Electronic Supplementary Information for

Carbon black nanoparticle trapping: A strategy to realize the true energy storage potential of redox-active conjugated microporous polymers

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Fig. S1. SEM images of CB, CB@CMP-DMBs, CMP-DMB, CB-O, CB@CMP-BQs, and CMP-BQ.

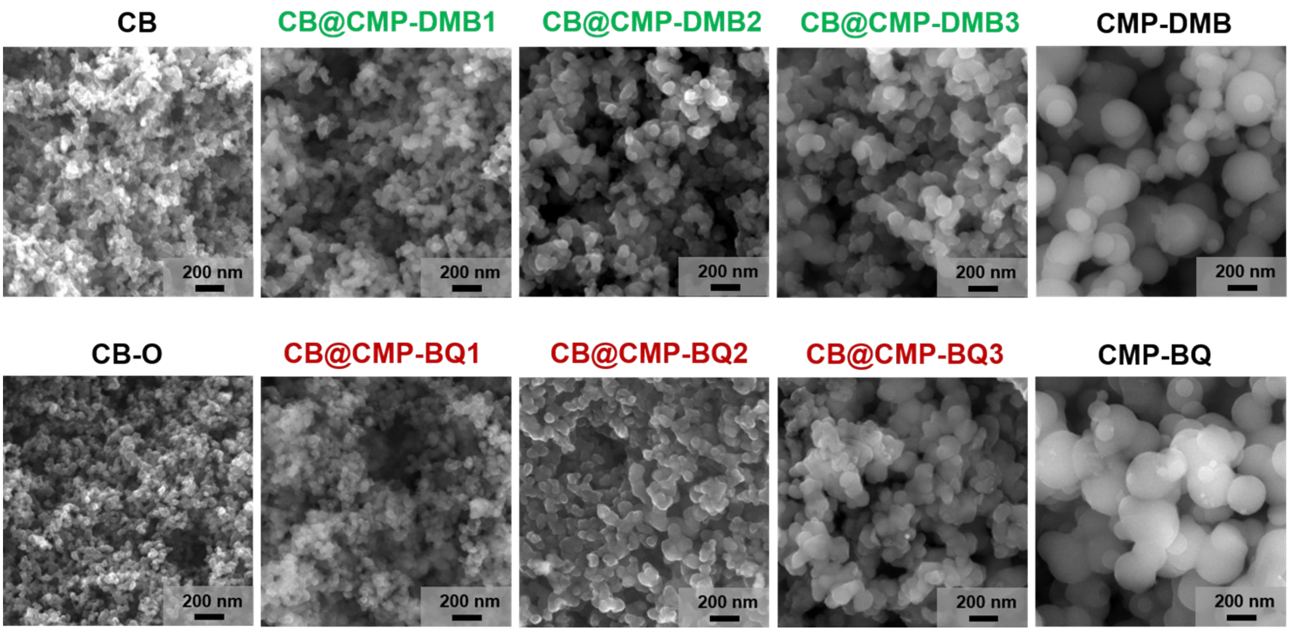


Fig. S2. TEM images of CB@CMP-DMB1, CB@CMP-DMB2, CB@CMP-BQ1, and CB@CMP-BQ2, compared with those of CB, CB@CMP-DMB3, CMP-DMB, CB-O, CB@CMP-BQ3, and CMP-BQ.

