Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supplementary Information (ESI)

Synthesis of Ag/PANI@MnO_2 Core–Shell Nanowires and Their Capacitance Behavior

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1. The behaviors of PANI in H_2SO_4 and KOH electrolyte

Fig. S1 shows a CV for PANI in the 1M H_2SO_4. The oxidation peak corresponding to the leucoemeraldine to emeraldine salt (ES) at about 0.22, 0.52V and the reduction peaks corresponding to the leucoemeraldine base (LB) and emeraldine base (EB) found to be at 0.05 and 0.47 V, respectively, were observed in PANI sample. The small peaks of 0.56 V potential are

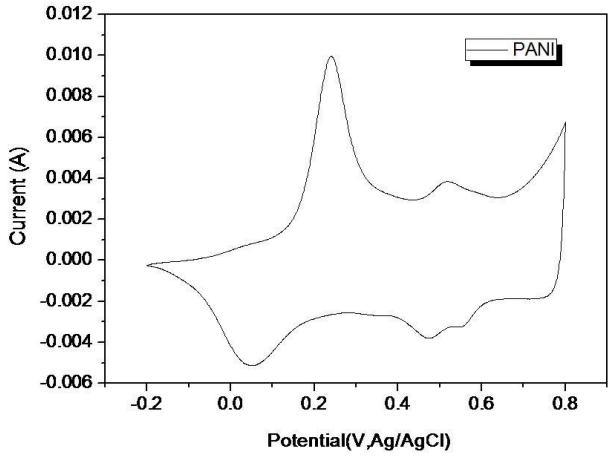
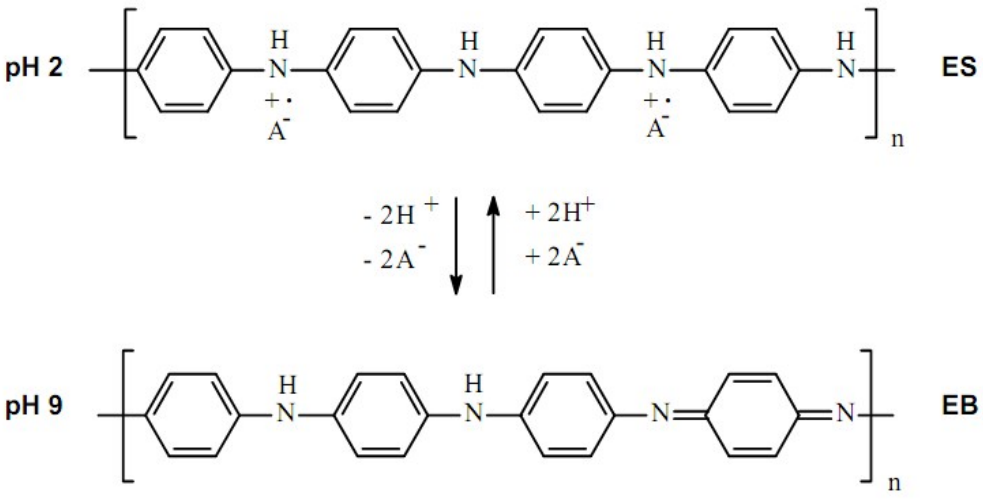


Fig. S1. Cyclic voltammogram of the PANI electrodes at the scan rate of 5 mV s^{-1} in 1M H_2SO_4

attributed to transformation of PANI charge carriers consisting of polaron (radical cation) and bipolaron (dication) forms delocalized on PANI chains. [1] The reaction between the Leucoemeraldine base (LB), emeraldine salt (ES) and emeraldine base (EB) is as follows:



Scheme S1 The PH dependent ES-EB transition of PANI. [2]

The pH sensitivity of PANI is based on the reversible emeraldine salt (ES)–emeraldine base (EB) transition, which is an acid–base equilibrium (Scheme S1). Since PANI deprotonated undoping process occurs at high pH environment, it greatly reduces the conductivity, thus affecting its oxidation-reduction charge transfer process, resulting in decreased electrochemical activity.

References:

[1] D. S. Patil, J. S. Shaikh, D. S. Dalavi, M. M. Karanjkar, R. S. Devan, Y. R. Ma and P. S. Patil, J. Electrochem. Soc., 2011, 158, 1.

[2] J. Chem. SOC., Faraday Trans. Polyaniline, a Novel Conducting Polymer 1, 1986,82, 2385-2400

2. The cycling stability of base Ni foam in Na_2SO_4 electrolyte

CV cures as well as the cycling stability of base Ni foam tested in Na_2SO_4 electrolyte. The CV behavior of the Ni foam was shown in the Fig. S2. No obvious peaks were observed in the potential range, indicating that Ni foam has good stability in Na_2SO_4 electrolyte.

