Supporting Information

Tunable N-doped ultra-microporous activated carbons: enhancing O_2 Activation to facilitate the conversion of H_2S to H_2SO_4 at ambient temperature

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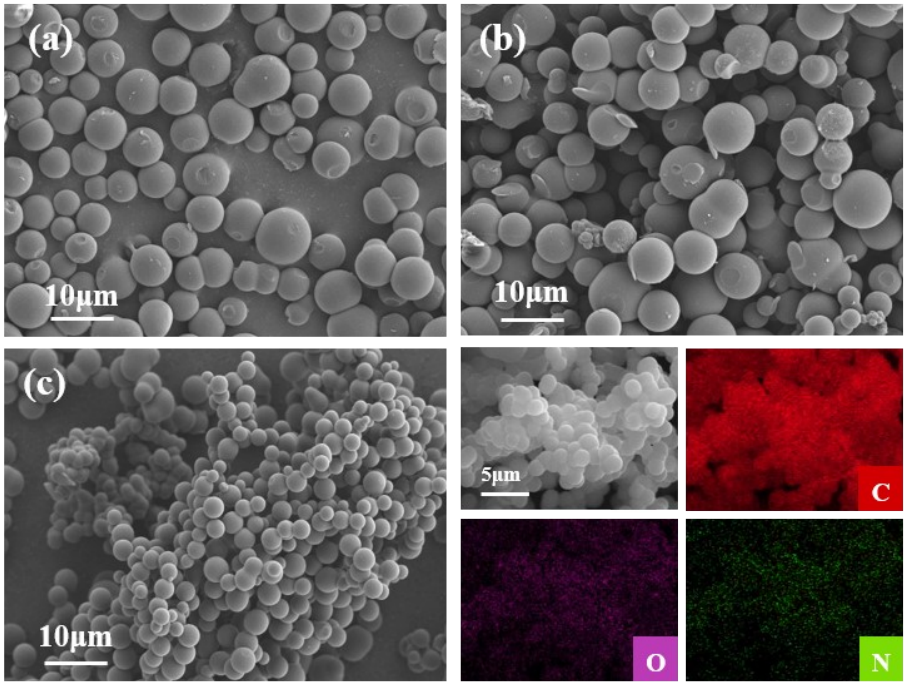

Figure S1. SEM diagram of (a) HC, (b) CHC, (c) MC-900 and EDS mapping of MC-900.