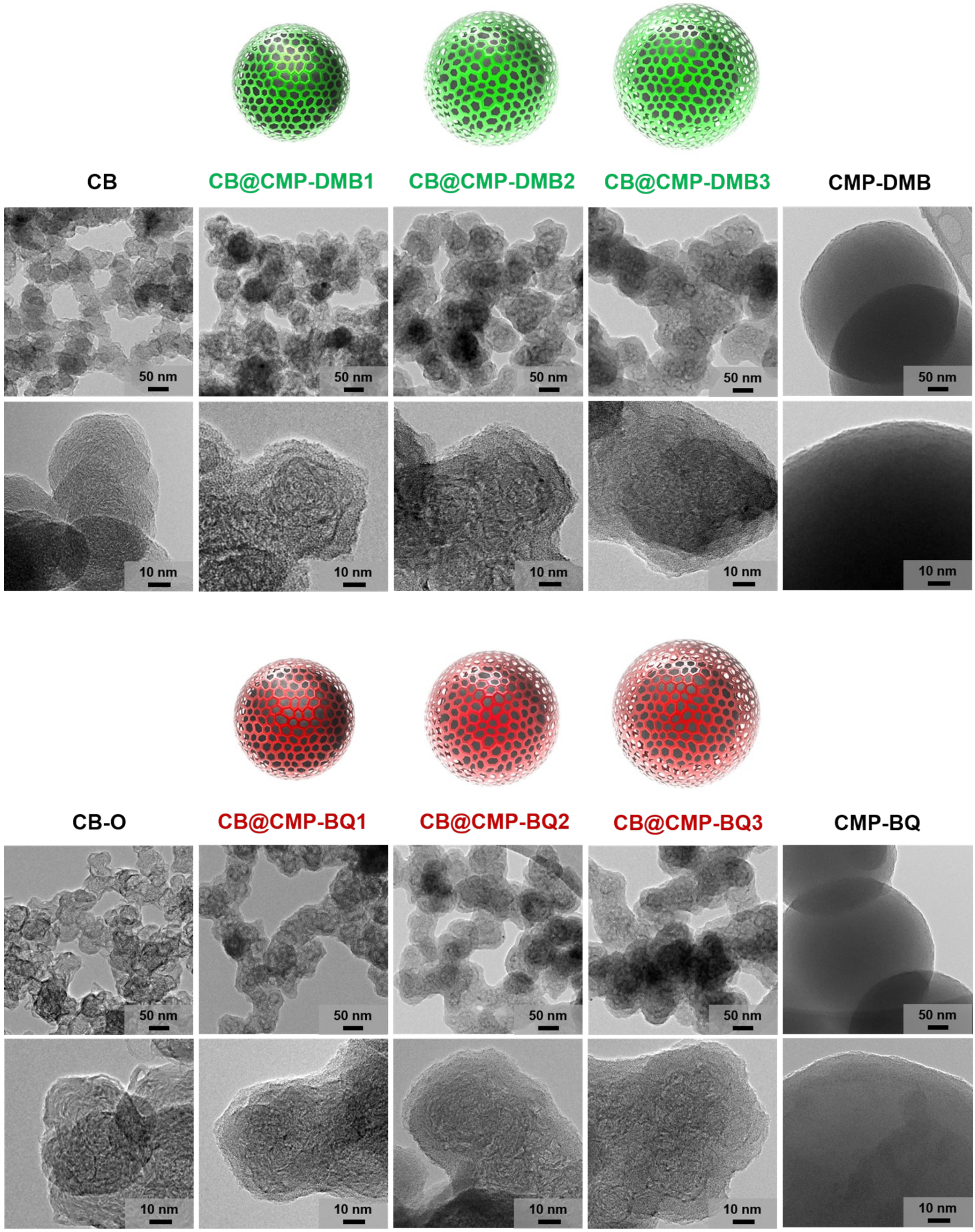


Fig. S3. TEM images of a mixture of CMP-DMB and CB@CMP-DMB that prepared by the Sonogashira coupling of 1,3,5-triethynylbenzene (0.13 mmol) and 1,4-diiodo-2,5-dimethoxybenzene (0.20 mmol) in the presence of CB (12.5 mg).

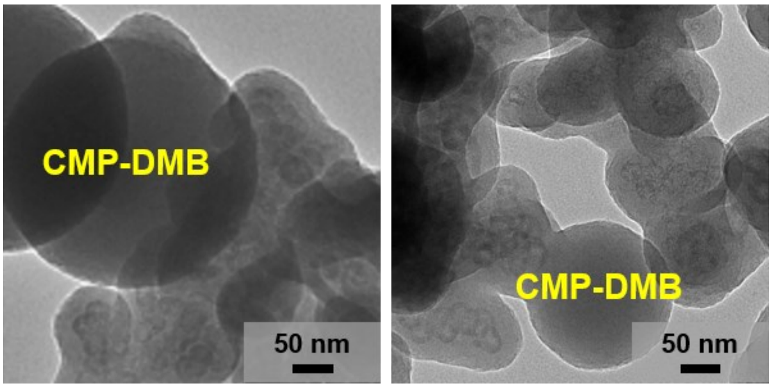


Fig. S4. N_2 adsorption-desorption isotherm curves (obtained at 77K) and pore size distribution diagrams (based on the DFT method) of CB@CMP-DMB1, CB@CMP-DMB2, CB@CMP-BQ1, and CB@CMP-BQ2.