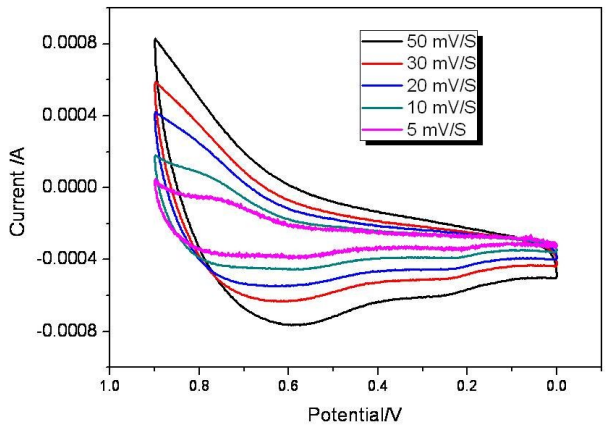
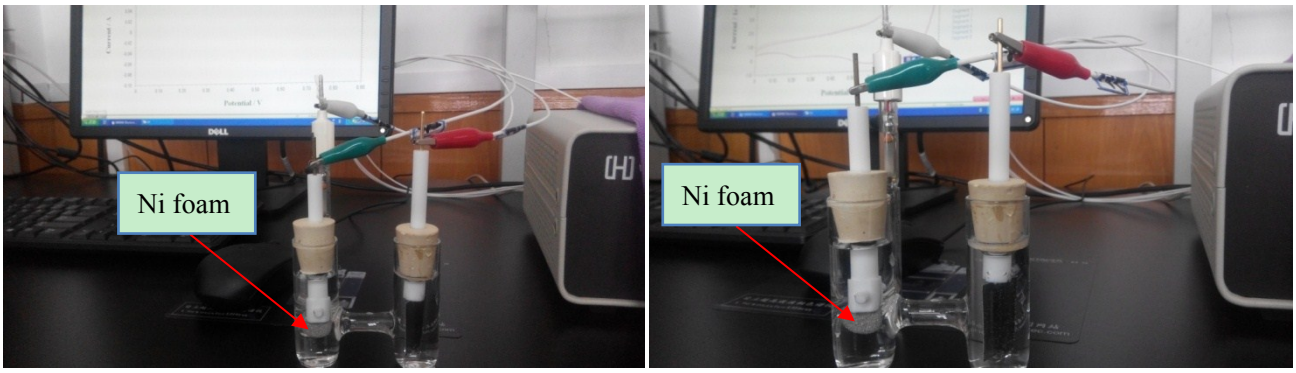


Fig. S2 Cyclic voltammograms (CV) of the Ni foam.

The color changes of Ni foam in Na_2SO_4 are shown in picture. The picture below clearly shows

that the color of bare Ni foam does not changed during the CV test, and thus can be used as a current collector for active electrode materials.



Before After

3. The EDX data and atomic ratio of Mn:Na:S of the Ag/ PANI@MnO_2 composite after discharge

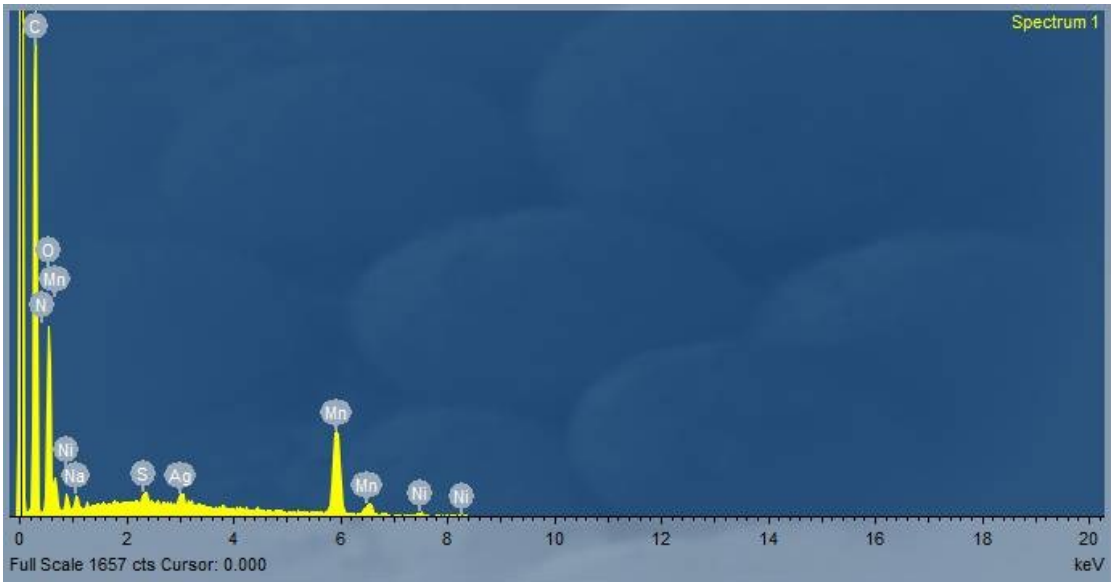


Fig. S3. The EDX data of the Ag/ PANI@MnO_2 composite after discharge.

Table S1. The atomic ratio of Ag/ PANI@MnO_2 sample

Element	Weight%	Atomic%
C K	43.64	64.85
N K	1.55	1.97

O K	19.60	21.87
Na K	0.86	0.67
S K	1.00	0.55
Mn L	25.78	8.38
Ni L	3.30	1.00
Ag L	4.27	0.71
Totals	100.00	