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Supporting Information

All-Solid-State Asymmetric Supercapacitors Based on ZnO Quantum Dots/ Carbon/CNTs and Porous N-doped Carbon/CNTs Electrodes Derived from a Single ZIF-8/CNTs Template

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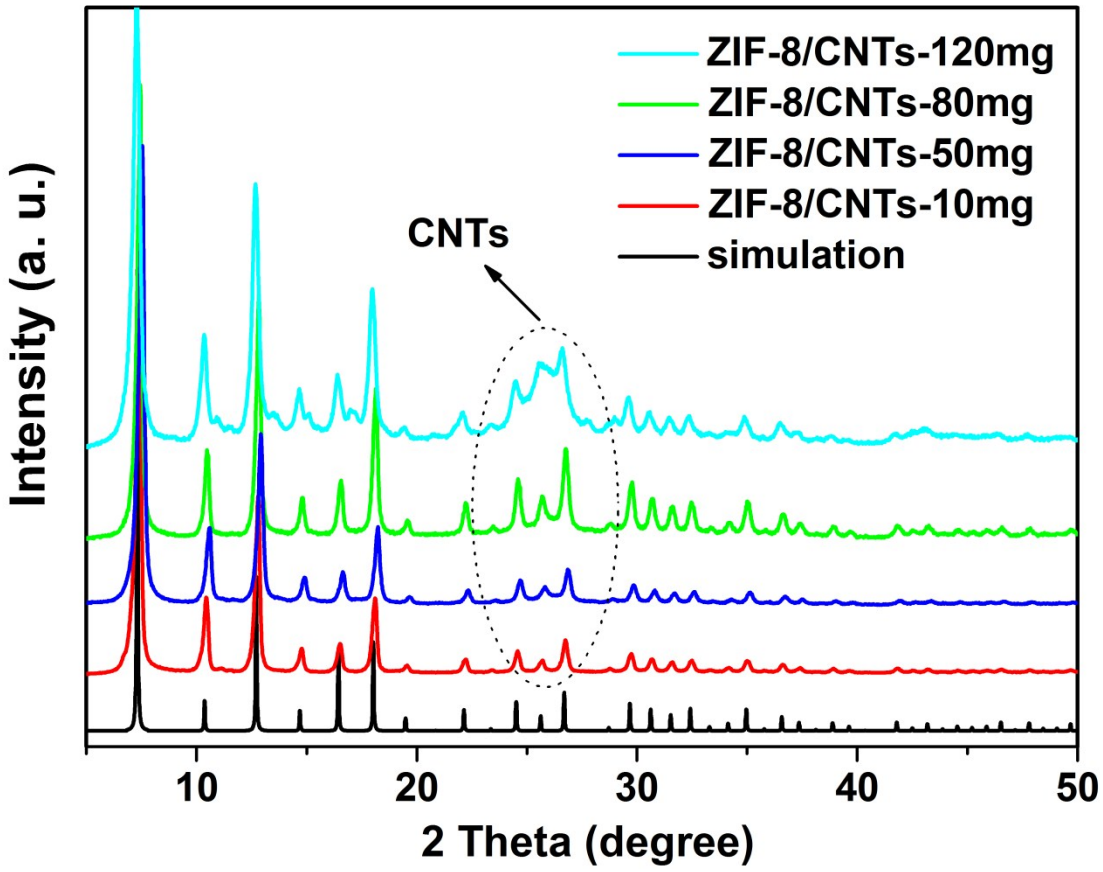

Fig. S1 Comparison of XRD patterns of ZIF-8/CNTs with different CNTs content.