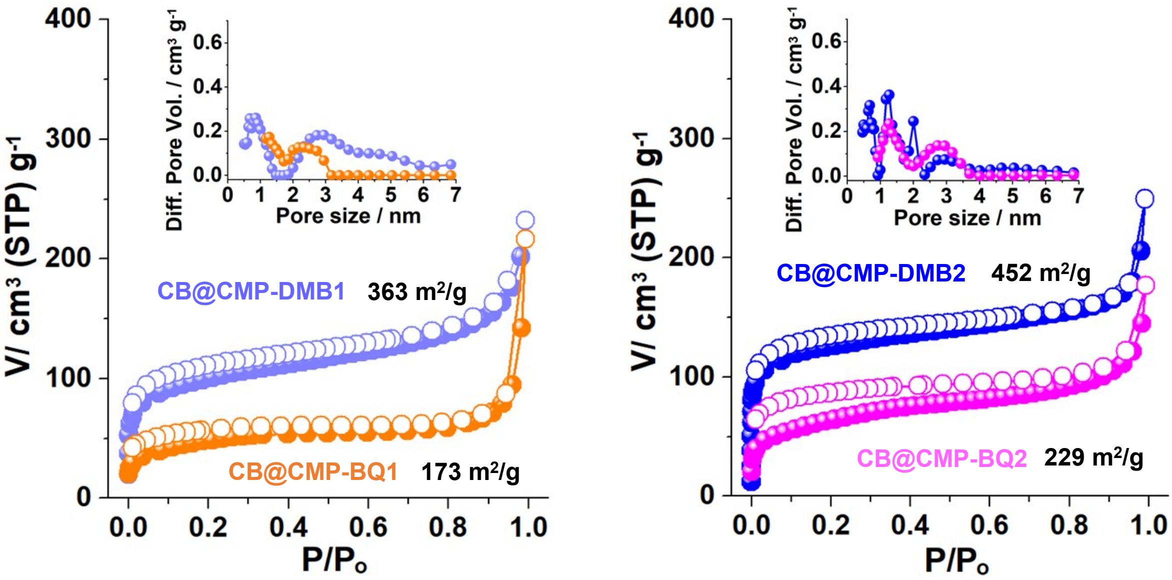


Fig. S5. IR spectra of CB@CMP-DMB1, CB@CMP-DMB2, CB@CMP-BQ1, and CB@CMP-BQ2.

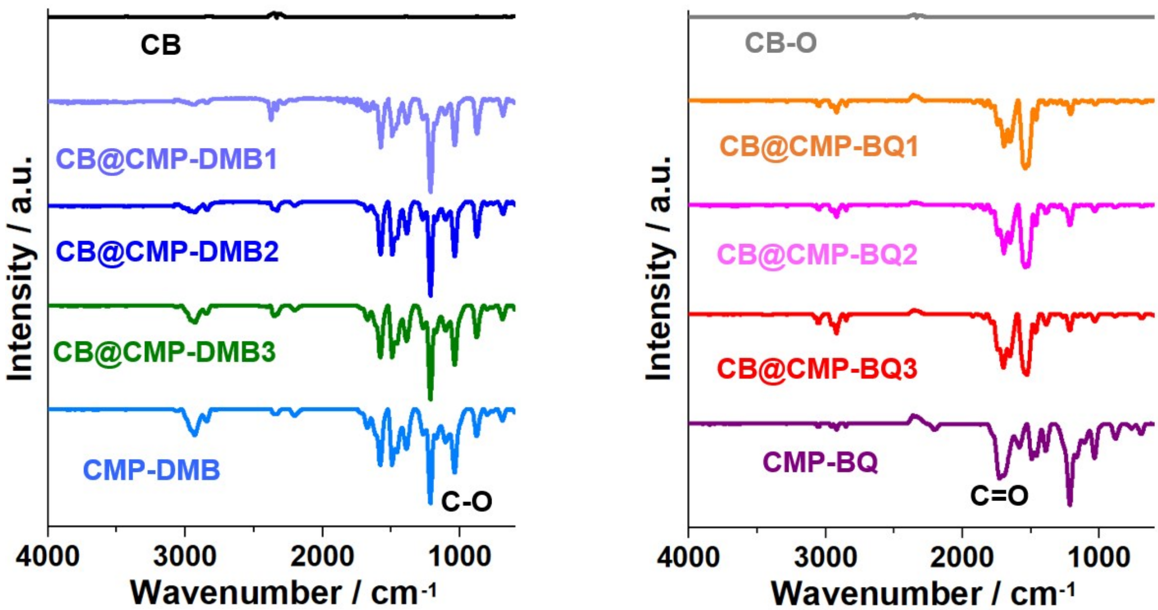


Fig. S6. Solid state ^{13}C NMR spectra of CB@CMP-DMB1, CB@CMP-DMB2, CB@CMP-BQ1, and CB@CMP-BQ2.

