

Supporting Information

Converting waste poly(ethylene terephthalate) to hierarchical porous carbon towards high-performance supercapacitor

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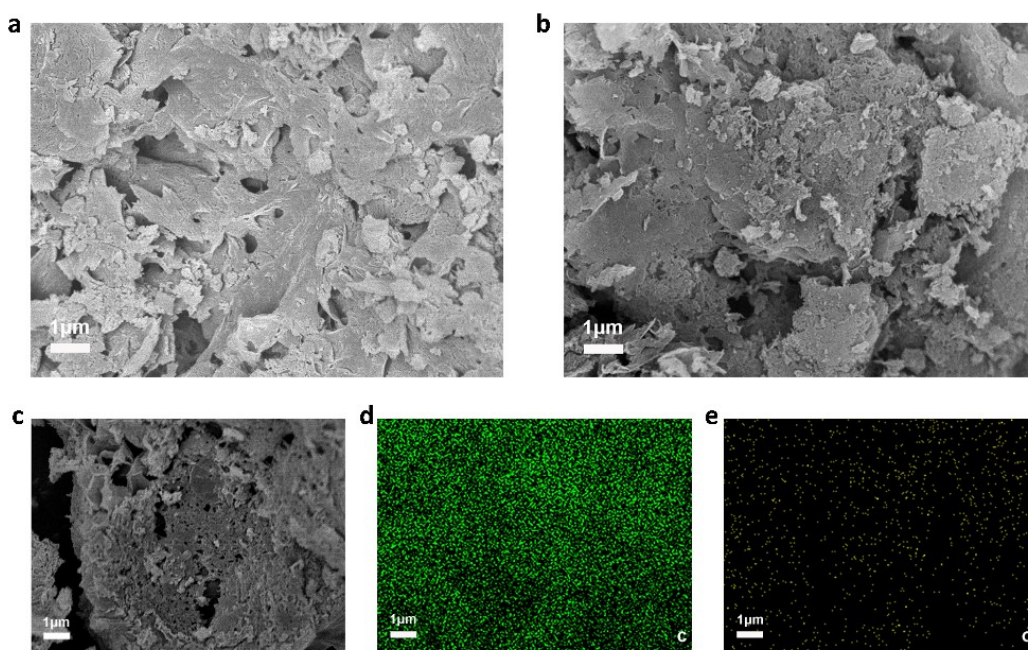


Fig. S1. (a) SEM image of HPC-600. (b) SEM image of HPC-800. (c-e) EDS mapping of HPC-700.

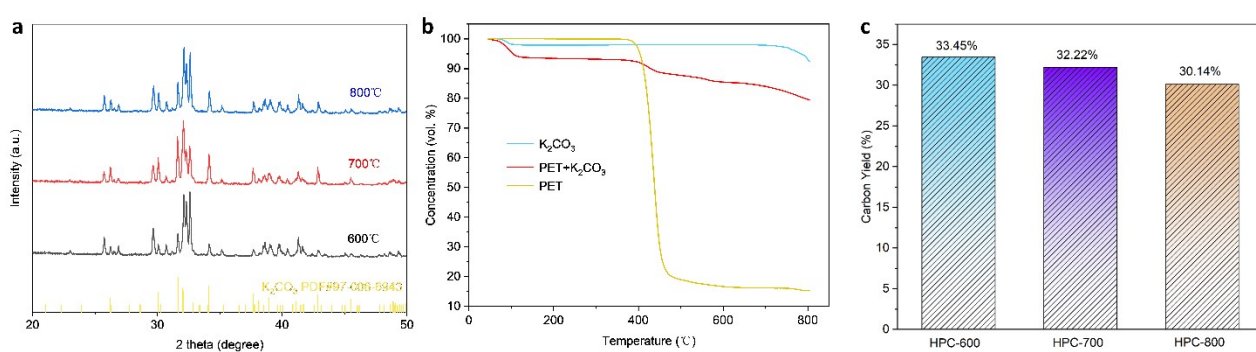


Fig. S2. (a) XRD patterns corresponding to the samples produced from the mixture of PET and K_2CO_3 before washing. (b) TGA curves of K_2CO_3 , PET and their mixture. (c) Carbon yield of HPCs.

