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Supporting information

Controllable fabrication of superhierarchical carbon nanonetworks from 2D molecular brushes and their use in electrodes of flexible supercapacitors

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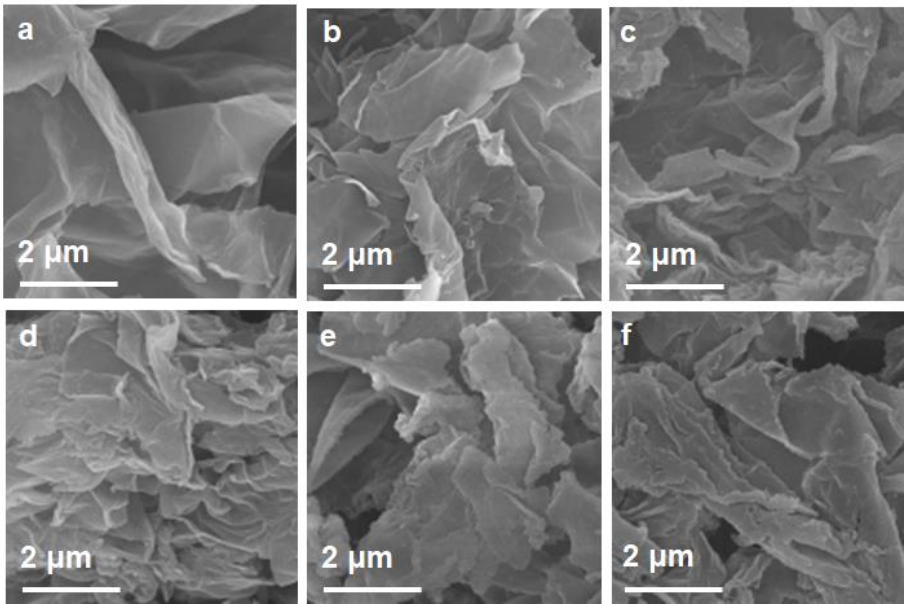

Fig. S1 SEM images of a) GO, b) GO-*g*-PA, and MBNN with different molar ratios of -NH_2 to -CHO: c) 0.22, d) 0.45, e) 0.89, and f) 1.78.

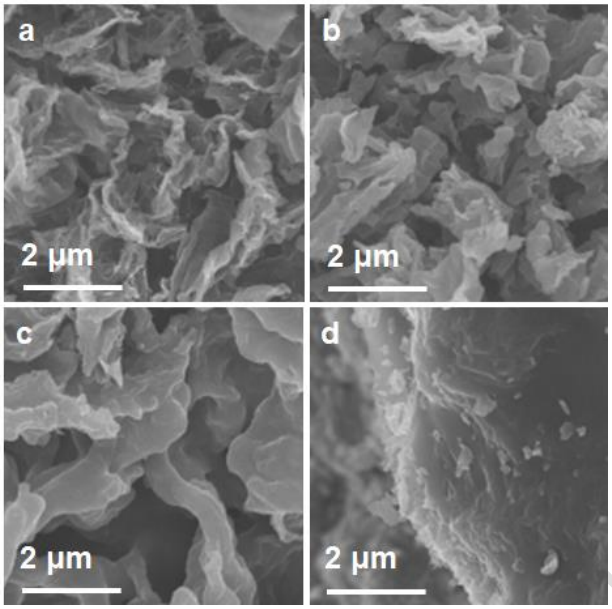

Fig. S2 SEM images of SCHNN obtained from MBNN with different molar ratios of -NH_2 to -CHO: a) 0.22, b) 0.45, c) 0.89, and d) 1.78. The carbonization condition is 900 °C for 3 hours in N_2 flow.

