarchical porous carbon framework PVDC-b-PS 1-2 6 M KOH 241.9 70.7% 93.3% 22 One-Dimensional Porous Carbon Fibers 0.5-20 A g ⁻¹ (10000 cycles) 22	N-doped hierarchical				314	67.8%	90%		
$ \frac{Mesoporous carbon}{nanoparticle} + \frac{PAN-b-PMMA}{PAN-b-PSM-b-PAN} + \frac{6 M KOH}{6 M KOH} + \frac{220}{(0.05 A g^{-1})} + \frac{91\%}{(1000 cycles)} + \frac{91\%}{(1000 cycles)} + \frac{20}{(1000 cycles)} + \frac{185}{(0.625 A g^{-1})} + \frac{185}{(0.625 A g^{-1})} + \frac{185}{(0.625 A g^{-1})} + \frac{10000 cycles}{(1000 cycles)} + \frac{1}{12} + \frac{12}{(0.5 A g^{-1})} + \frac{241.9}{(0.5 A g^{-1})} + \frac{10000 cycles}{(0.5-20 A g^{-1})} + \frac{10000 cycles}{(1000 cycles)} + \frac{1}{2} + \frac{12}{(0.5 A g^{-1})} + \frac{10000 cycles}{(0.5-20 A g^{-1})} + \frac{10000 cycles}{(1000 cycles)} + \frac{1}{12} + \frac{10000 cycles}{(0.5 A g^{-1})} + \frac{10000 cycles}{(0.5 A g^{-1})} + \frac{10000 cycles}{(0.5-20 A g^{-1})} + \frac{10000 cycles}{(1000 cycles)} + \frac{1000 cycles}{(1000 cycles$	porous carbon	PAN- <i>b</i> -PMMA	_	2 M KOH	(0.5 A g ⁻¹)	(0.5–20 A g ⁻¹)	(10000 cycles)	19	
nanoparticle PAN-b-PMMA - 6 M KOH (0.05 A g ⁻¹) - 20 Mesoporous carbon PAN-b-PS-b-PAN 8 mg 2 M KOH (185 67.5% 97.5% 21 Hierarchical porous PVDC-b-PS - 6 M KOH 241.9 (0.625-6.25 A g ⁻¹) (10000 cycles) 21 Hierarchical porous PVDC-b-PS 1-2 6 M KOH 241.9 70.7% 93.3% 22 One-Dimensional Porous Carbon Fibers One-Dimensional Porous Carbon Fibers (0.5-20 A g ⁻¹) (10000 cycles) 22	Mesoporous carbon				220		91%		
Mesoporous carbon PAN-b-PS-b-PAN 8 mg 2 M KOH 185 67.5% 97.5% 21 Hierarchical porous carbon framework PVDC-b-PS $1-2$ 6 M KOH 241.9 $0.625-6.25 \text{ A g}^{-1}$ 10000 cycles 22 Mesoporous carbon framework $1-2$ 6 M KOH 241.9 $0.5-20 \text{ A g}^{-1}$ 0.000 cycles 22 One-Dimensional Porous Carbon Fibers	nanoparticle	PAN- <i>b</i> -PMMA	_	6 M KOH	(0.05 A g^{-1})	_	(10000 cycles)	20	
Mesoporous carbon PAN-b-PS-b-PAN 8 mg 2 M KOH (0.625 A g ⁻¹) (0.625-6.25 A g ⁻¹) (10000 cycles) Hierarchical porous PVDC-b-PS 1-2 6 M KOH 241.9 70.7% 93.3% 22 Garbon framework 1-2 6 M KOH (0.5 A g ⁻¹) (0.5-20 A g ⁻¹) (10000 cycles) 22			0		185	67.5%	97.5%		
Hierarchical porous carbon framework PVDC-b-PS 1–2 6 M KOH 241.9 70.7% 93.3% 22 0.5 A g ⁻¹ (0.5 A g ⁻¹) (0.5–20 A g ⁻¹) (10000 cycles) 22	Mesoporous carbon	PAN- <i>b</i> -PS- <i>b</i> -PAN	8 mg		(0.625 A g ⁻¹)	(0.625–6.25 A g ⁻¹)	(10000 cycles)	21	
carbon framework I-2 6 M KOH (0.5 A g ⁻¹) (0.5-20 A g ⁻¹) (10000 cycles) One-Dimensional Porous Carbon Fibers	Hierarchical porous		1.0		241.9	70.7%	93.3%	22	
One-Dimensional Porous Carbon Fibers	carbon framework	PVDC-0-PS	1-2	6 M KUH	(0.5 A g ⁻¹)	(0.5–20 A g ⁻¹)	(10000 cycles)	22	