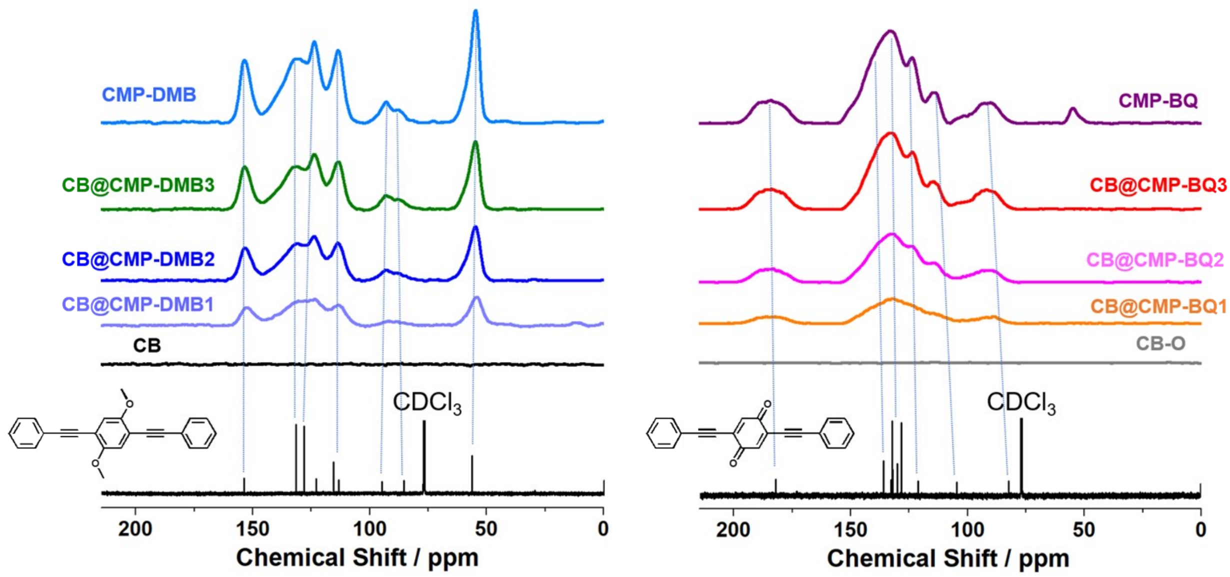


Fig. S7. PXRD patterns of CB@CMP-DMBs, CB@CMP-BQs, CMP-DMB, CMP-BQ, CB, and CB-O.

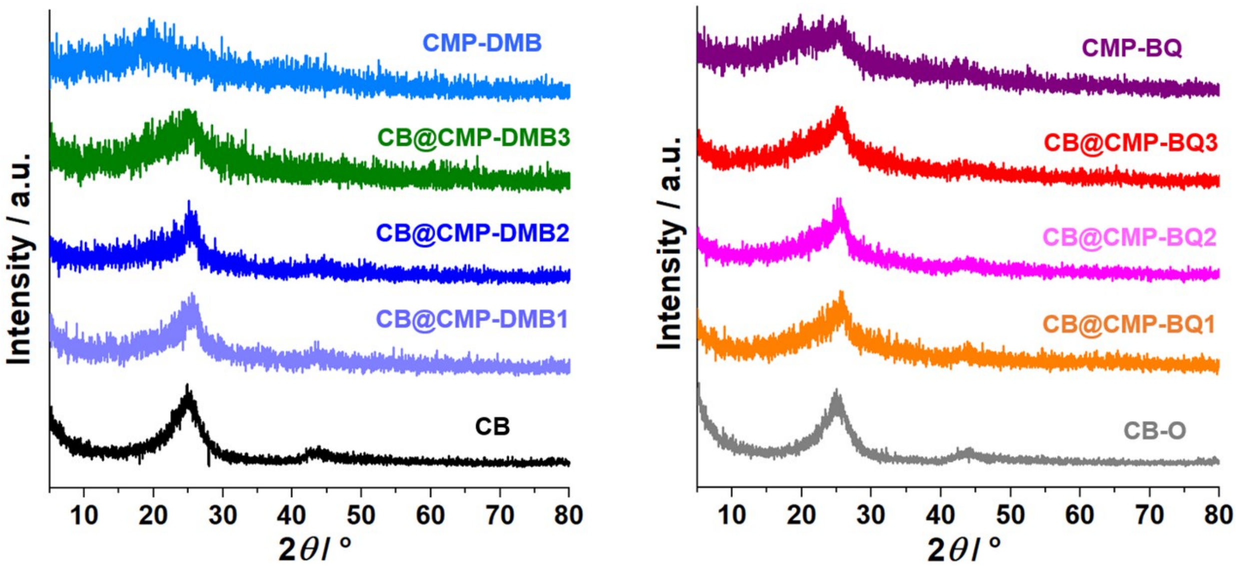


Fig. S8. TGA curves of CB@CMP-DMBs, CB@CMP-BQs, CMP-DMB, and CMP-BQ.

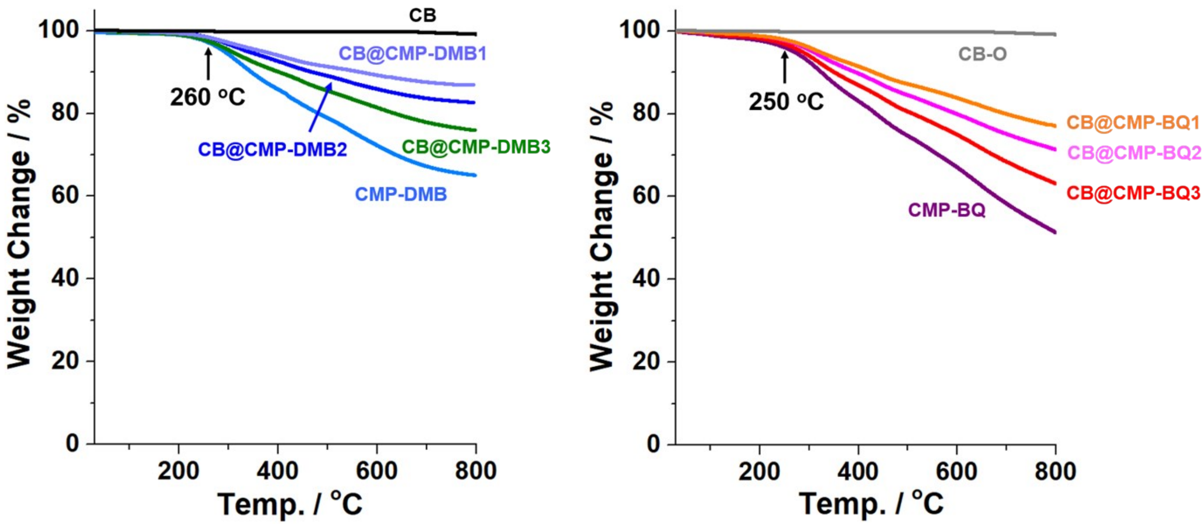


Fig. S9. (a) Cyclic voltammograms and (b) charge-discharge profiles of CB@CMP-BQ1 and CB@CMP-BQ2.

