

Supporting information

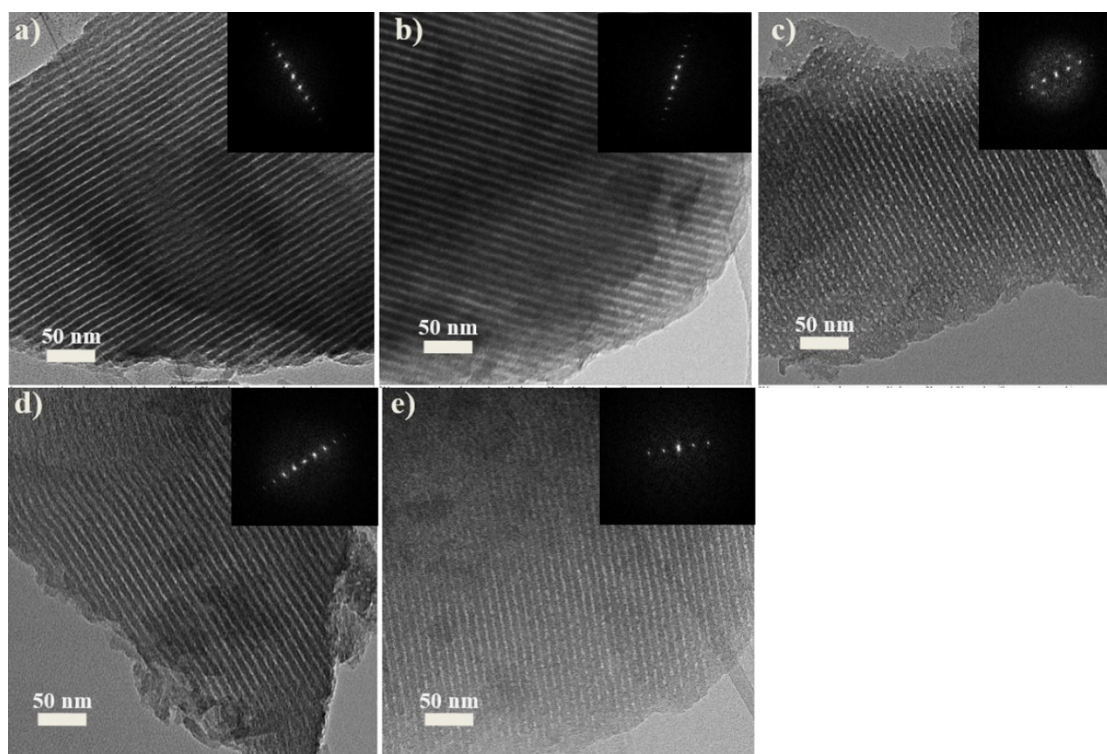


Fig. S1 TEM images of OMC (a), N-OMC-1 (b), N-OMC-2 (c), N-OMC-3 (d) and N-OMC-5 (e) viewed along the [110]. The insets are the corresponding Fast Fourier Transformations (FFT) diffractograms.

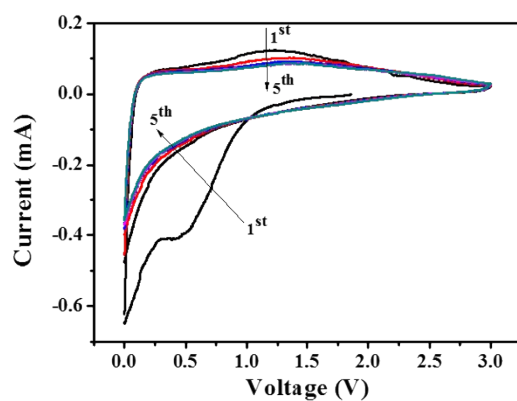


Fig. S2 Cyclic voltammograms of the N-OMC-4 anode for the initial five cycles.

