Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary information

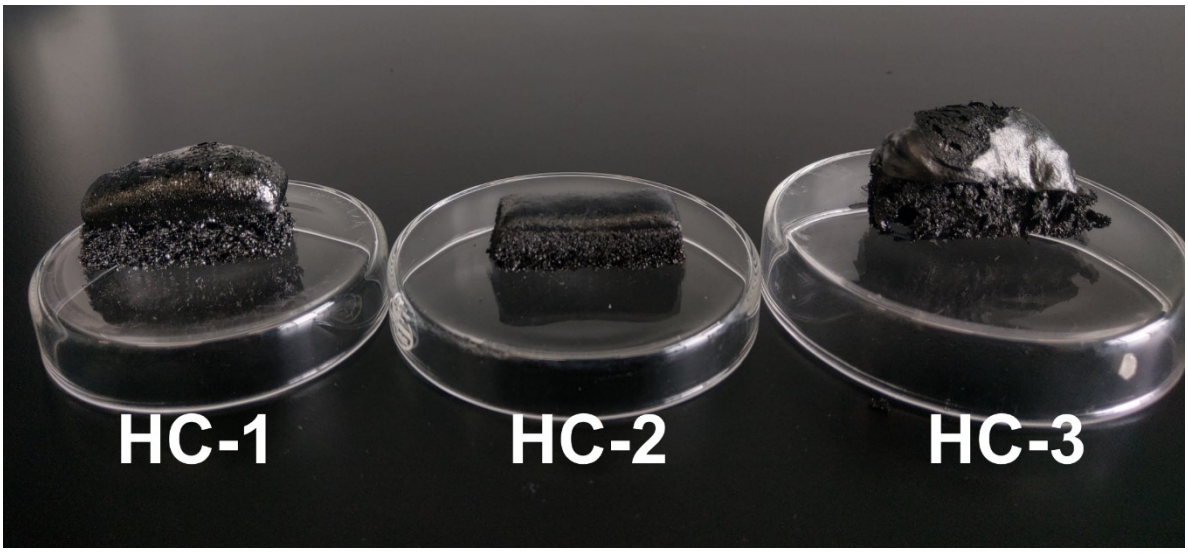

Fig. S1. Digital photos of HCs.

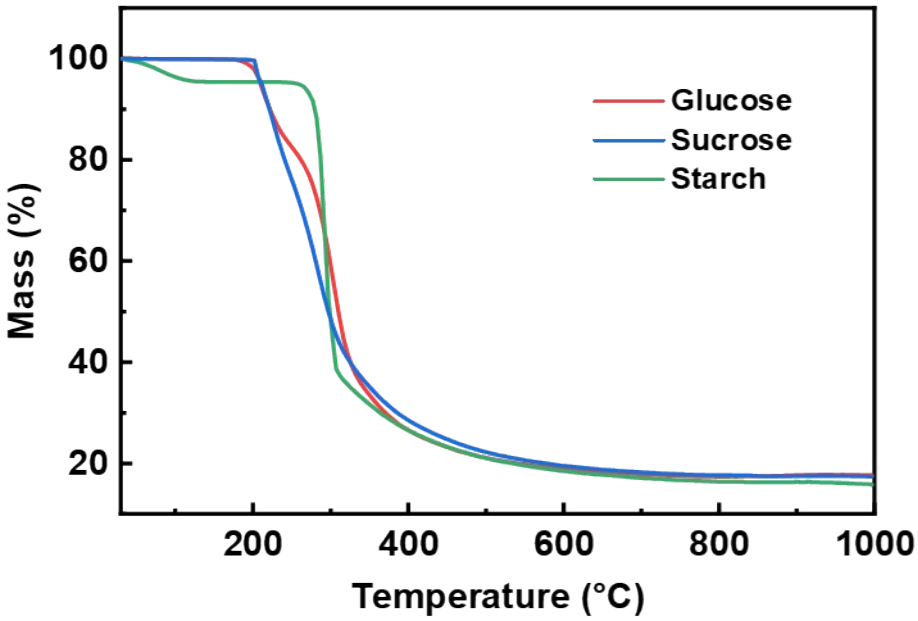

Fig. S2. TG curves of different saccharides pyrolysis.