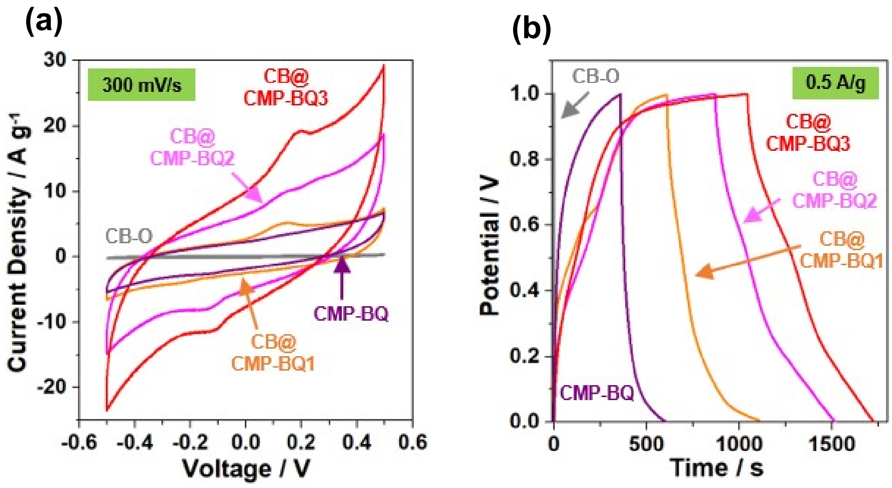


Fig. S10. Scan rate-dependent cyclic voltammograms of CB@CMP-BQ1, CB@CMP-BQ2, CB@CMP-BQ3, CB-O, and CMP-BQ.

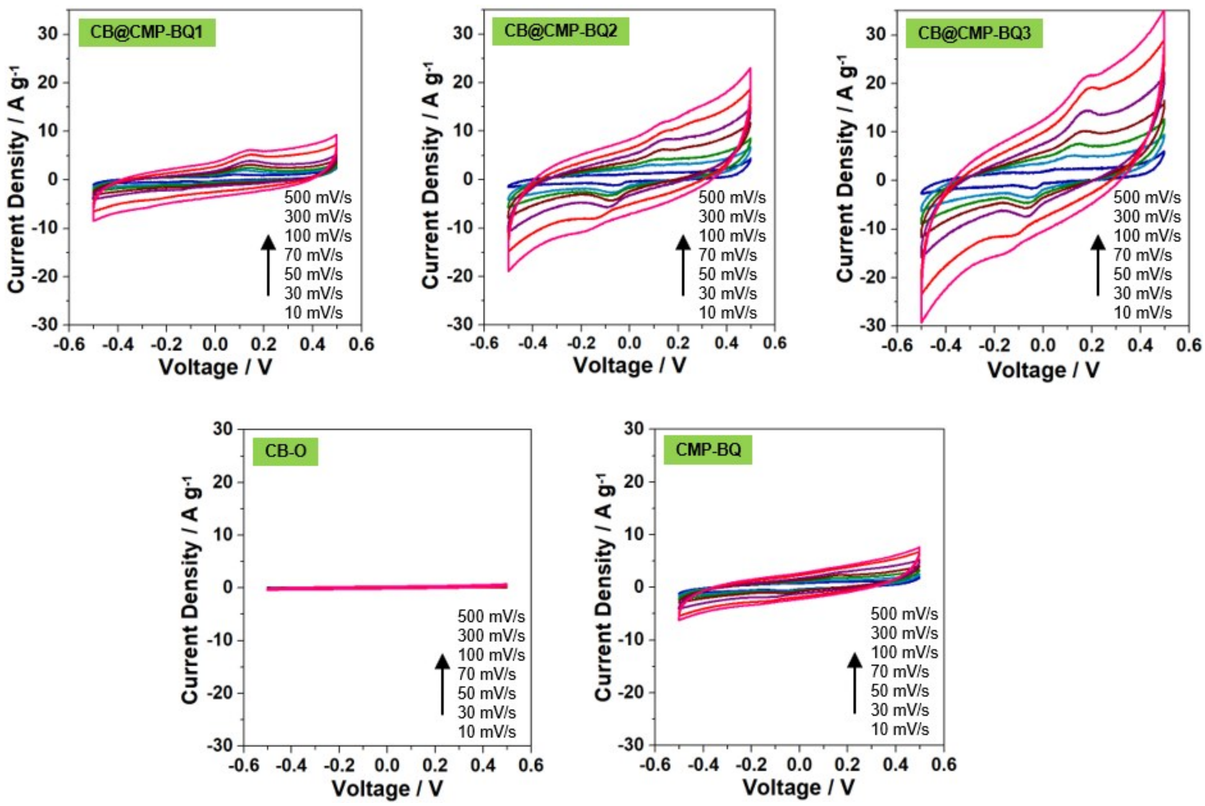


Fig. S11. Current density-dependent charge-discharge profiles of CB@CMP-BQ1, CB@CMP-BQ2, CB@CMP-BQ3, CB-O, and CMP-BQ.