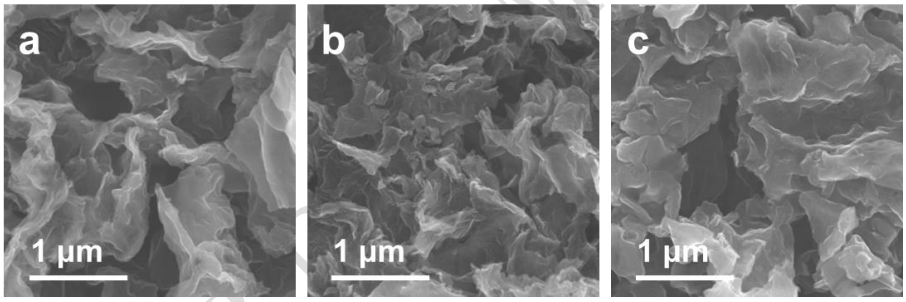

Fig. S3 SEM images of SHCNN obtained under different carbonization time: a) 3 hours, b) 10 hours, and c) 20 hours. The molar ratio of –NH_2 to –CHO in MBNN is 0.22.

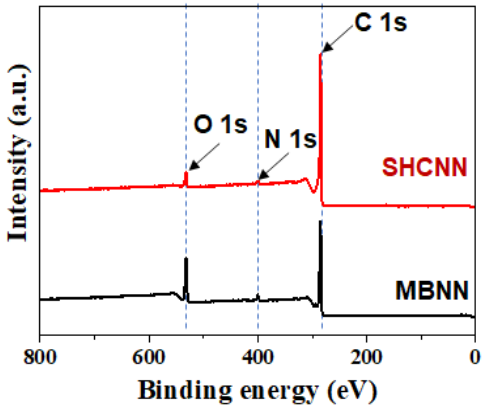

Fig. S4 XPS surveys of MBNN and SHCNN.

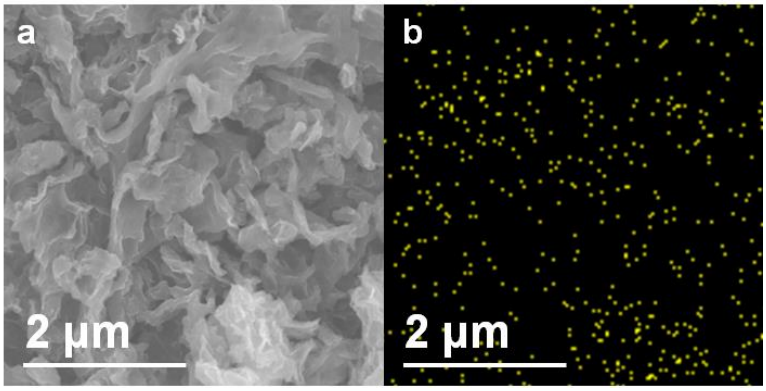

Fig. S5 Elemental mapping of SHCNN, showing uniform distribution of the N element.