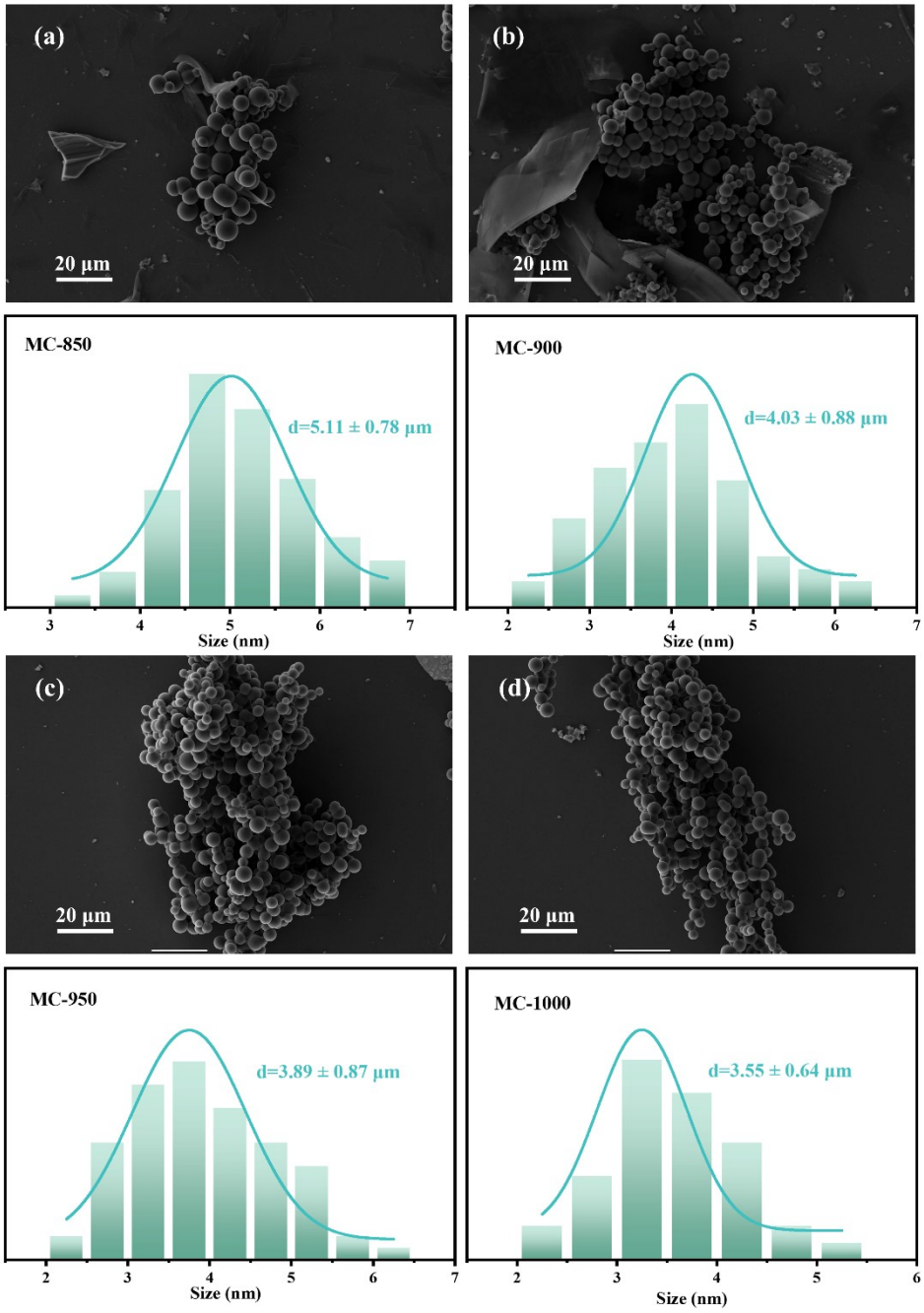

Figure S2. SEM images and the distribution of particle size over (a) MC-850, (b) MC-900, (c) MC-950, (d) MC-1000 catalysts.

Table S1. BET Specific Surface and Pore Structure Parameters of the Samples.

Sample	S_{BET} [a] (m^2/g)	V_{total} [b] (cm^3/g)	V_{micro} [c] (cm^3/g)	$V_{<0.7nm}$ [d] (cm^3/g)	$V_{0.7\text{-}2.0nm}$ [e] (cm^3/g)	$V_{>2.0nm}$ [f] (cm^3/g)	V_{micro}/V_{total}	MC yield [g]
HC	5	-	-	-	-	-	-	-
CHC	308	0.09	0.09	0.058	0.032	-	100.00%	100.00%
MC-850	652	0.24	0.23	0.147	0.083	0.010	95.83%	79.70%
MC-900	1078	0.41	0.39	0.163	0.227	0.020	95.12%	68.04%
MC-950	1349	0.58	0.48	0.146	0.334	0.100	82.76%	53.26%
MC-1000	1597	0.63	0.51	0.147	0.363	0.120	80.95%	22.28%
MC-H_2O-900	1475	0.67	0.56	0.152	0.408	0.110	83.58%	30.43%
MC-KOH	2291	1.00	0.87	0.170	0.700	0.130	87.00%	31.65%

[a] Surface area was calculated by BET method

[b] Total pore volume was the single point pore volume at $P/P_0 = 0.95$

[c] Micropore volume was calculated by t-plot method

[d] Pore volume less than 0.7 nm was determined by DFT

[e] Pore volume in the range of 0.7-2.0 nm was derived by subtracting the pore volume corresponding to diameters less than 0.7 nm from the micropore pore volume

[f] Pore volume lager than 2.0 nm was derived by subtracting the micropore pore volume from the total pore volume

[g] MC yield was calculated by dividing the mass of the MCs product by the mass of CHC loaded into the tube furnace

Table S2. Organic Element Analysis results of MC samples.

Sample	EA（wt.%）		
	C	H	N
HC	70.13	2.53	3.27
CHC	85.15	1.67	3.18
MC-850	79.75	1.96	3.00
MC-900	69.15	3.03	2.54
MC-950	60.57	3.84	1.81
MC-1000	51.29	4.41	0.96
MC-H_2O-900	61.25	3.91	0.88
MC-KOH	64.56	3.68	0.12

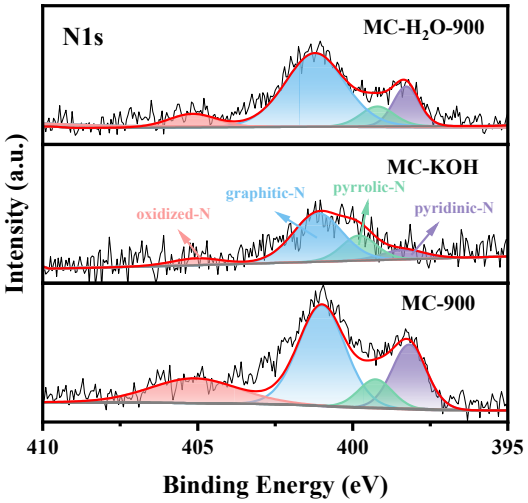

Figure S3. High-resolution N1s spectra of MC-H_2O-900, MC-KOH, and MC-900.

Table S3. XPS results of MC-H_2O-900, MC-KOH, and MC-900.