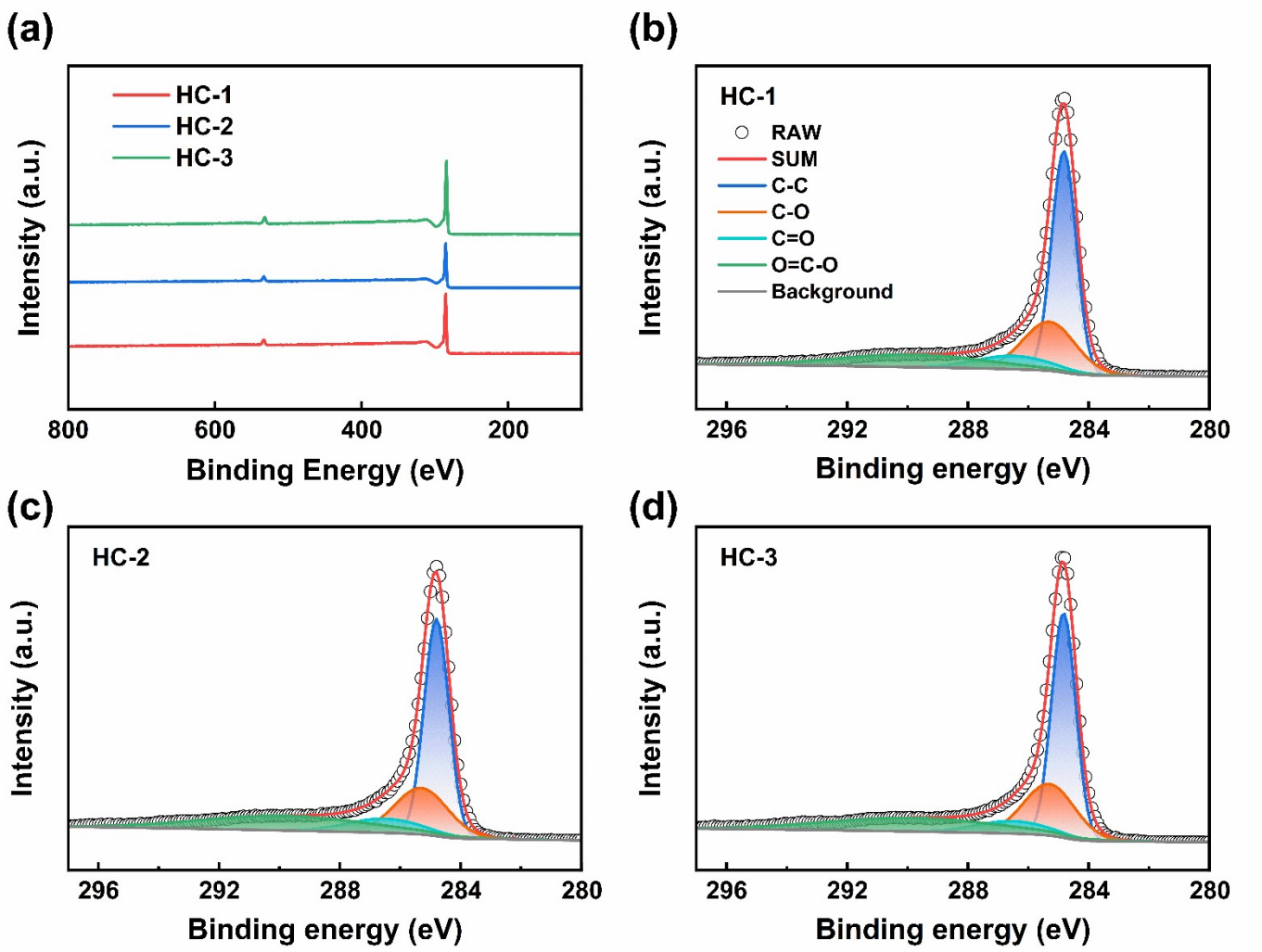

Fig. S3 (a) XPS survey spectra of HCs; (b-d) C1s spectra of the HCs

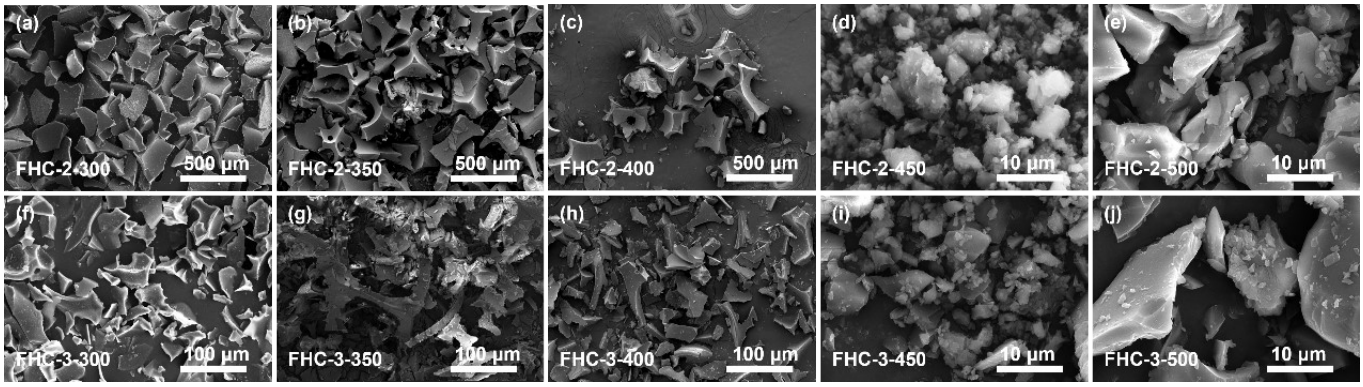

Fig. S4 SEM images of FHC-2 and FHC-3.