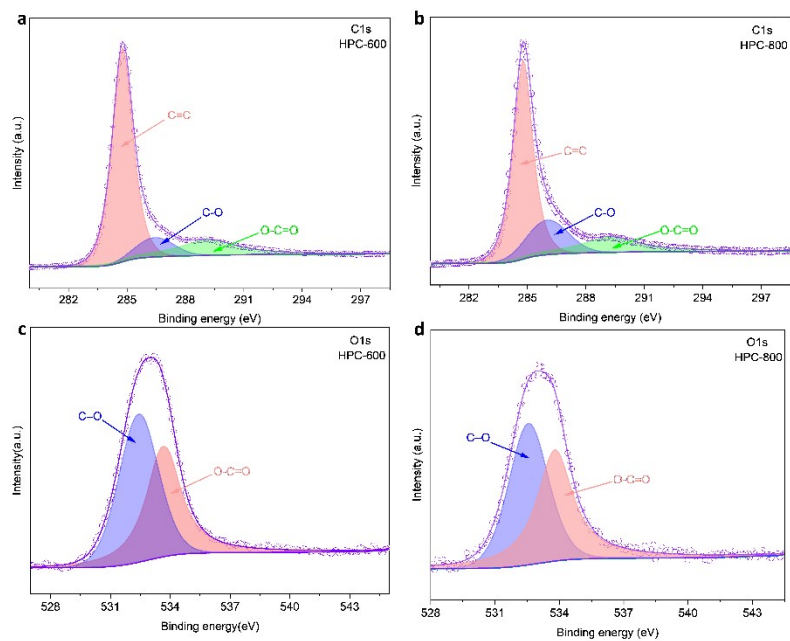


Fig. S3. XPS results of HPC-600 and HPC-800 : (a-b) C1s spectra, (c-d) O1s spectra.

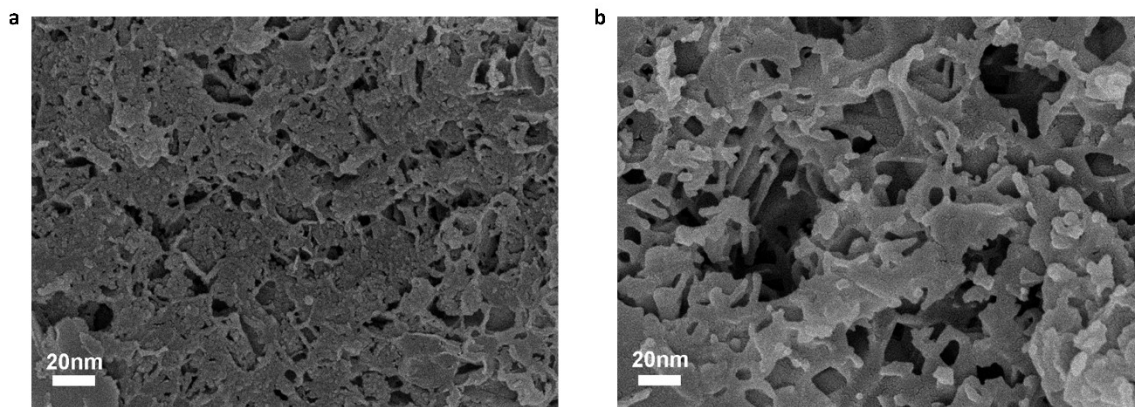


Fig. S4. SEM images of the HPC-700 electrode before (a) and after 10,000 cycles (b).