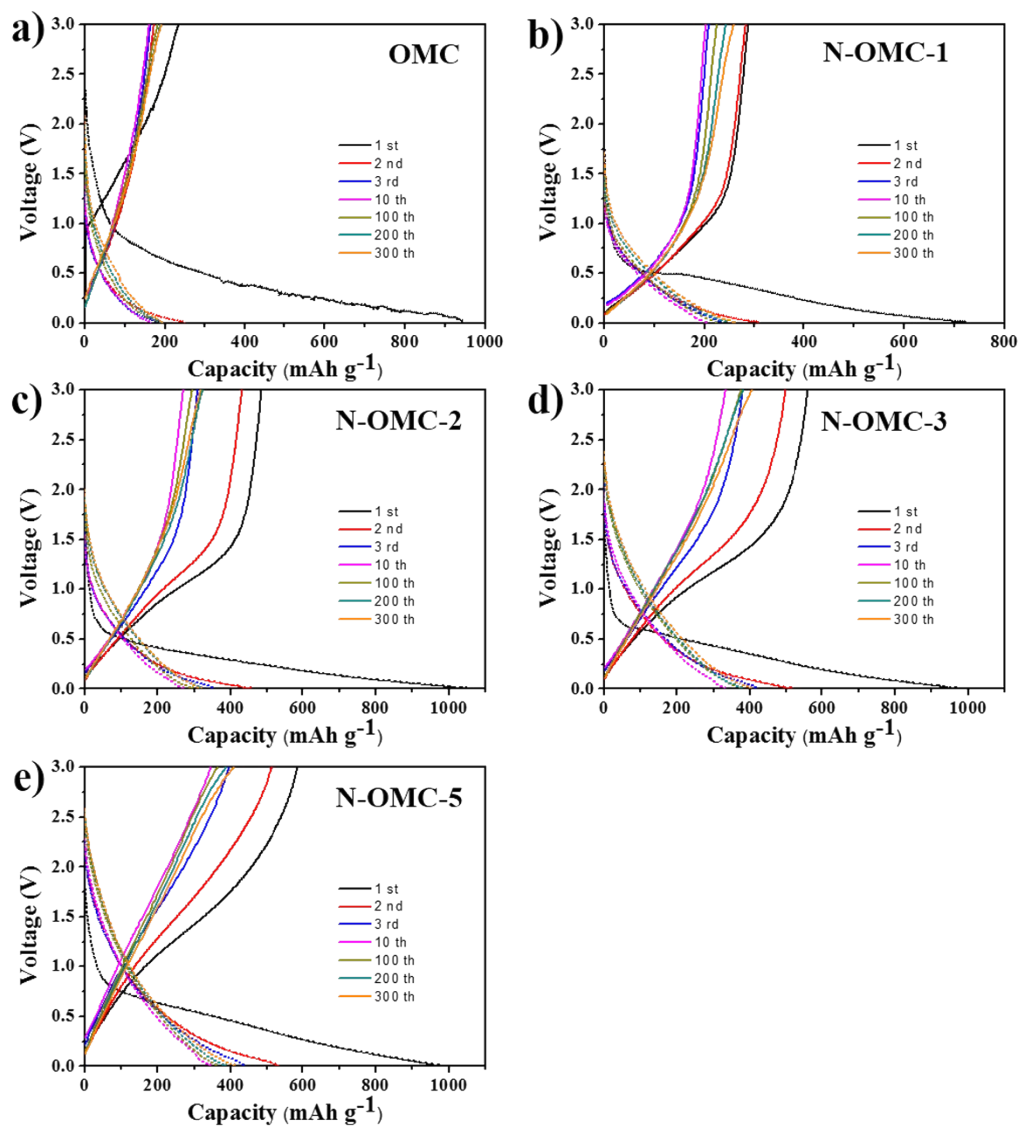


Fig. S3 The galvanostatic charge/discharge curves of OMC, N-OMC-1, N-OMC-2, N-OMC-3 and N-OMC-5 at a cycling rate of 100 mA g^{-1} for the 1st, 2nd and 300 mA g^{-1} for the subsequent cycles.

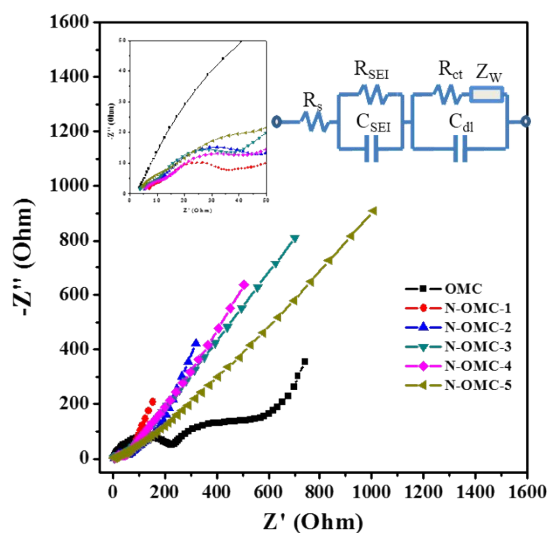


Fig. S4 Nyquist plots of OMC and N-OMCs. Inset: the magnified Nyquist plots (left); equivalent circuit (right). R_s , R_{SEI} , C_{SEI} , R_{ct} , C_{dl} and Z_W represent the electrolyte resistance, the resistance and capacitance of the SEI film, the charge transfer resistance, the double layer capacitance and the Warburg impedance, respectively.