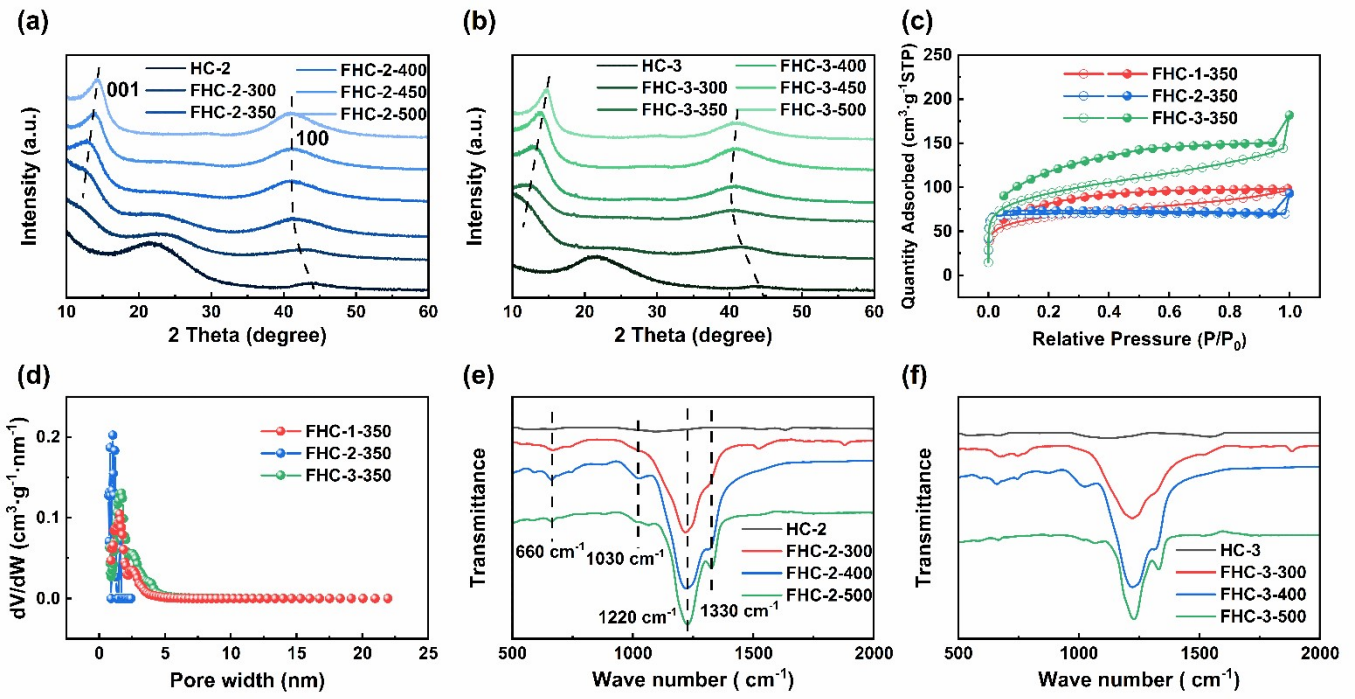

Fig. S5 (a-b) XRD patterns of FHC-2 and FHC-3; (b) Nitrogen sorption isotherms of FHC-X-350; (d) pore size distributions of FHC-X-350; (e-f) FT-IR spectra of FHC-2 and FHC-3.