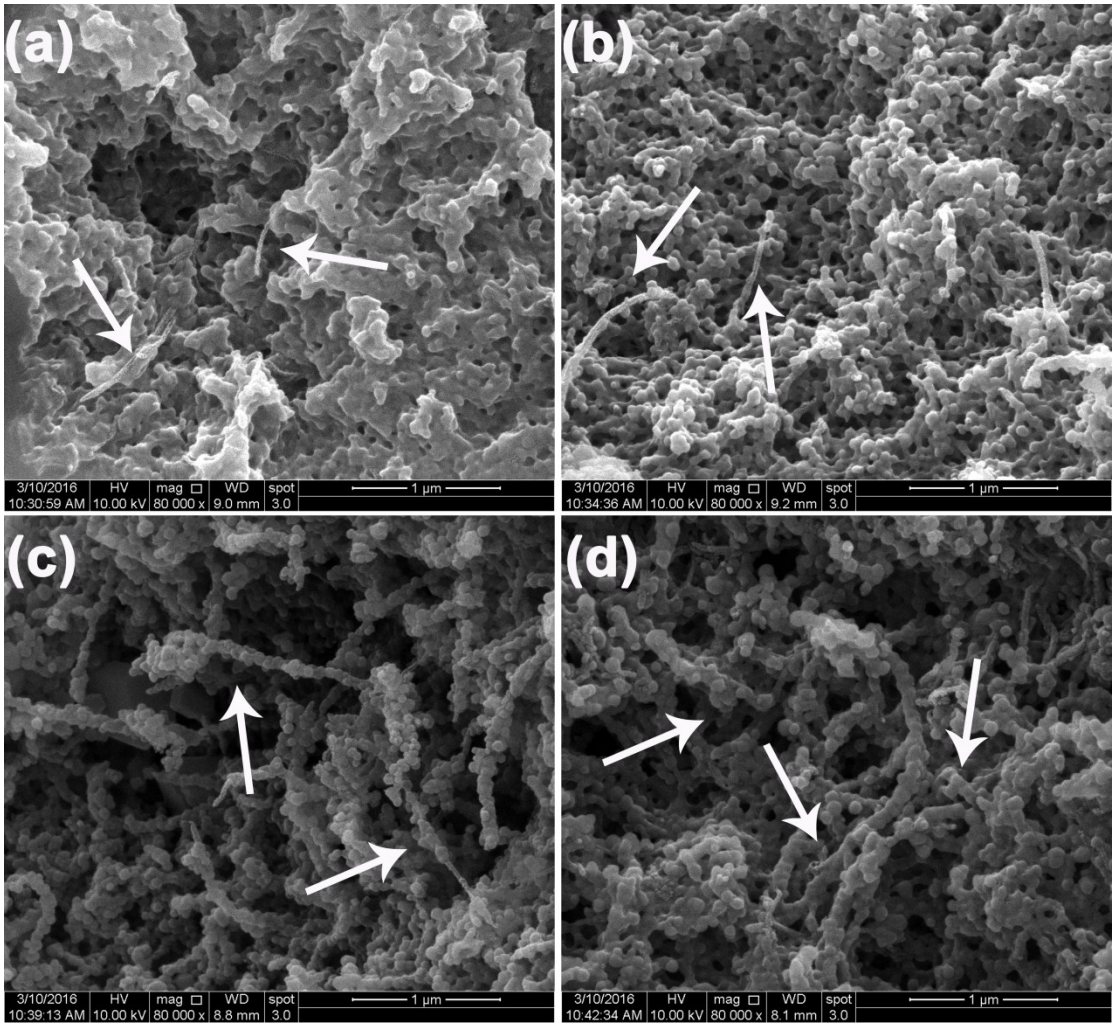

Fig. S2 SEM images of ZIF-8/CNTs with different CNTs contents: (a) ZIF-8/CNTs-10; (b) ZIF-8/CNTs-50; (c) ZIF-8/CNTs-80; (d) ZIF-8/CNTs-120. In ideal reaction, the theoretical product yield of ZIF-8 is 0.4527 g when $Zn(NO_3)_2 \cdot 6H_2O$ is equal to 0.5866 g. The corresponding percentage of incorporated CNTs can be calculated by $CNTs\% = 100\% \times W_{CNTs} / (W_{CNTs} + W_{ZIF\text{-}8})$, where W_{CNTs} and $W_{ZIF\text{-}8}$ are the weight of CNTs and ZIF-8, respectively. The values are 2.16, 9.95, 15.02 and 20.95 wt% of the theoretical final product, respectively.

