Experimental Section

Material preparation

The Zeolite imidazole ester skeleton material was synthesized according to a typical method.[1] Typically, 0.735 g of $Zn(NO_3)_2 \cdot 6H_2O$ (99%, Aldrich) was employed to obtain a mixture with Zn/MeIM/methanol in a molar ratio of approximately 1 : 8 : 700. And the mixture was aged 1h at room temperature, and then the ZIF-8 precipitate was centrifugation and washed with fresh methanol three times, and dried at 60 ^oC.

To obtained the N-doped C: 0.15 g of as-prepared ZIF-8 powder was annealed at 700 ℃ in the Argon atmosphere for 2 h with a heating rate of 3 ℃ min^{-1}. After Cooling to room temperature, take the black power in 50ml of 12M HCl for 12 h at 80 ℃, then rinsed with deionized water until the solution became neutral, and dried at 60 ^oC. The black power was N-doped carbon.

To grow MoS_2 to coat the N-doped carbon: 0.021 g of N-doped C power was dispersed into 40ml of deionized water and ultrasonication for 1 h. Then 0.3g of sodium molybdate ($Na_2MoO_4 \cdot 2H_2O$, 99%, Aldrich) and 1.25g L- cysteine was added under vigorous stirring. After stirring 30 min, the solution was then transferred into a 50ml Teflon-lined stainless steel autoclave and maintained at 220 ℃ for 24 h. Then the autoclave was left to cool down to room temperature. The black product was collected by centrifugation and washed with deionized water and ethanol 4 times, and dried at 60 ^oC. Similarly, the preparation process of MoS_2 is similar except for the addition of N-doped carbon templates.[2]

Material Characterization

The samples were thoroughly characterized by using scanning electron microscope (SEM) on a Hitachi S-4800 microscope, transmission electron microscopy (TEM) on an FEI Tecnai F20 electron microscope, powder X-ray diffraction (XRD) on a Rigaku DMAX2500 X-ray diffractometer, and thermal gravimetric analysis (TGA) on a Netzsch STA449C instrument using a heating rate of 10℃ min^{-1} in air. The Brunauer-Emmett-Teller (BET) surface area was determined using a Micromeritics model ASAP 2020M+C physical and chemical adsorption analyzer X-ray photoelectron spectroscopy (XPS) analysis was performed on a KRATOS AXIS ULTRA-DLD spectrometer with a monochromatic Al Ka1 radiation (hv5=1486.6 eV).

Electrochemical measurement

The electrochemical properties were determined using CR 2025-type coin cells. In a

process of fabricating the LIBs, The anode electrode prepared by 80 wt% active material, 10 wt% conductive carbon black, and 10 wt% carboxyl methyl cellulose on pure Cu foil. The electrolyte was consisted of a solution of LiPF6 (1M) containing vinylene carbonate (2wt %) in ethylene carbonate/dimethyl carbonate/diethyl carbonate (1:1:1, volume ratio). The assembly of the test cells was performed in an argon-filled glove box with water and oxygen contents less than 1 ppm using pure lithium foils as the counter electrode, and Celgard 2400 was used as the separator. The cells were then aged for 8 h before measurement. The electrochemical test were carried out on a multi-channel current static system (Arbin Instruments BT 2000, USA), in the voltage range of 0.01-3 V (vs Li/Li^+).

