Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

High Performance Asymmetric Supercapacitor Based on MnO_2 Electrode in Ionic Liquid Electrolyte

Supporting Information

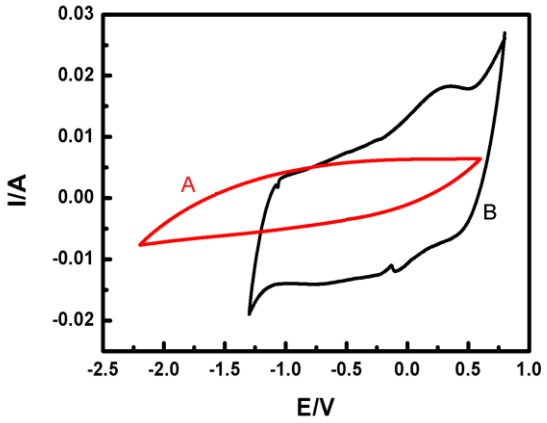

Fig. S1 CV curves of activated carbon electrode (A) and the NF/CNT/Au/MnO_2 electrode (B) measured at a scan rate of 50 mV s^{-1} in S_{50} electrolyte.

The specific capacitance (based on active materials) of activated carbon (A) and NF/CNT/Au/MnO_2 electrode (B) at a scan rate of 50 mV s^{-1} in S_{50} electrolyte are 134.3 F g^{-1} and 385.7 F g^{-1}, respectively. The specific capacitance (C) was calculated as follows[28, 29]:

$$C = (\int Id\Delta V) / (\nu m \Delta V) \quad (6)$$

Where C is the specific capacitance (F g^{-1}), I is the specific current (A g^{-1}), ν is the potential scan rate (mV s^{-1}), ΔV is the potential window, m is the mass of active material (g) such as activated carbon or MnO_2.

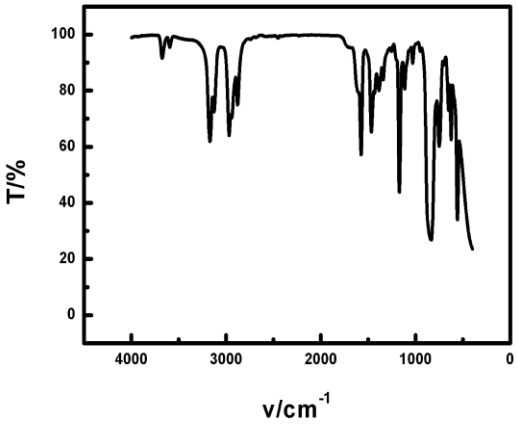

Fig. S2 The IR spectrometry of [Bmim]PF_6

The samples were directly coated on KBr-chip, and then were analyzed using a Fourier transform infrared (FTIR) spectroscope (Nicolet 670 FTIR, USA) in the region of 4000–500 cm^{-1}.

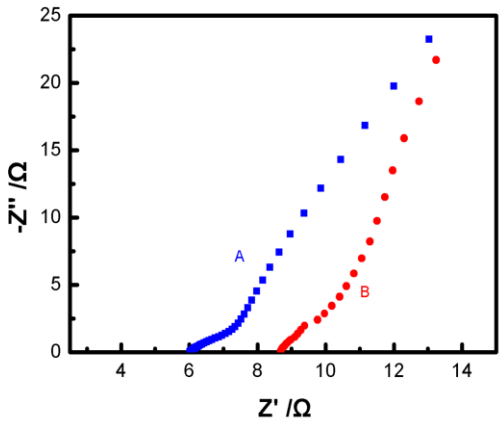

Fig. S3 EIS of the NF/CNT/Au/MnO_2 electrode (A) and NF/CNT/ MnO_2 electrode (B) in S_{50} electrolyte.

The EIS were tested in the frequency range from 10^{-2} to 10^5 Hz at open circuit potential with amplitude of 5 mV.