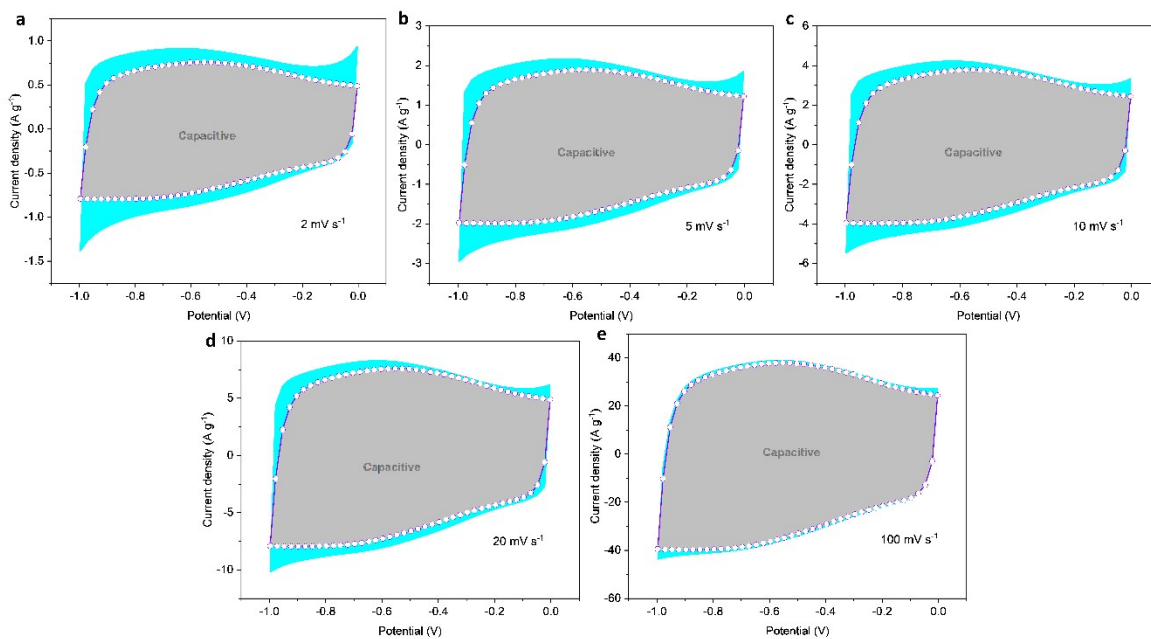


Fig. S5. The contributions of EDLC and PC of HPC-700 at various scan rates.

Table S1 Energy consumption at different stages of the porous carbon preparation process.

Preparation Stage	Temperature/Time	Power (kW)	Energy Consumption (kWh)	Sample Yield (g)	Specific Energy Consumption (kWh/g)
Carbonization Stage	800°C/2 h	1.6	3.2	0.805	3.975
Washing Stage	Room temperature /0.5 h	0.37	0.185	0.805	0.230
Drying Stage	80°C / 3 h	0.6	1.8	0.805	2.236

Table S2 Element composition and content of O functional groups tested from XPS.

Samples	Element composition (at.%)		Content of O functional groups (at.%)		
	C	O	OH	COOH	CO
HPC-600	90.53	9.47	//	4.54	4.93
HPC-700	89.3	10.7	2.92	5.20	2.58
HPC-800	92.63	7.37	//	3.56	3.81

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2 **Table S3.** Life cycle environmental impact of HPC-700.

Impact category	Preprocessing	Carbonization	Washing and drying	Sum
CED (MJ)	33.6	99.39	15.429	148.419
GWP (kg CO₂ eq)	3.225	8.726	1.549	13.5
ADP (MJ)	34.777	109.0296	18.212	162.0186
WU (kg)	0.703	2.37	0.269	3.342
AP (kg SO₂ eq)	0.0158	0.0453	0.009	0.0701
EP (kg PO₄₃-eq)	0.0082	0.0026	0.0038	0.0146
RI (kg PM_{2.5} eq)	0.0054	0.015233	0.002	0.022633
ODP (kg CFC-11 eq)	9.4578E-08	6.4549E-09	3.6310E-09	1.05E-07
POFP (kg NMVOC eq)	0.011	0.0295	0.005	0.0455
IRP (kg U235 eq)	0.18	0.9045	0.204	1.2885
ET (CTUe)	0.731	2.7196	0.327	3.7776

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