Porous carbon fiber	PMMA- <i>b</i> -PAN	1	6 M KOH	360	62.7%	100%	22
				(1 A g ⁻¹)	(1–10 A g ⁻¹)	(10000 cycles)	23
MnO ₂ -coated porous	PMMA-b-PAN	6.8	6 M KOH	462	50.2%	98%	24
carbon fiber				(10 mV s ⁻¹)	(10-1000 mV s ⁻¹)	(5000 cycles)	
Well-aligned ordered		_	_	172.9	69 20/	70.29/	25
mesoporous carbon	PS-b-PEO			(0.22, A, -1)	(0.22, 11.25, A, -1)	(10001)	
nanofiber				(0.23 A g^{-1})	$(0.23-11.25 \text{ A g}^{-1})$	(1000 cycles)	
		Two-Dimens	ional Porous Carbon H	Films and Sheets			
N-doped mesoporous	F127+00		()()()	268.9	76.2%	87%	26
carbon sheet	F127+GO	5–8 mg	6 M KOH	(0.2 A g ⁻¹)	(0.2–20 A g ⁻¹)	(4000 cycles)	
N 1 100	F107 , CO	7 mg		210	73.8%	95.6%	27
Mesoporous reduced GO	F127+GO		6 M KOH	(1 mV s ⁻¹)	(1-100 mV s ⁻¹)	(1000 cycles)	
Ordered mesoporous,				20.9	510/	000/	
highly uniform carbon	F127+Resol	_	(gel)	208	51%	99%	28
sheet				(0.2 A g^{-1})	$(0.2-100 \text{ A g}^{-1})$	(20000 cycles)	
Bimodal nanoporous		_	6 M KOH	173	92.5%	100%	29
carbon	PS- <i>b</i> -P2VP			(1 A g ⁻¹)	(1–10 A g ⁻¹)	(10000 cycles)	
Hierarchically ordered		3	1 M H ₂ SO ₄	212	96.2%	97%	30
mesoporous cabon	F12/+Resol			(0.25 A g ⁻¹)	(0.25–10 A g ⁻¹)	(5000 cycles)	
Activated hierarchical			6 M KOH	297	74.9%	90%	31
porous carbon	PAN- <i>D</i> -PMMA- <i>D</i> -PAN	_		(0.5 A g^{-1})	(0.5–5 A g ⁻¹)	(2000 cycles)	
	Th	ree-Dimension	al Porous Carbon Mo	noliths and Aerogels	3		
			1 M				
S-rich carbon cryogel	F127+RF resin	_	tetraethylammon	27.5 (0.5 A g ⁻¹)	54 5%	98.8%	
			ium tetrafluoroborate		$(0.5, 10, 4, a^{-1})$	(1000 gyales)	32
					$(0.3-10 \text{ Ag}^{-1})$	(1000 cycles)	
			(organic)				
Heteroatom-doped	F127+PF resin	2	6 M KOH	433	63.5%	_	33

carbon aerogel				(0.2 A g ⁻¹)	(0.5–2 A g ⁻¹)		
Hierarchical porous	F127+PF resin	_	6 M KOH	379	29.3%	94%	34
carbon foam				(0.2 A g ⁻¹)	(0.2–20 A g ⁻¹)	(1000 cycles)	
Graphene-based ordered				227	Q50/	020/	
mesoporous carbon	F127+PF resin	1	6 M KOH	$(5.5 \land c^{-1})$	$(5.5 \ 111 \ 1 \ A \ cm^{-1})$	9270	35
hybrid				(5.5 A g^{-1})	(5.5–111.1 A g ¹)	(10000 cycles)	
Ordered mesoporous			6 M KOH	230	71.7%		36
nanorod monolith	F12/+RF resin	_		(5 mV s ⁻¹)	(5-100 mV s ⁻¹)	—	
N-doped carbon net	F127+dicyandiamide	_	$0.5 \text{ M H}_2 \text{SO}_4$	537.3	69.1%	98.8%	37
				(0.5 A g ⁻¹)	(0.5–10 A g ⁻¹)	(10000 cycles)	
Layer-by-layer motif				240	75 50/	0.00/	
structured hierarchical	F127+Resol	_	6 M KOH	(1 4 -1)	(1, 40, 4, -1)	98%	38
porous carbon				$(1 \text{ A } g^{-1})$	$(1-40 \text{ A g}^{-1})$	(7000 cycles)	
KOH activated, O, N, S-				402.5		000/	
doped hierarchical	F127+GO	1.32	6 M KOH	402.5	/6.6%	90%	39
porous graphene aerogel				(1 A g^{-1})	$(1-100 \text{ A g}^{-1})$	(30000 cycles)	
N-doped multiscale	PEO-b-PPO-b-PEO	2 mg	20 mol kg ⁻¹	167	67.1%	61%	40
porous carbon			LiTFSI	(0.1 A g^{-1})	(0.1–5 A g ⁻¹)	(10000 cycles)	40
Rich N-doped	PS- <i>b</i> -PAA	AA 1.34	1 M H ₂ SO ₄	252	61%	100%	41
mesoporous carbon				(0.2 A g^{-1})	$(0.2-10 \text{ A g}^{-1})$	(5000 cycles)	41