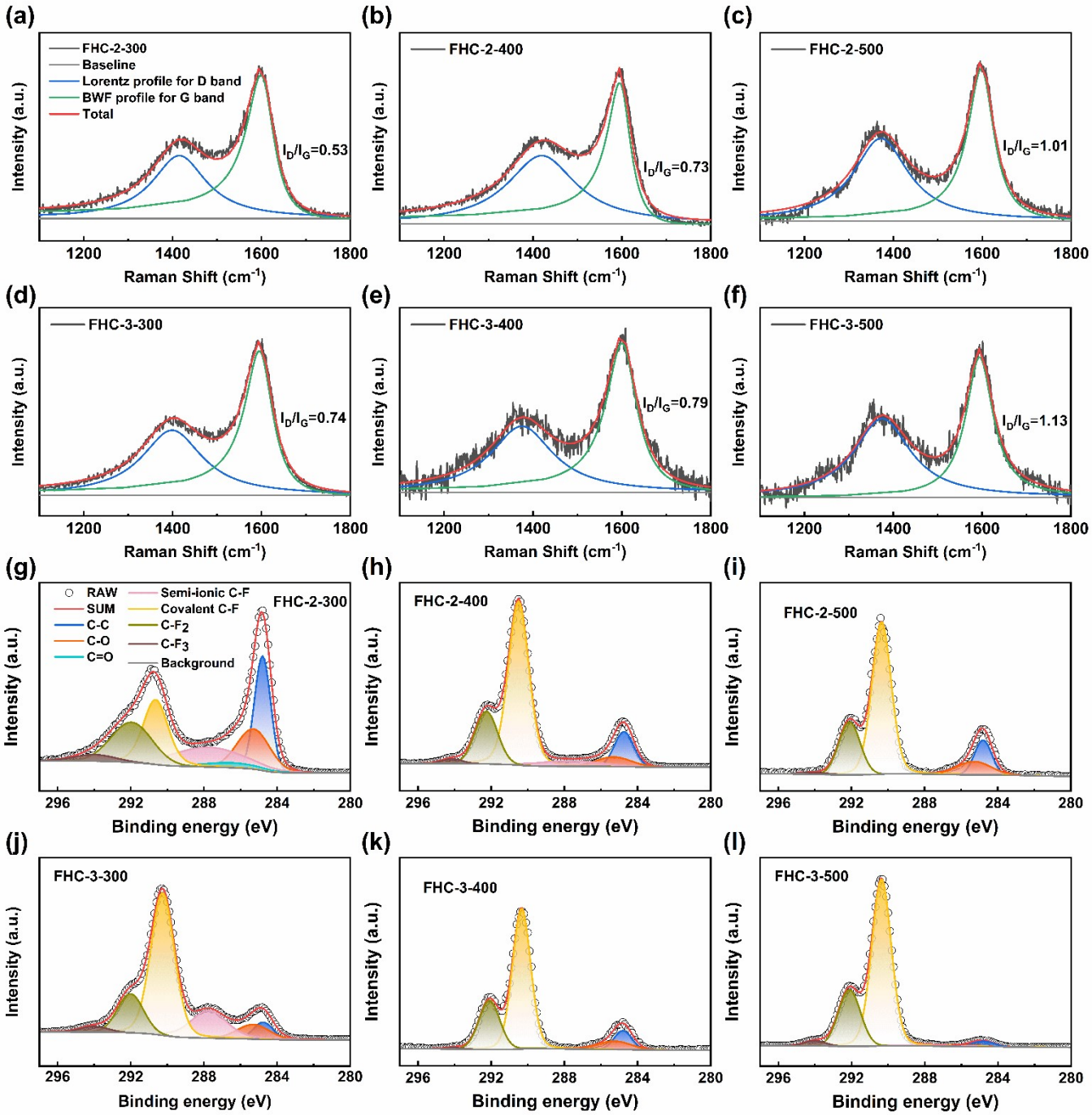

Fig. S6 (a-f) Raman spectra of FHC-2 and FHC-3; (g-l) C1s spectra of the FHC-2 and FHC-3.