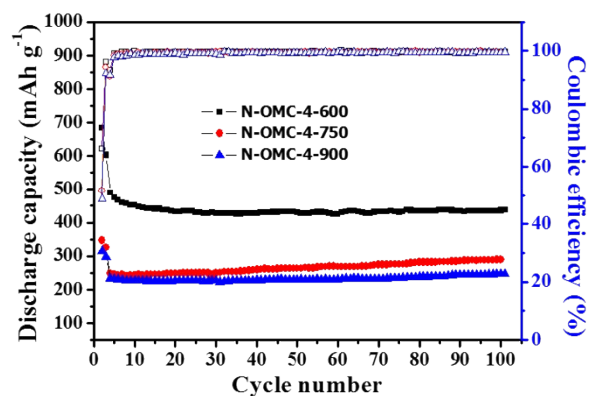


Fig. S5 Cycle performances and coulombic efficiency of N-OMC-4-X (X = 600, 750, 900).

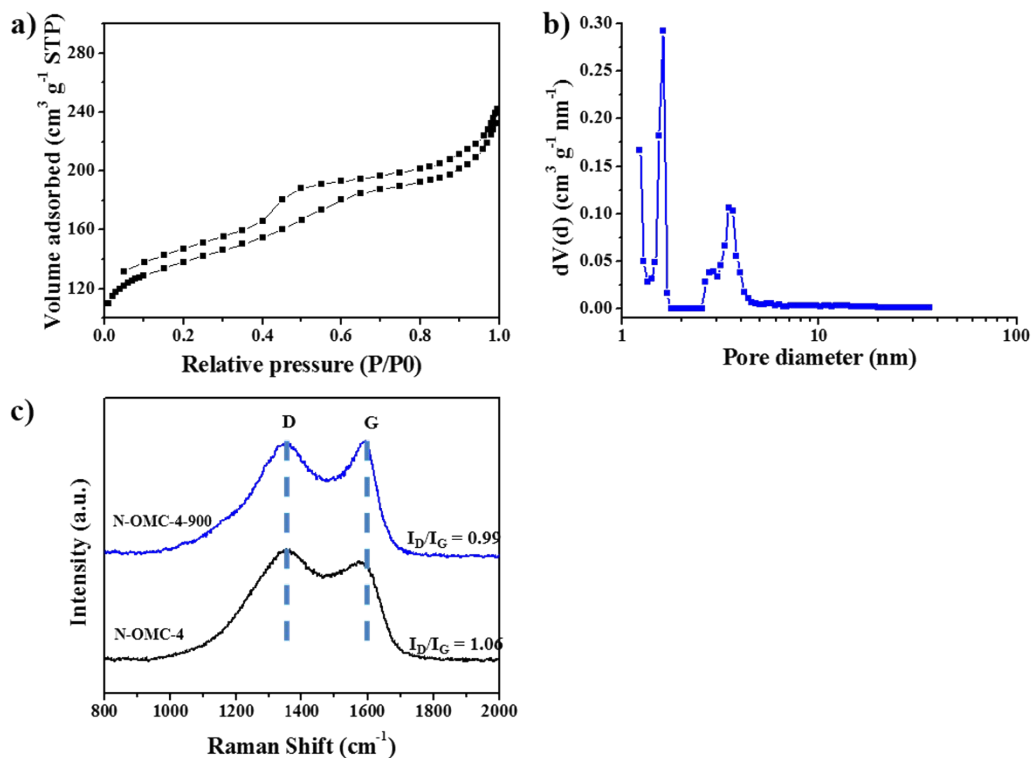


Fig. S6 Nitrogen adsorption-desorption isotherm (a) and the corresponding pore size distribution (b) for N-OMC-4-900; Raman spectra (c) of N-OMC-4 and N-OMC-4-900.

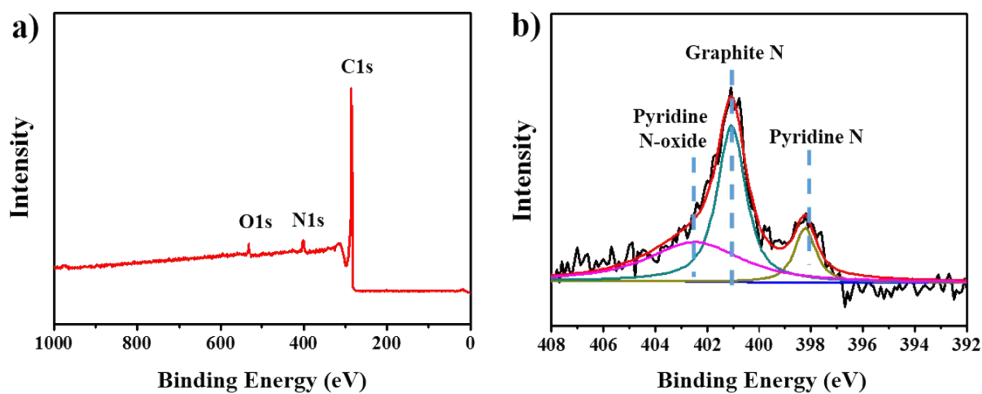


Fig. S7 XPS survey spectrum (a) and N1s spectrum (b) of N-OMC-4-900.