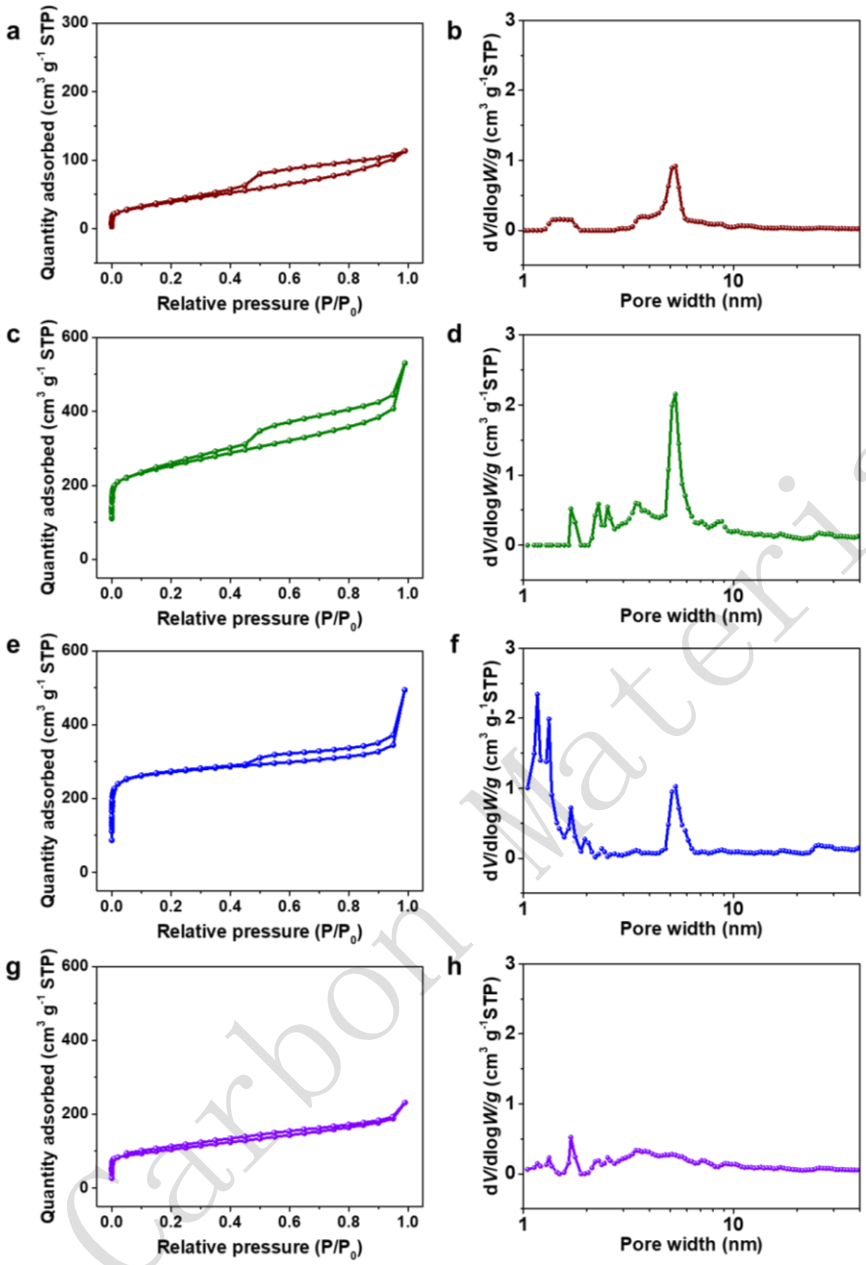

Fig. S6 N_2 adsorption-desorption isotherms and the DFT pore size distributions of a, b) GO-C-900-3, and SHCNN obtained under different carbonization conditions: c, d) 900 ℃ for 3 hours, e, f) 900 ℃ for 10 hours, and g, h) 700 ℃ for 20 hours.

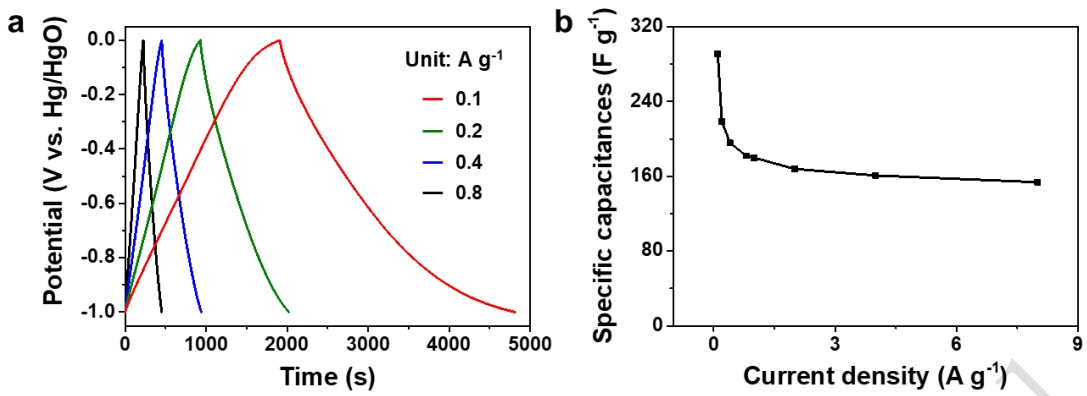

Fig. S7 a) GCD curves of SHCNN/CC at different low current densities. b) Specific capacitances of SHCNN/CC at different current densities.

