

Supporting information

This supporting information contains Fig. S1-S6 and Table S1.

Synthesis and electrocatalytic performance of nitrogen-doped macroporous carbons

Xin Meng, Huijuan Cui, Jianhui Dong, Jianfeng Zheng, Yanyan Zhu, Zhijian Wang, Jian Zhang, Suping Jia, Jianghong Zhao, Zhenping Zhu

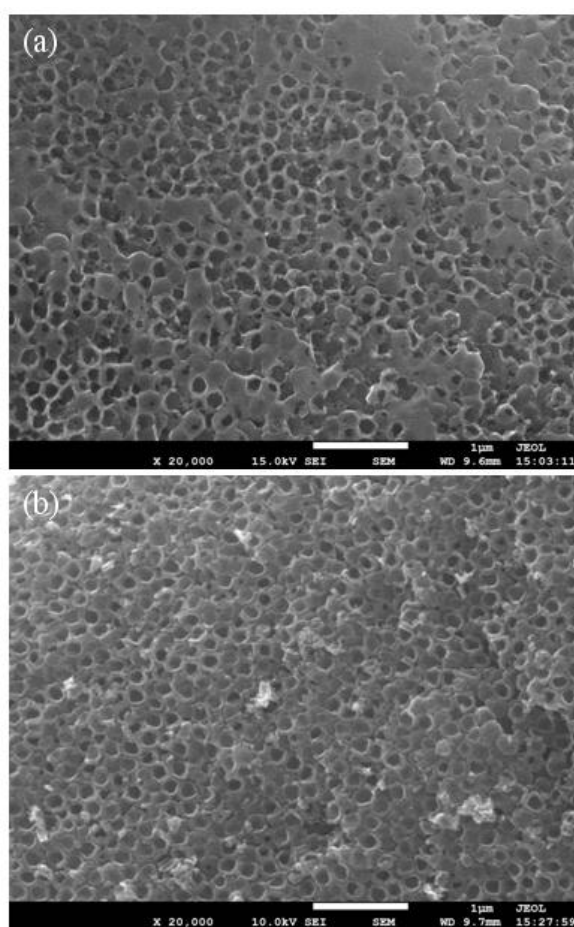


Fig. S1 SEM images of the samples obtained at different carbonization temperatures, (a) 700°C, (b) 1100°C.

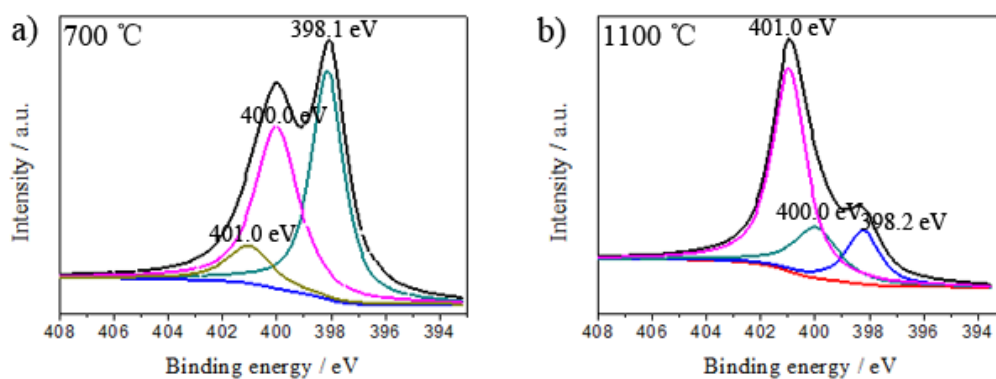


Fig. S2 The high-resolution N_{1s} XPS spectrum of the samples obtained at different carbonization temperatures.