References

1. R. L. Liu, D. Q. Wu, X. L. Feng and K. Müllen, *Angew. Chem. Int. Ed.*, 2010, **49**, 2565-2569.

2. L. Zhang, H. B. Wu, Y. Yan, X. Wang and X. W. Lou, *Energy Environ. Sci*., 2014, **7**, 3302-3306.

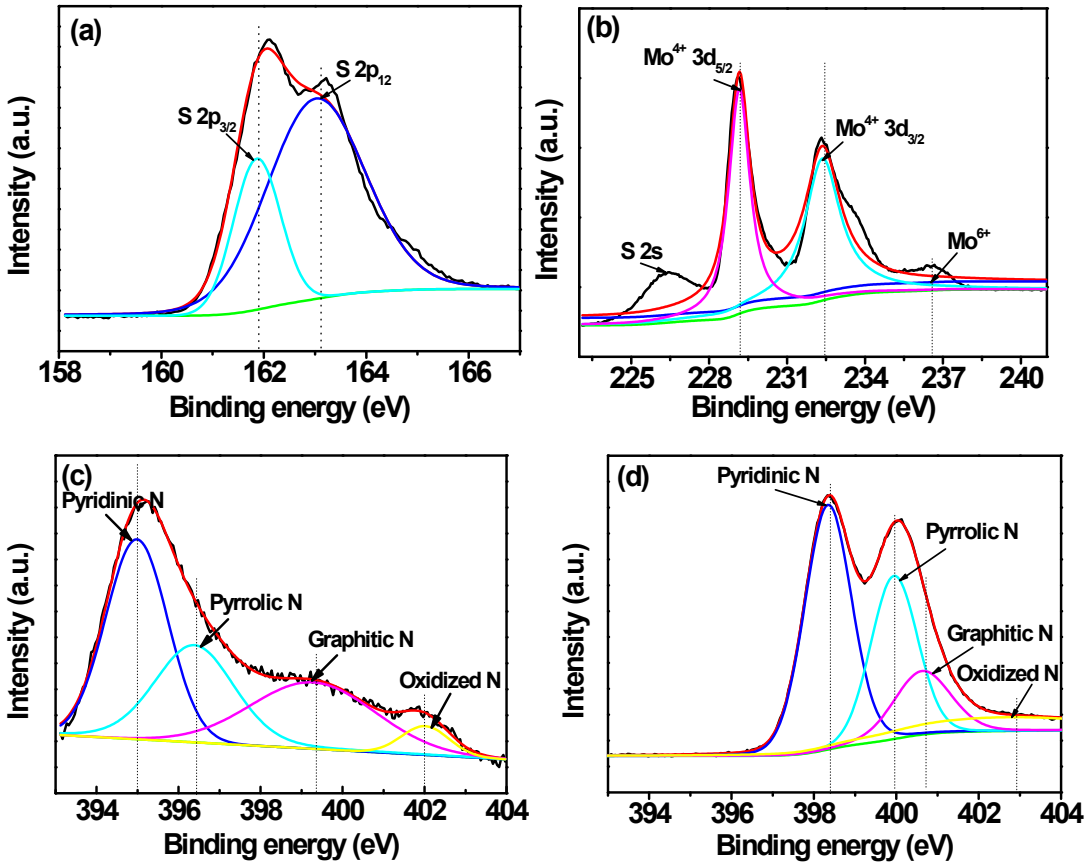

Fig. S1 (a) High resolution XPS spectra of S 2p in C@MoS_2 sample; (b) High resolution XPS spectra of Mo 3d in C@MoS_2 sample; (c) high resolution XPS spectra of N1s in C@MoS_2 sample; (d) high resolution XPS spectra of N1s in C sample.

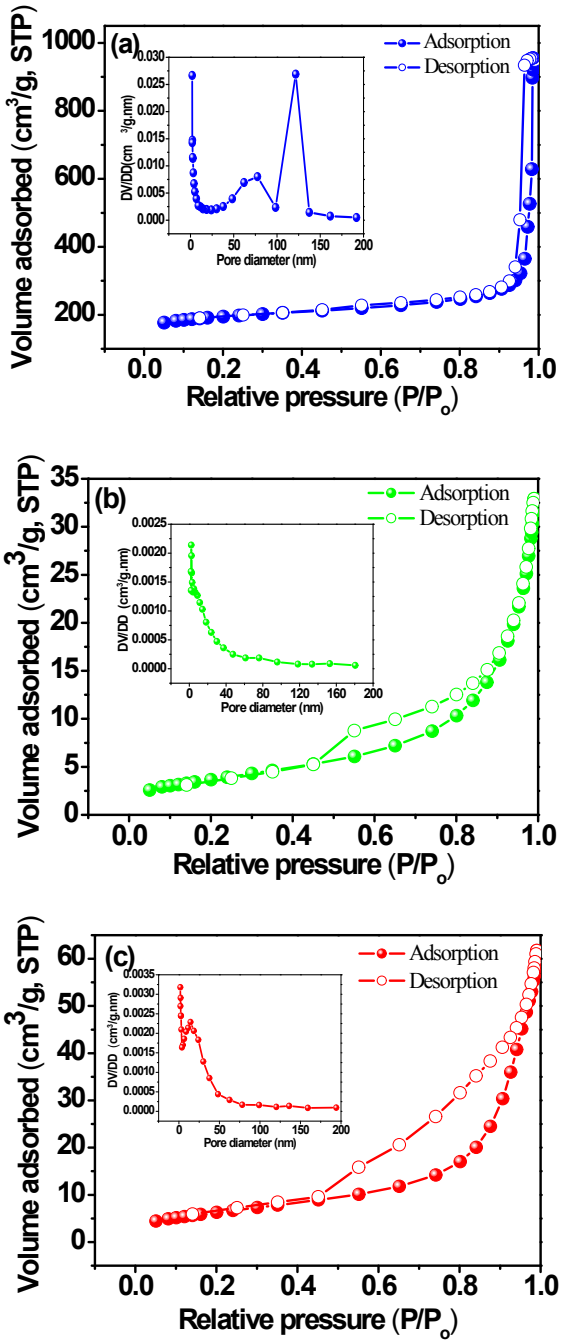

Fig. S2 Specific surface area of the three samples: (a) C; (b) MoS_2; (c) C@MoS_2.