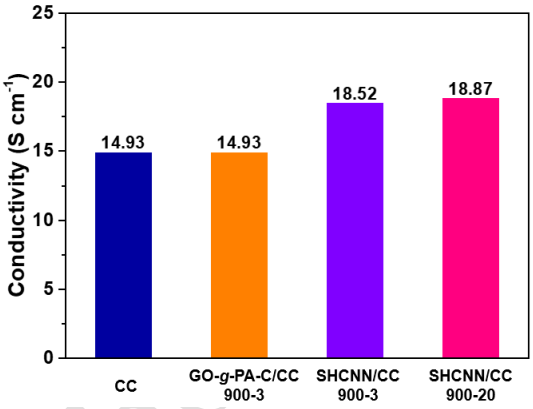

Fig. S8 Electrical conductivity of carbon cloth (CC), GO-*g*-PA-C/CC-900-3 electrode, SHCNN/CC-900-3 electrode, and SHCNN/CC-900-20 electrode.

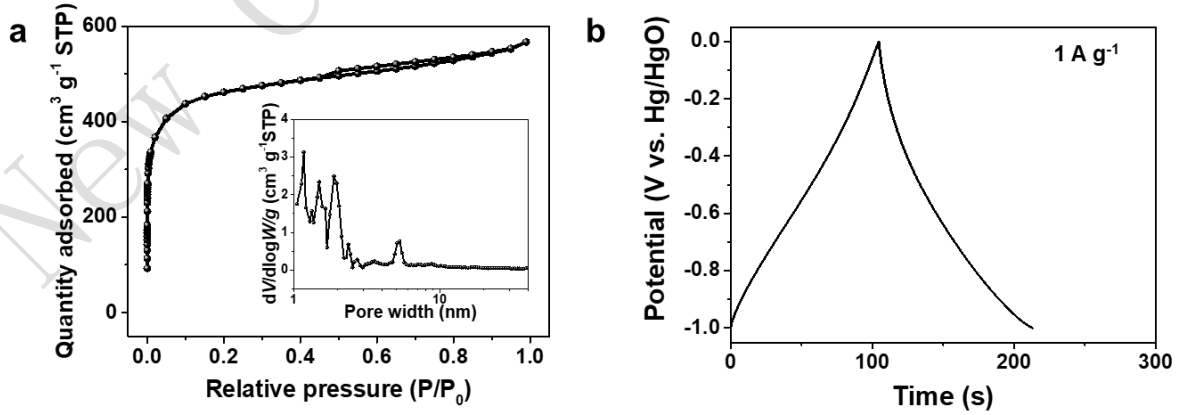

Fig. S9 a) N_2 adsorption-desorption isotherm and DFT pore size distribution (inset) of YP50. b) GCD curve of YP50/CC at 1 A g^{-1}.

Table S1. Carbonization yields of different samples.

Precursor	Molar ratio of –NH_2 to -CHO	Carbonization		
		Temperature (℃)	Time (hours)	Yield (%)
MBNN	0.22	900	20	10.3
MBNN	0.22	900	10	11.7
MBNN	0.22	900	3	14.2
MBNN	0.44	900	3	17.9
MBNN	0.88	900	3	23.1
MBNN	1.76	900	3	24.7
MBNN	0.22	700	20	24.5
Pure TAPM	/	900	3	3.3
Pure GO-*g*-PA	/	900	3	9.3
Pure PA	/	900	3	0

Table S2. Pore structure parameters of SHCNN, GO-C, and YP50.

Sample	S_{BET} (m^2 g^{-1})	S_{mic} (m^2 g^{-1})	S_{ext} (m^2 g^{-1})	V_t (cm^3 g^{-1})	V_{mic} (cm^3 g^{-1})
SHCNN-900-20	1187	985	202	0.89	0.40
SHCNN-900-10	1056	903	153	0.77	0.36
SHCNN-900-3	926	543	383	0.82	0.23
SHCNN-700-20	368	151	217	0.36	0.07
GO-C-900-3	143	--	143	0.18	--
YP50	1740	1487	253	0.88	0.61

Note: (1) SHCNN-x-y and GO-C-x-y are the products obtained by various carbonization conditions, where x and y represent carbonization temperature and carbonization time, respectively. (2) S_{BET}, S_{mic}, S_{ext}, V_t, and V_{mic}, denote BET surface area, micropore surface area, t-plot external surface area, total pore volume, and micropore volume, respectively.