Table S1 The element composition and nitrogen configuration in the samples obtained at different carbonization temperatures, analyzed by XPS.

| Carbonization temperature | Elemental composition | | | Nitrogen configuration | | |
|---------------------------|-----------------------|-----------|----------|------------------------|------------|--------------|
| | C | N | O | pyridinic-N | pyrrolic-N | quaternary-N |
| 700 °C | 82.25 at% | 11.89 at% | 5.87 at% | 46.92% | 42.34% | 10.73% |
| 900 °C | 84.80 at% | 9.40 at% | 5.70 at% | 42.25% | 20.44% | 37.30% |
| 1100 °C | 89.53 at% | 3.25 at% | 2.87 at% | 17.60% | 20.01% | 62.38% |

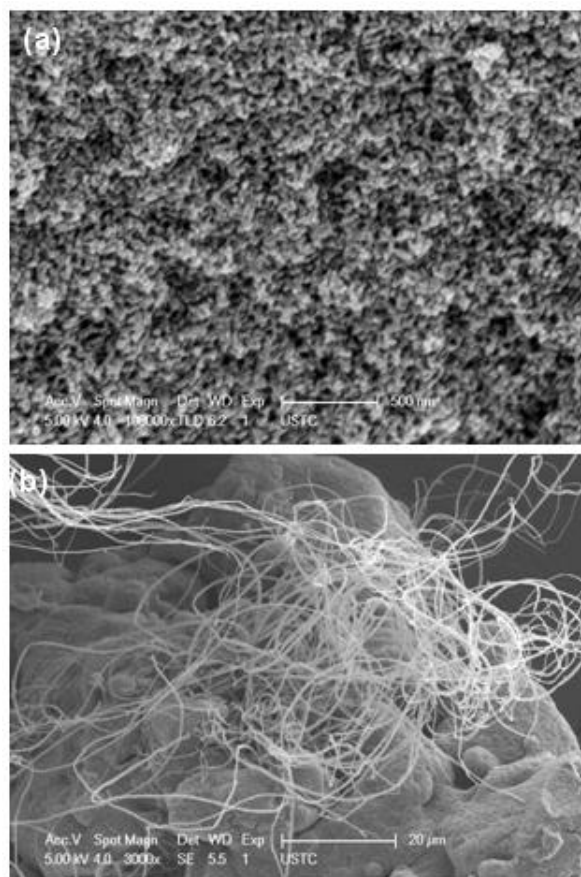


Fig. S3 (a,b) SEM images of the sample obtained from a 220 °C-pre-oxidized PMMA/PAN core-shell nanoparticles, with carbonization conditions are the same as that shown in Fig. 8. They show the formation of (a) irregular worm-like porous materials and (b) carbon nanofibers.

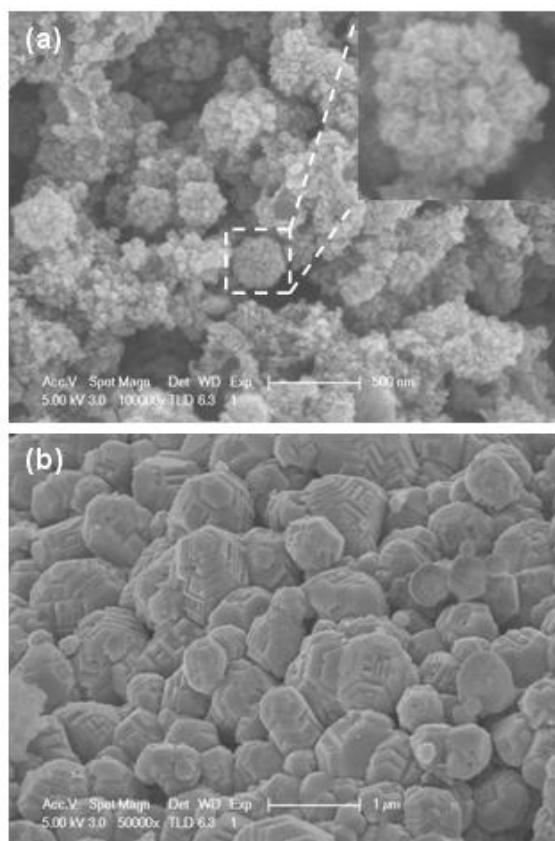


Fig. S4 (a) SEM image of the sample obtained from the pre-oxidation of PMMA/PAN core-shell nanoparticles with KMnO_4 . The inset is the magnification of single particle, which is obviously consisted of small worm-like objects. (b) SEM image of the sample obtained from the carbonization of the KMnO_4 -pre-oxidized PMMA/PAN core-shell nanoparticles. Carbonization conditions are the same as that shown in Fig. 8.