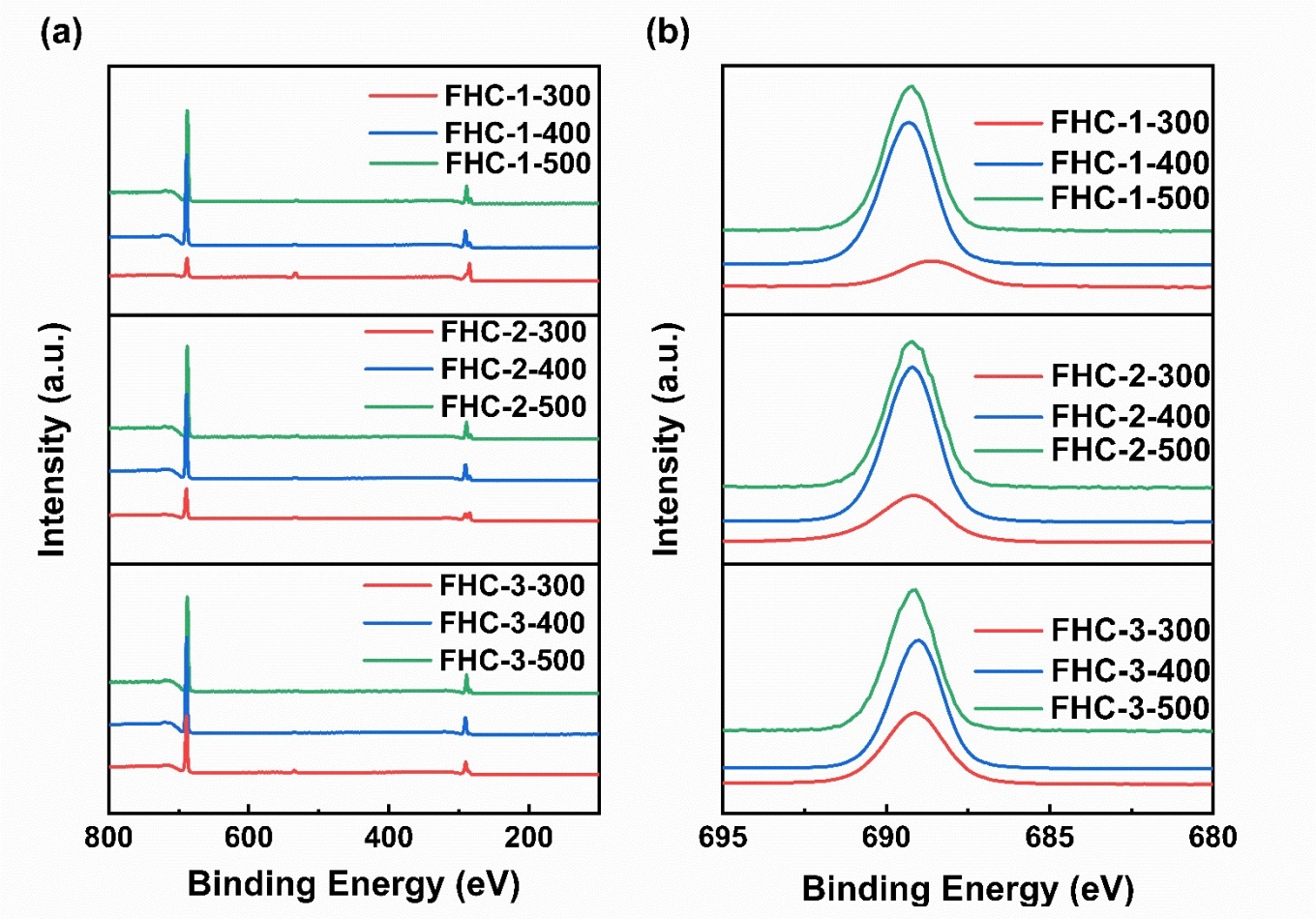

Fig. S7 (a)XPS survey spectra of FHCs ; (b) F1s spectra of the FHCs.