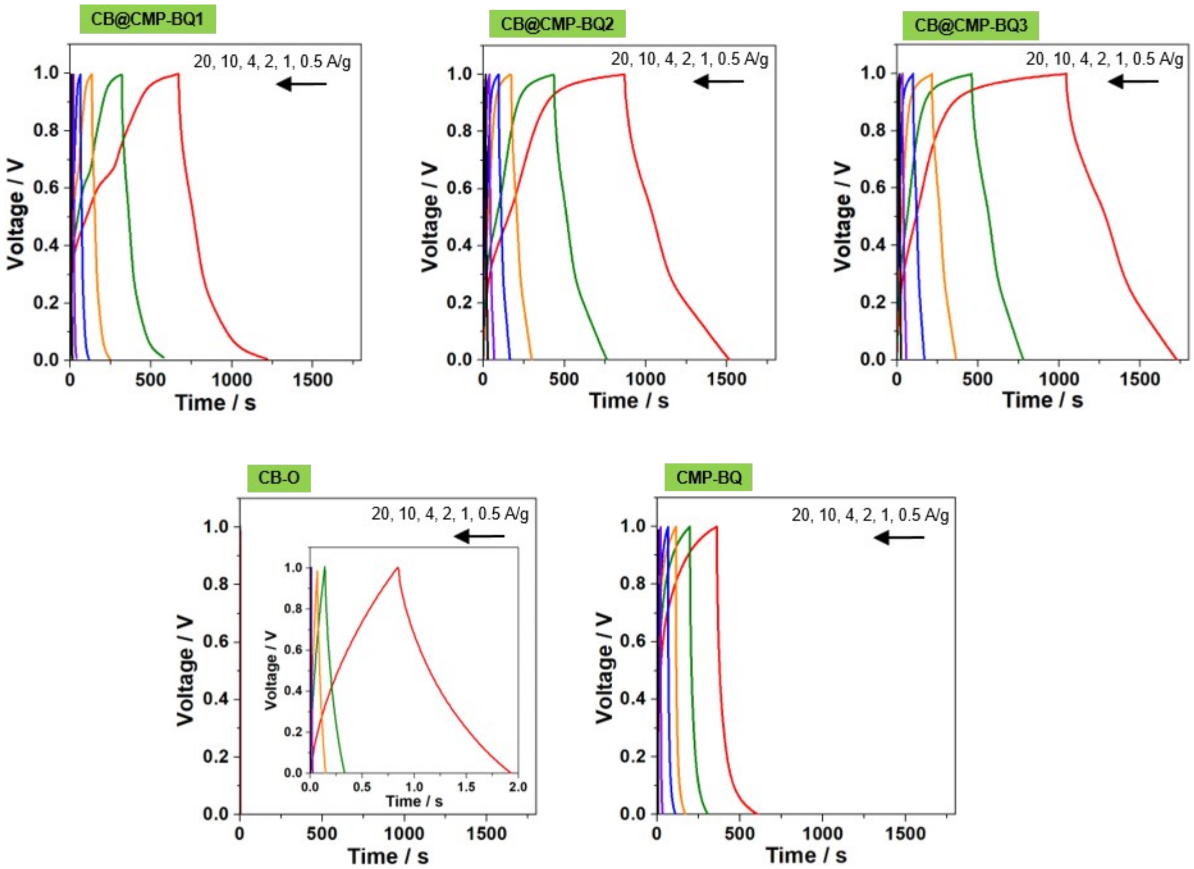
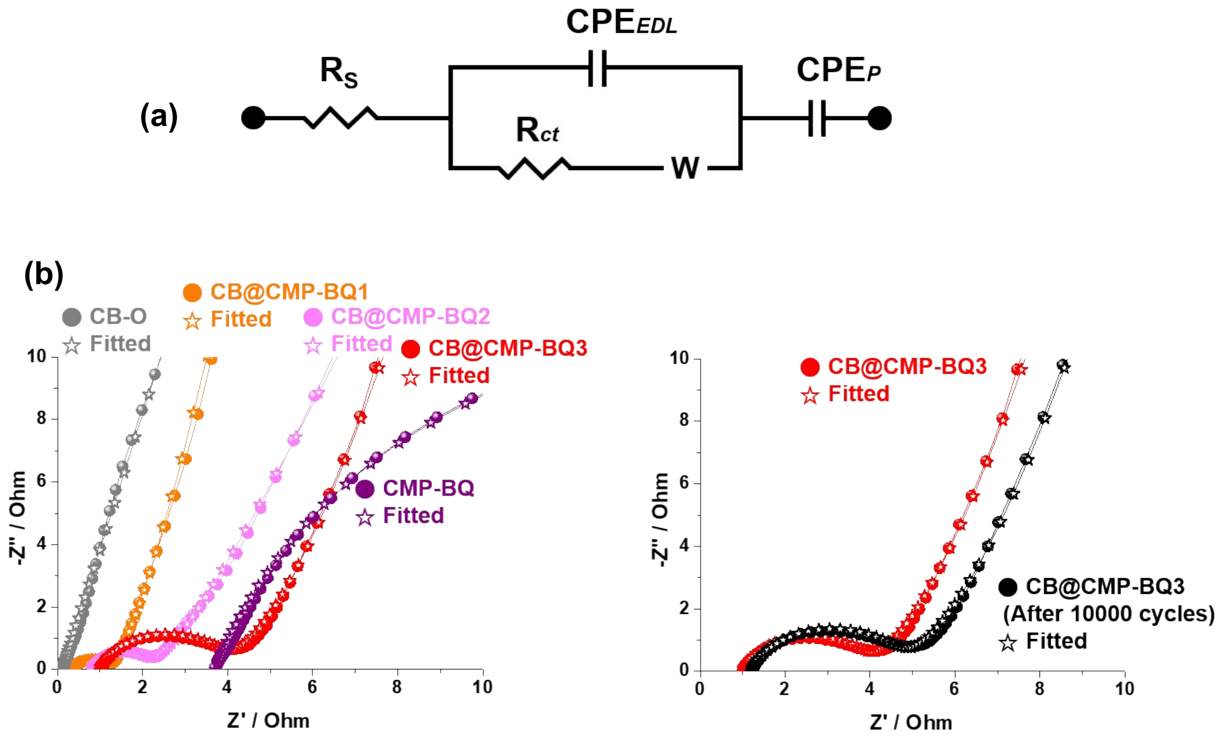