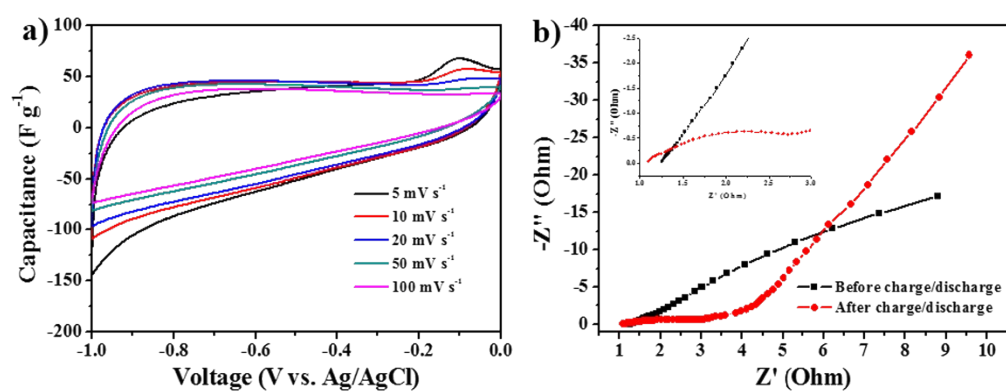


Fig. S8 Electrochemical performance of N-OMC-4-900 electrode: Cyclic voltammograms at different scan rates in 6 M KOH (a), Nyquist plots before and after charge and discharge under open-circuit voltage (b).

Table S1 Nitrogen contents of OMC and N-OMC-X (X = 1-5) from Elemental Analysis (EA) and corresponding nitrogen species concentration calculated by XPS.

	OMC	N-OMC-1	N-OMC-2	N-OMC-3	N-OMC-4	N-OMC-5
Total N (wt%)	-	6.29	12.84	19.94	24.40	31.66
Pyridinic N (%)	-	-	12.0	18.9	31.4	40.6
Pyridinic N (%)	-	41.4	33.0	30.8	26.0	29.1
Pyrrolic N (%)	-	28.1	55.0	50.3	42.6	30.3
Quaternary N (%)	-	30.5	-	-	-	-

Table S2 Comparison of the electrochemical performance of N-OMC-4 and other reported OMCs and N-doped Carbons.

Sample	Condition	Specific capacity (mAh g ⁻¹) (cycles)	Ref.
CMK-3	100 mA g ⁻¹	850-1100 (20)	1
OMC-100	0.2 C	178 (100)	2
OMC-3	100 mA g ⁻¹	1012 (100)	3
Tri-OMC	50 mA g ⁻¹	500 (50)	4
CMK-3	100 mA g ⁻¹	356 (100)	5
CMK-8	100 mA g ⁻¹	569 (100)	5
N-rich mesoporous carbons	0.1 mA cm ⁻²	1200 (100)	6
HN-CNTs	100 mA g ⁻¹	494 (100)	7
CN _X -NTs	0.1 C	311.6 (30)	8
N-OMC-4	300 mA g ⁻¹	505 (300)	This work

Table S3 Kinetic parameters of OMC and N-OMCs.

Sample	OMC	N-OMC-1	N-OMC-2	N-OMC-3	N-OMC-4	N-OMC-5
R _s (Ω) ^a	2.9	2.4	4.3	2.5	4.2	3.2
R _{SEI} (Ω) ^b	240.1	14.1	17.3	13.6	16.4	22.7
R _{ct} (Ω) ^c	173.9	37.4	51.2	46.3	46.9	92.9

^a R_s = solution resistance, ^b R_{SEI} = SEI resistance, ^c R_{ct} = charge transfer resistance.

Table S4 Textural parameters of N-OMC-4-900 based on nitrogen physisorption.

Sample	S _{BET} ^a (m ² g ⁻¹)	S _{micro} ^b (m ² g ⁻¹)	V _{total} ^c (cm ³ g ⁻¹)	V _{micro} ^d (cm ³ g ⁻¹)	D ^e (nm)
N-OMC-4-900	513	282	0.37	0.11	2.9

References

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