Acronyms:

PS = polystyrene; PEO = poly(ethylene oxide); PPO = poly(propylene oxide); P4VP = poly(4-vinyl pyridine); PAN = polyacrylonitrile; PMMA = poly(methyl methacrylate); PBA = poly(butyl acrylate); PVDC = poly(vinyl idene chloride-*co*-methylacrylate); PAA = poly(acrylic acid); PVA = poly(vinyl alcohol); GO = graphene oxide; PF = phenol-formaldehyde; RF = resorcinol-formaldehyde; LiTFSI = Lithium bis(trifluoromethanesulfonyl)imide

Notes:

1) Unless otherwise specified, the unit is mg cm⁻². The masses of porous carbons are listed in the table for reports where no mass loadings are available.

2) Unless otherwise stated, all electrolytes are aqueous solutions.

3) "-" means not reported.

Supplementary References

- 1. L. Jiang, J. Yan, R. Xue, G. Sun and B. Yi, J. Solid State Electrochem., 2014, 18, 2175-2182.
- 2. Z. Zhu, Y. Hu, H. Jiang and C. Li, J. Power Sources, 2014, 246, 402-408.
- 3. Y. Song, S. Hu, X. Dong, Y. Wang, C. Wang and Y. Xia, *Electrochim. Acta*, 2014, 146, 485-494.
- 4. A. Chen, Y. Yu, Y. Li, Y. Wang, Y. Li, S. Li and K. Xia, J. Mater. Sci., 2016, 51, 4601-4608.
- 5. M. Xie, K. Fang, Y. Shen, Y. Wang, J. Liang, L. Peng, X. Guo and W. Ding, *Microporous Mesoporous Mater.*, 2016, 223, 114-120.
- 6. A. Sanchez-Sanchez, M. T. Izquierdo, J. Ghanbaja, G. Medjahdi, S. Mathieu, A. Celzard and V. Fierro, *J. Power Sources*, 2017, 344, 15-24.
- 7. X.-Q. Zhang, A.-H. Lu, Q. Sun, X.-F. Yu, J.-Y. Chen and W.-C. Li, *ACS Appl. Energy Mater.*, 2018, 1, 5999-6005.
- 8. A. Zhang, S. Cao, Y. Zhao, C. Zhang and A. Chen, New J. Chem., 2018, 42, 6903-6909.
- 9. Y.-N. Sun, Z.-Y. Sui, X. Li, P.-W. Xiao, Z.-X. Wei and B.-H. Han, *ACS Appl. Nano Mater.*, 2018, 1, 609-616.
- 10. D. Saha, Y. Li, Z. Bi, J. Chen, J. K. Keum, D. K. Hensley, H. A. Grappe, H. M. Meyer, S. Dai, M. P. Paranthaman and A. K. Naskar, *Langmuir*, 2014, 30, 900-910.
- 11. M. Wu, P. Ai, M. Tan, B. Jiang, Y. Li, J. Zheng, W. Wu, Z. Li, Q. Zhang and X. He, *Chem. Eng. J.*, 2014, 245, 166-172.
- 12. S. Wang, C. Han, J. Wang, J. Deng, M. Zhu, J. Yao, H. Li and Y. Wang, *Chem. Mater.*, 2014, 26, 6872-6877.
- 13. Y. Hu, H. Liu, Q. Ke and J. Wang, J. Mater. Chem. A, 2014, 2, 11753-11758.
- 14. Z. Lin, H. Tian, F. Xu, X. Yang, Y. Mai and X. Feng, *Polym. Chem.*, 2016, 7, 2092-2098.
- 15. S. Cao, T. Qu, A. Zhang, Y. Zhao and A. Chen, *ChemElectroChem*, 2019, 6, 1696-1703.
- 16. K. Yan, L. B. Kong, Y. H. Dai, M. Shi, K. W. Shen, B. Hu, Y. C. Luo and L. Kang, *J. Mater. Chem. A*, 2015, 3, 22781–22793.
- 17. Y.-X. Tong, X.-M. Li, L.-J. Xie, F.-Y. Su, J.-P. Li, G.-H. Sun, Y.-D. Gao, N. Zhang, Q. Wei and C.-M. Chen, *Energy Storage Mater.*, 2016, 3, 140-148.
- 18. R. Yuan, H. Wang, M. Sun, K. Damodaran, E. Gottlieb, M. Kopeć, K. Eckhart, S. Li, J. Whitacre, K. Matyjaszewski and T. Kowalewski, *ACS Appl. Nano Mater.*, 2019, 2, 2467-2474.
- 19. K. Yan, L. B. Kong, K. W. Shen, Y. H. Dai, M. Shi, B. Hu, Y. C. Luo and L. Kang, *Appl. Surf. Sci.*, 2016, 364, 850-861.
- 20. A. Zhang, A. Li, Y. Wang, M. Liu, H. Ma, Z. Song and J. Liu, *RSC Adv.*, 2016, 6, 103843-103850.
- 21. Y. Wang, L.-B. Kong, X.-M. Li, F. Ran, Y.-C. Luo and L. Kang, New Carbon Mater., 2015, 30, 302-309.
- 22. J. Yang, G. Li, M. Cai, P. Pan, Z. Li, Y. Bao and Z. Chen, Chem. Commun., 2017, 53, 5028-5031.
- 23. Z. Zhou, T. Liu, A. U. Khan and G. Liu, *Sci. Adv.*, 2019, 5, eaau6852.
- 24. T. Liu, Z. Zhou, Y. Guo, D. Guo and G. Liu, Nat. Commun., 2019, 10, 675.
- 25. E. Kang, G. Jeon and J. K. Kim, *Chem. Commun.*, 2013, 49, 6406-6408.
- 26. M. Li and J. Xue, J. Phys. Chem. C, 2014, 118, 2507-2517.
- 27. Q. Ke, Y. Liu, H. Liu, Y. Zhang, Y. Hu and J. Wang, RSC Adv., 2014, 4, 26398-26406.
- 28. X. Xi, D. Wu, L. Han, Y. Yu, Y. Su, W. Tang and R. Liu, ACS Nano, 2018, 12, 5436-5444.