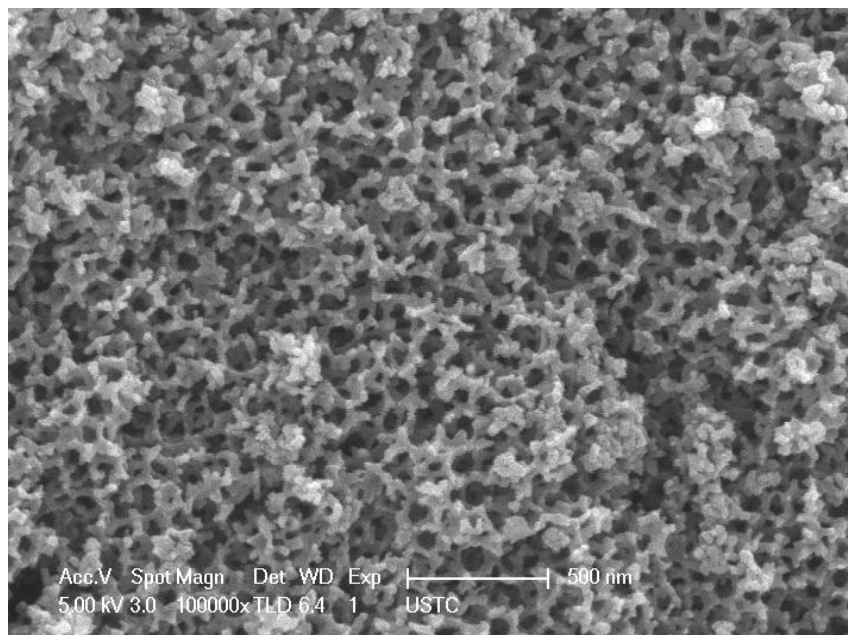


Fig. S5 The SEM image of sample obtained from the carbonization of the 250 °C-pre-stabilized PMMA/PAN core-shell nanoparticles, with a heating program: 25 to 900 at 5 °C/min, staying at 900 °C for 30 min).

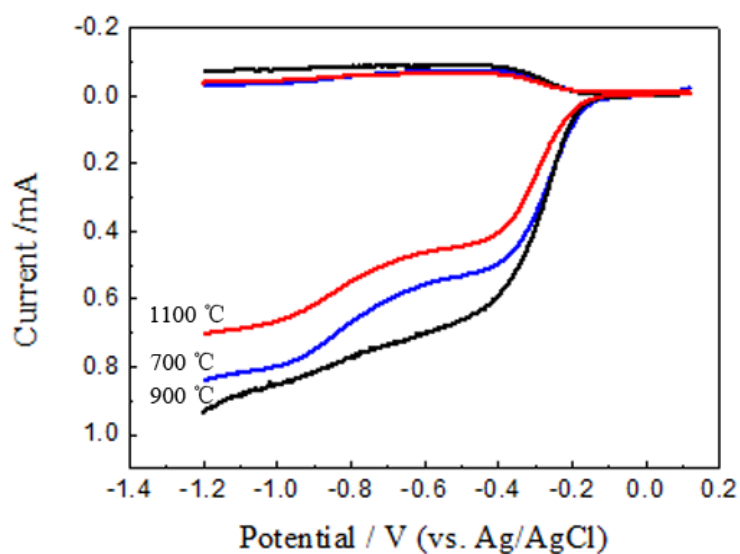


Fig. S6 The rotating ring disk electrode voltammetry of the N-MPCs electrodes obtained at different carbonization temperatures (700 °C, 900 °C, 1100 °C). Scan rate, 5 mV/s; electrode rotation speed, 1500 rpm; the potential of Pt ring electrode, 0.5 V.