Fig. S12. (a) An equivalent circuit model used for the analysis of EIS results, (b) the fitted Nyquist plots, (c) equivalent circuit parameters of CB-O, CB@CMP-BQs, and CMP-BQ.

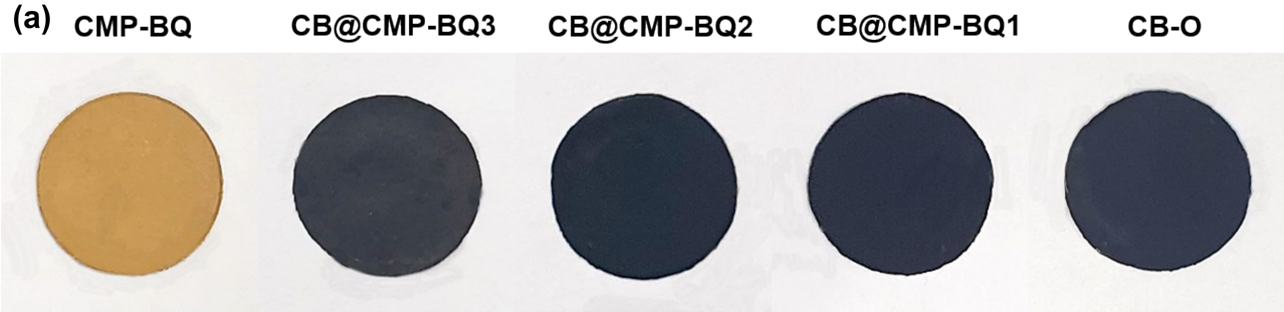


(c)

Materials	R^2	Rs (Ω)	Rct (Ω)	C_{EDL} (uF)	C_P (mF)
CB-O	0.9976	0.110	0.324	4.103	0.016
CB@CMP-BQ1	0.9997	0.333	0.911	4.440	2.980
CB@CMP-BQ2	0.9998	0.795	1.255	4.179	5.404
CB@CMP-BQ3	0.9988	0.976	3.210	4.915	6.036
CB@CMP-BQ3 (After 10000 cycles)	0.9987	1.181	3.898	11.103	5.967
CMP-BQ	0.9977	3.938	12.338	6.579	0.458

Fig. S13. (a) Photographs of pellets and (b) conductivity measurements of CB-O, CB@CMP-BQs, and CMP-BQ.

(a)



(b)

Materials	CMP-BQ	CB@CMP-BQ3	CB@CMP-BQ2	CB@CMP-BQ1	CB-O
Average Sheet Resistance (Ohm/sq)	null	25.27	15.20	9.22	6.41
Thickness (mm)	0.20	0.21	0.22	0.20	0.20
Conductivity (S/m)	null	190	300	540	780

Fig. S14. IR spectra of CB@CMP-BQ3 before and after 10000 cycles.