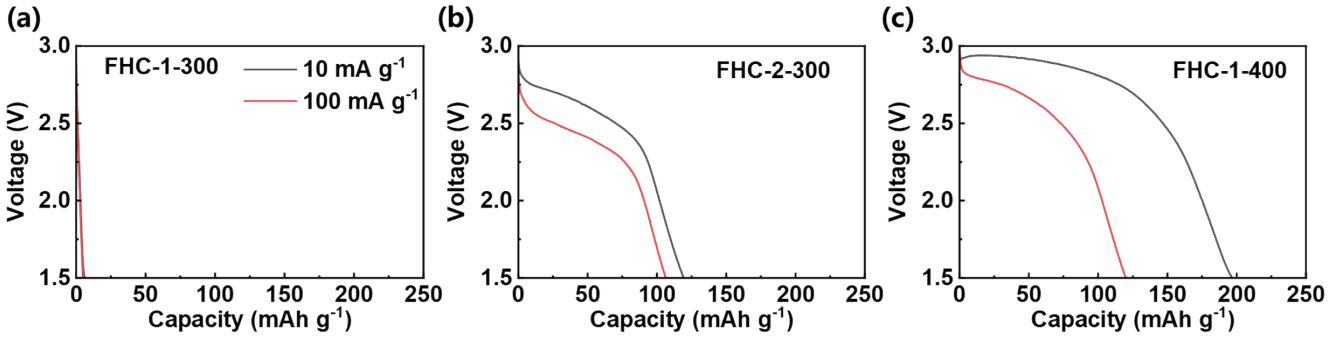

Fig. S8 Galvanostatic discharge curves of FHC-X-300.

Table S1. The crystal structural characteristic of HC.

Sample	Precursor	Yield (%)	d_{002} (nm)	L_a (nm)	L_c (nm)	N	S_{BET} (m^2/g)	Pore size (nm)
HC-1	glucose	16.1	0.39	4.4	1.6	4.1	253	2.06
HC-2	sucrose	15.3	0.39	4.6	1.7	4.3	492	2.10
HC-3	starch	13.0	0.39	4.0	1.6	4.1	866	2.14

Table S2. Chemical composition of HC determined from XPS spectra.

Sample	at%		at%(XPS)		C1s(%)			
	C	O	C	O	C-C	C-O	C=O	O=C-O
HC-1	95.43	3.85	96.56	3.44	49.88	23.77	9.05	17.31
HC-2	88.13	10.59	95.4	4.6	47.50	21.78	9.13	21.59
HC-3	86.38	12.68	94.5	5.5	47.94	23.35	7.94	20.77

Table S3 Physical parameters of the FHCs samples from XRD.

Sample	2θ (°)	d_{001} (nm)
FHC-1-300		
FHC-1-350	12.26	0.721
FHC-1-400	13.10	0.675
FHC-1-450	13.44	0.658
FHC-1-500	13.95	0.634
FHC-2-300	11.88	0.744
FHC-2-350	12.38	0.714
FHC-2-400	13.13	0.673
FHC-2-450	13.62	0.649
FHC-2-500	13.97	0.633
FHC-3-300	11.92	0.741
FHC-3-350	12.41	0.712
FHC-3-400	13.17	0.671
FHC-3-450	13.77	0.642
FHC-3-500	13.99	0.632

Table S4 Physical parameters of the FHCs samples from N_2 sorption.

Sample	S_{BET} (m^2/g)	Pore size (nm)
1-300	200.10	2.51
1-350	217.58	2.80
1-400	203.33	2.99
1-450	123.70	3.96
1-500	280.42	3.11
2-350	218.74	2.89
3-350	307.55	3.52

Table S5. Content of chemical groups and chemical composition of CF_x samples measured by XPS.

Sample	at%				C1s(%)						
	F	C	F/C	O	C-C	C-O	C=O	Semi-CF	Cov-CF	$-CF_2$	$-CF_3$
FHC-1-300	19.8	71.29	0.28	9.0	30.19	23.30	8.12	16.22	14.45	6.55	1.17
FHC-1-400	52.77	46.07	1.14	1.16	9.53	5.47		7.01	56.44	19.28	2.27
FHC-1-500	52.6	45.67	1.15	1.73	12.19	7.22			58.74	20.99	0.86
FHC-2-300	37.48	58.09	0.64	4.43	21.66	15.33	3.17	16.39	21.26	19.11	3.08
FHC-2-400	52.55	46.13	1.13	1.32	10.49	5.20		5.36	58.59	18.89	1.47
FHC-2-500	52.94	45.18	1.17	1.88	11.03	8.31			58.73	20.95	0.98
FHC-3-300	48.74	47.89	1.01	3.37	5.08	6.97		17.20	53.59	14.91	2.25
FHC-3-400	54.1	44.57	1.21	1.33	7.48	5.43		0.78	61.81	23.90	0.60
FHC-3-500	58.16	41.22	1.41	0.62	2.22	0.52			69.52	24.80	2.94