- 29. L. Guo, X. Wang and Y. Wang, Chem. Eng. J., 2017, 313, 1295-1301.
- 30. D. Liu, G. Cheng, H. Zhao, C. Zeng, D. Qu, L. Xiao, H. Tang, Z. Deng, Y. Li and B.-L. Su, *Nano Energy*, 2016, 22, 255-268.
- 31. F. Ran, K. Shen, Y. Tan, B. Peng, S. Chen, W. Zhang, X. Niu, L. Kong and L. Kang, *J. Membrane Sci.*, 2016, 514, 366-375.
- 32. Y. Zhou, S. L. Candelaria, Q. Liu, Y. Huang, E. Uchaker and G. Cao, *J. Mater. Chem. A*, 2014, 2, 8472-8482.
- 33. B. You, P. Yin and L. An, Small, 2014, 10, 4352-4361.
- 34. B. You, J. Jiang and S. Fan, ACS Appl. Mater. Interfaces, 2014, 6, 15302-15308.
- 35. Y. Deng, A. Xu, W. Lu, Y. Yu, C. Fu and T. Shu, New J. Chem., 2018, 42, 7043-7048.
- 36. G. Hasegawa, K. Kanamori, T. Kiyomura, H. Kurata, T. Abe and K. Nakanishi, *Chem. Mater.*, 2016, 28, 3944-3950.
- 37. L.-N. Han, X. Wei, Q.-C. Zhu, S.-M. Xu, K.-X. Wang and J.-S. Chen, *J. Mater. Chem. A*, 2016, 4, 16698-16705.
- 38. J. Wang, J. Tang, B. Ding, V. Malgras, Z. Chang, X. Hao, Y. Wang, H. Dou, X. Zhang and Y. Yamauchi, *Nat. Commun.*, 2017, 8, 15717.
- 39. H. Peng, B. Yao, X. Wei, T. Liu, T. Kou, P. Xiao, Y. Zhang and Y. Li, *Adv. Energy Mater.*, 2019, 9, 1803665.
- 40. X. Liu, R. Mi, L. Yuan, F. Yang, Z. Fu, C. Wang and Y. Tang, *Front Chem.*, 2018, 6, 475.
- 41. Y. Liu, Z. Wang, W. Teng, H. Zhu, J. Wang, A. A. Elzatahry, D. Al-Dahyan, W. Li, Y. Deng and D. Zhao, *J. Mater. Chem. A*, 2018, 6, 3162-3170.