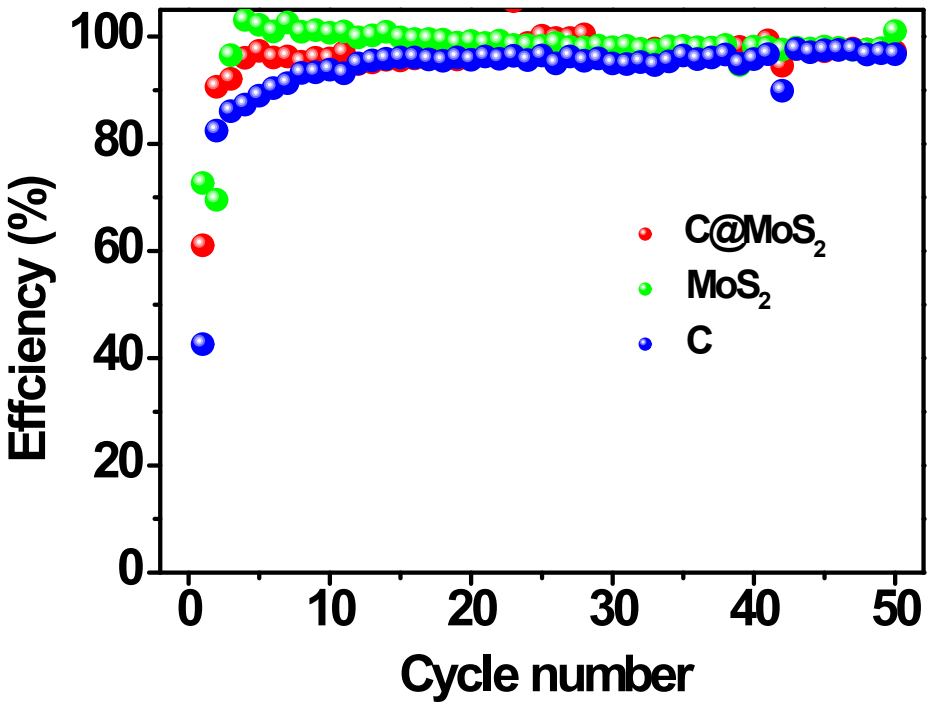

Fig. S3 The coulombic efficiencies of C, MoS_2 and C@MoS_2 electrodes.

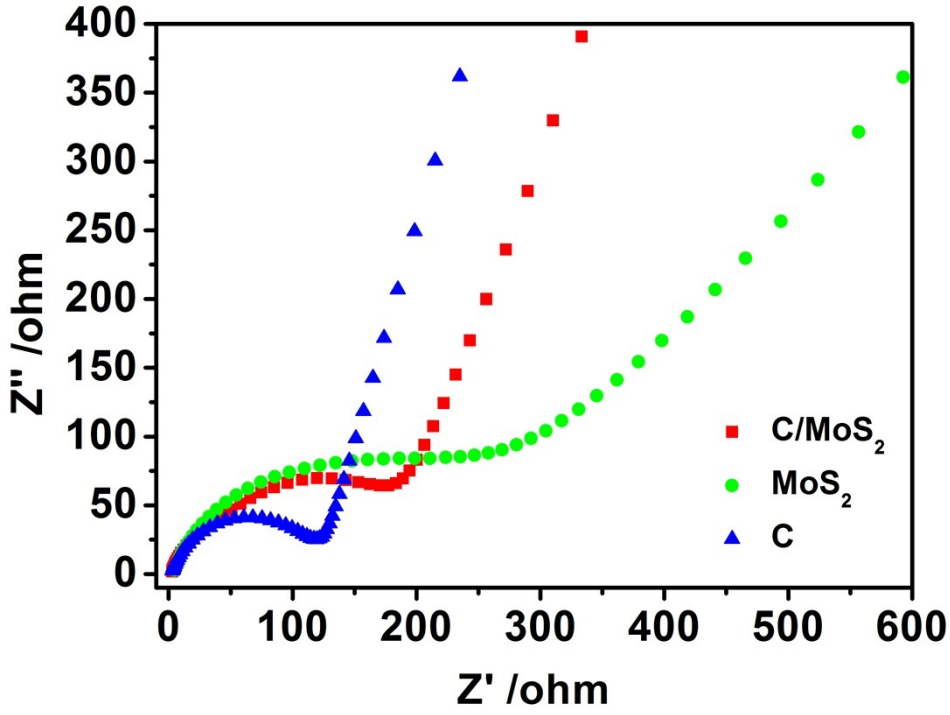

Fig. S4: Nyquist plots of the C, MoS_2 and C/MoS_2 electrodes at open potential before cycling.