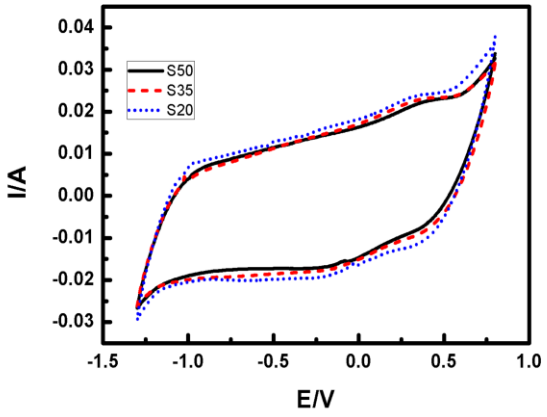

Fig. S4 CV curves of the NF/CNT/Au/MnO_2 electrodes at a scan rate of 100 mV s^{-1} in [Bmim]PF_6/DMF electrolyte with different volume fractions.

The same electrode was tested in different volume fractions electrolyte.

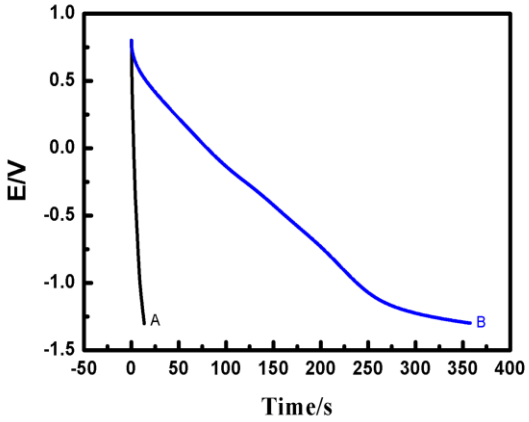

Fig. S5 Discharge curves of the NF/CNT/Au electrode (A) and NF/CNT/Au/MnO_2 electrode (B) in S_{50} electrolyte at the same current.

The NF/CNT/Au electrode and the NF/CNT/Au/MnO_2 electrode have the same dimensions and total masses of Ni foam, CNT and Au.

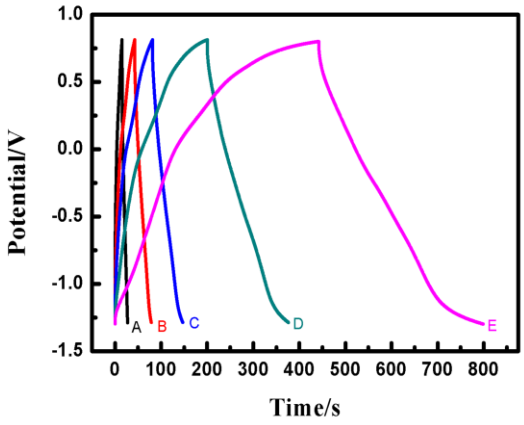

Fig. S6 Charge/discharge curves of the NF/CNT/Au/MnO_2 electrode at different specific current: (A) 30 A g^{-1} (B) 15 A g^{-1} (C) 10 A g^{-1} (D) 5 A g^{-1} (E) 3 A g^{-1}.

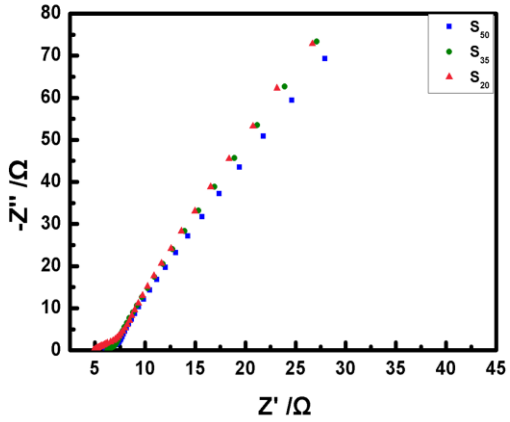

Fig. S7 EIS of the same NF/CNT/Au/MnO_2 electrode in different [Bmim]PF_6/DMF volume fraction electrolyte.

The EIS were tested in the frequency range from 10^{-2} to 10^{5} Hz at open circuit potential with amplitude of 5 mV.