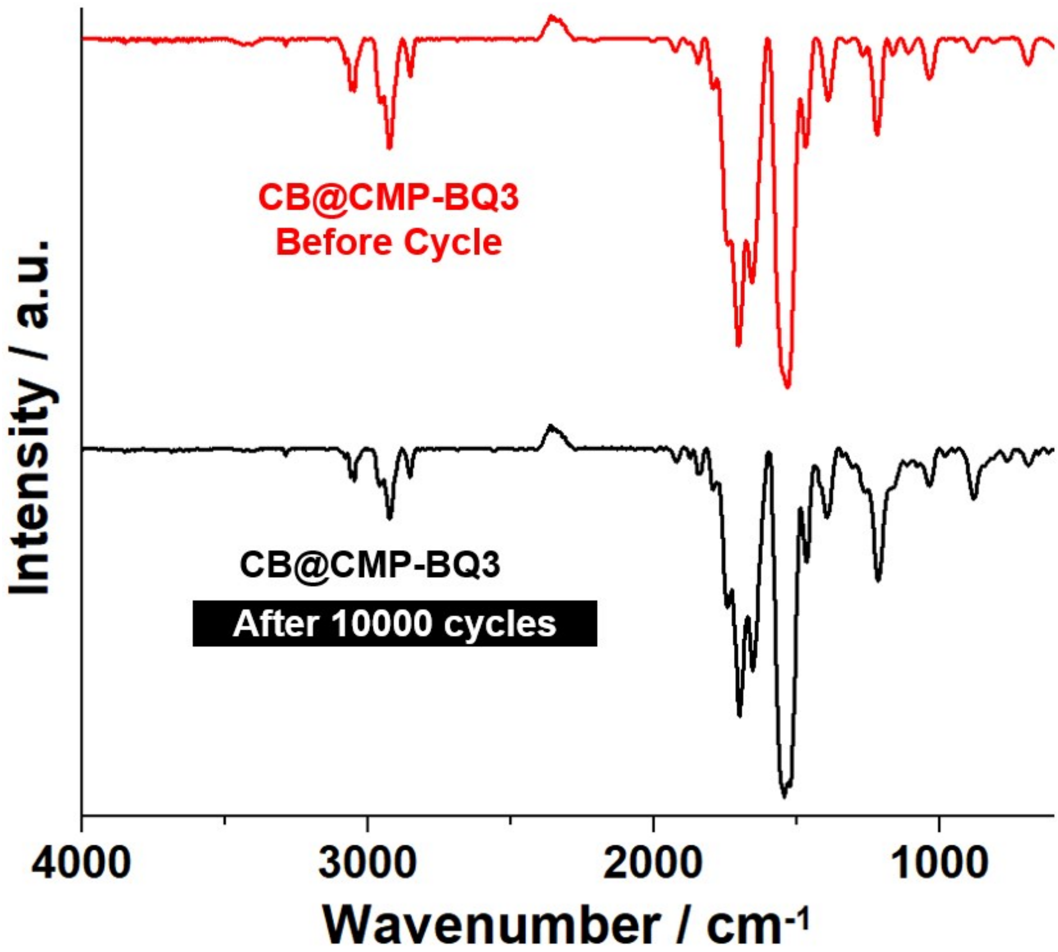


Table S1. Porous parameters of CB, CB-O, CMP-DMB, CMP-BQ, CB@CMP-DMBs, and CB@CMP-BQs.

Entry	Materials	S_{BET} [a] (m^2/g)	V_{mic} [b] (cm^3/g)
1	CB	68	0.00
2	CB@CMP-DMB1	363	0.07
3	CB@CMP-DMB2	452	0.13
4	CB@CMP-DMB3	524	0.15
5	CMP-DMB	609	0.16
6	CB-O	78	0.00
7	CB@CMP-BQ1	173	0.02
8	CB@CMP-BQ2	229	0.02
9	CB@CMP-BQ3	301	0.07
10	CMP-BQ	313	0.07

[a] Surface areas based on BET theory. [b] Micropore volumes based on t-plot.

Table S2. Electrochemical performance of the recent CMP-based electrode materials for supercapacitors.

Entry	Materials	Type of Materials	Specific Capacitances (F/g)							Measurment Type	Ref
			Current Density (A/g)								
			0.1	0.2	0.5	1	2	5	10		
1	Aza-CMP@350	CMP				461		397	378	three electrode	1
2	CMP	CMP						142		three electrode	2
3	aG-PTEPE-TBPE-C	CMP/C composite		179						three electrode	3
4	TpDAB	CMP				400				three electrode	4
5	N3-CMP-1	Carbonization	175			164			149	three electrode	5
6	G-TEPA-TPA-C	Carbonization		268						two electrode	6
7	NPCM-1	Carbonization	264							two electrode	7
8	TAT-CMP-2	CMP				183	173	158	137	three electrode	8
9	Fc-GMP	CMP/C composite			231				134	two electrode	9
10	H-CMP-BPPB	CMP			220	193			120	two electrode	10
11	PAQTA	CMP				168				two electrode	11
12	H-NCB-900	Carbonization				286			224	two electrode	12
13	POP_{M-TFP}	POP			178	137.4	130.5			three electrode	13
	POP_{M-TFP}	POP		91.7						two electrode	
14	N-CMP-BZ	CMP				189			138	two electrode	14
15	GT-POP-1	CMP			324					two electrode	15
16	CB@CMP-BQ3	CMP/C composite			424	373			280	two electrode	This work

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