Sample	XPS (at.%)	N configuration content			
	N	pyridinic-N	pyrrolic-N	graphitic-N	oxidized-N
MC-H_2O-900	1.29	0.20	0.13	0.65	0.31
MC-KOH	0.41	0.04	0.09	0.24	0.04
MC-900	3.60	1.04	0.36	1.24	0.96

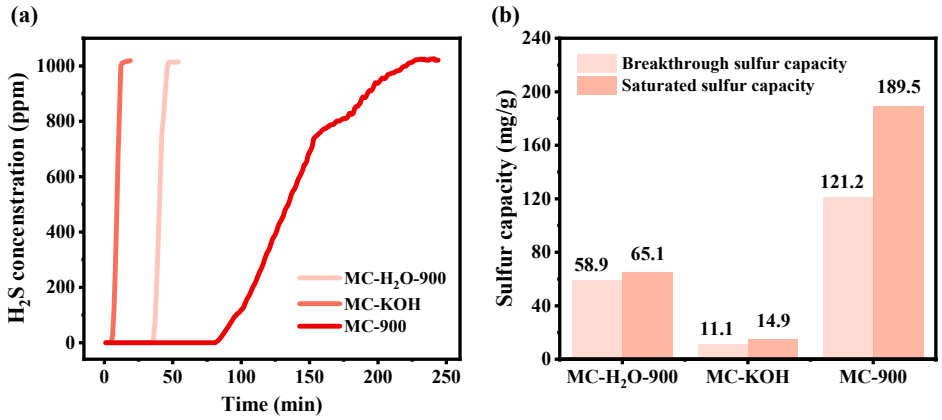

Figure S4. (a) Breakthrough curves, (b) breakthrough and saturated sulfur capacity of MC-H_2O-900, MC-KOH, and MC-900.

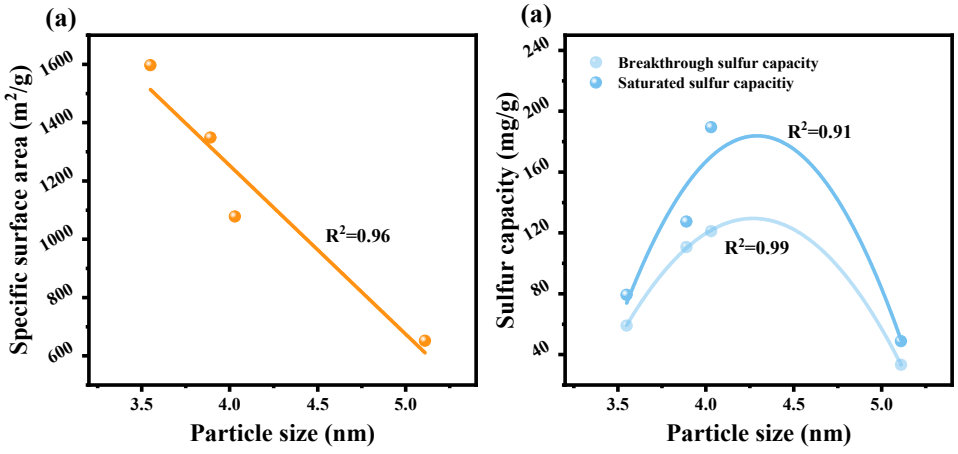

Figure S5. Relationships between the particle size and (a) specific surface area, (b) sulfur capacity.

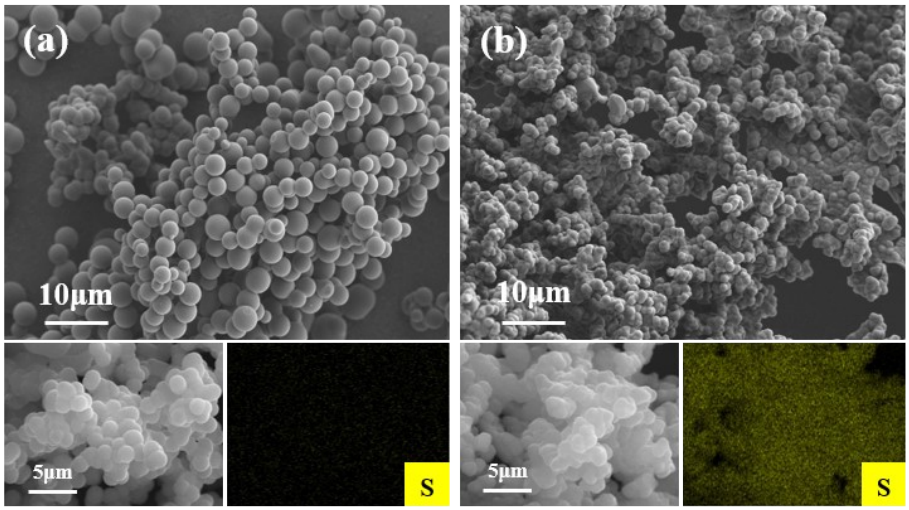

Figure S6. SEM diagram of (a) MC-900, (b) MC-900-S, and EDS distribution diagram of S.

Table S4. Organic Element Analysis results of MC-T-S.

Sample	EA（wt.%）			
	C	H	N	S
MC-850-S	77.52	1.67	2.88	4.73
MC-900-S	62.36	1.86	2.31	15.67
MC-950-S	59.56	3.04	1.75	9.34
MC-1000-S	50.94	4.70	0.72	6.16