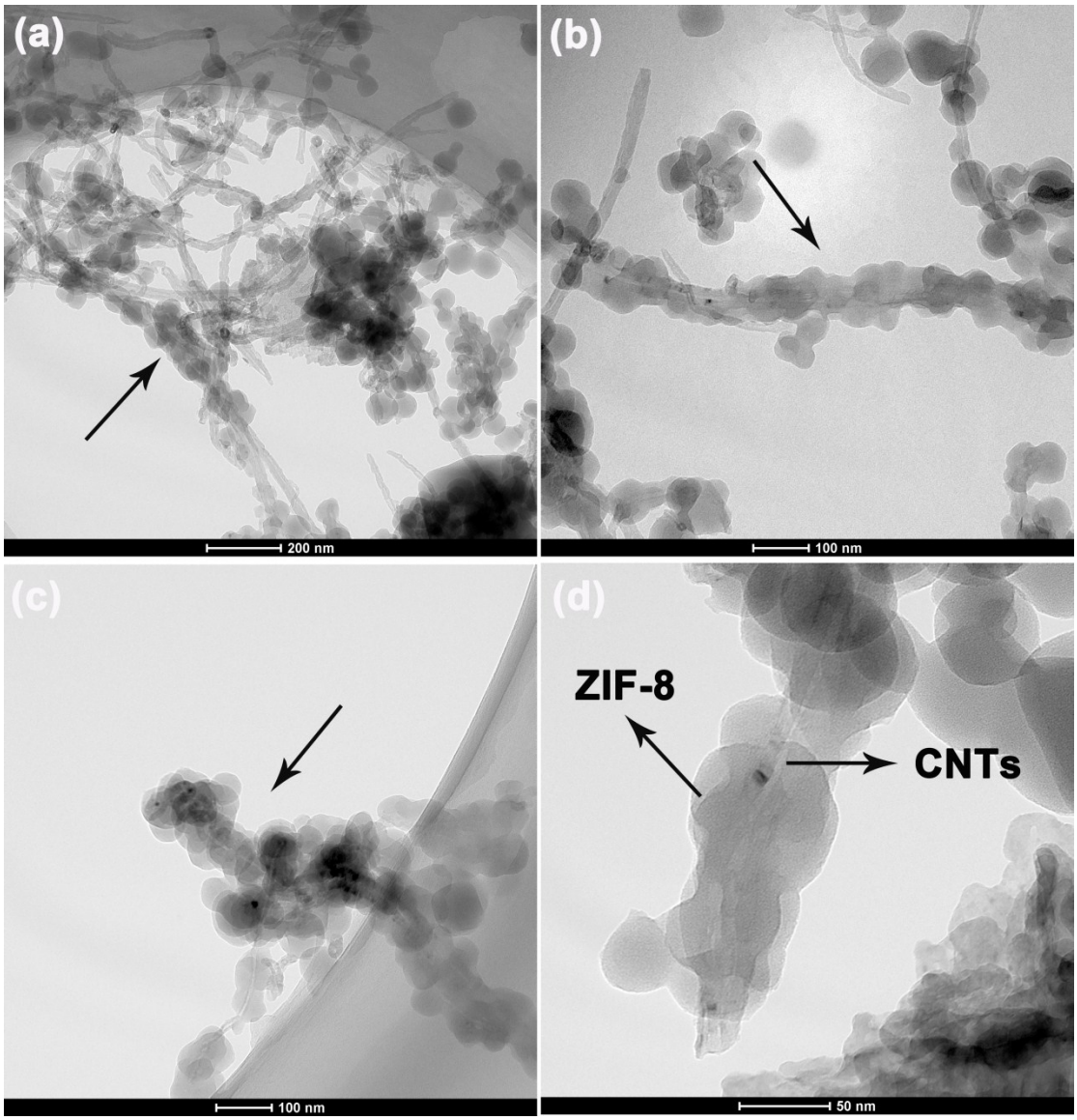

Fig. S3 TEM images of ZIF-8/CNTs in different scale.

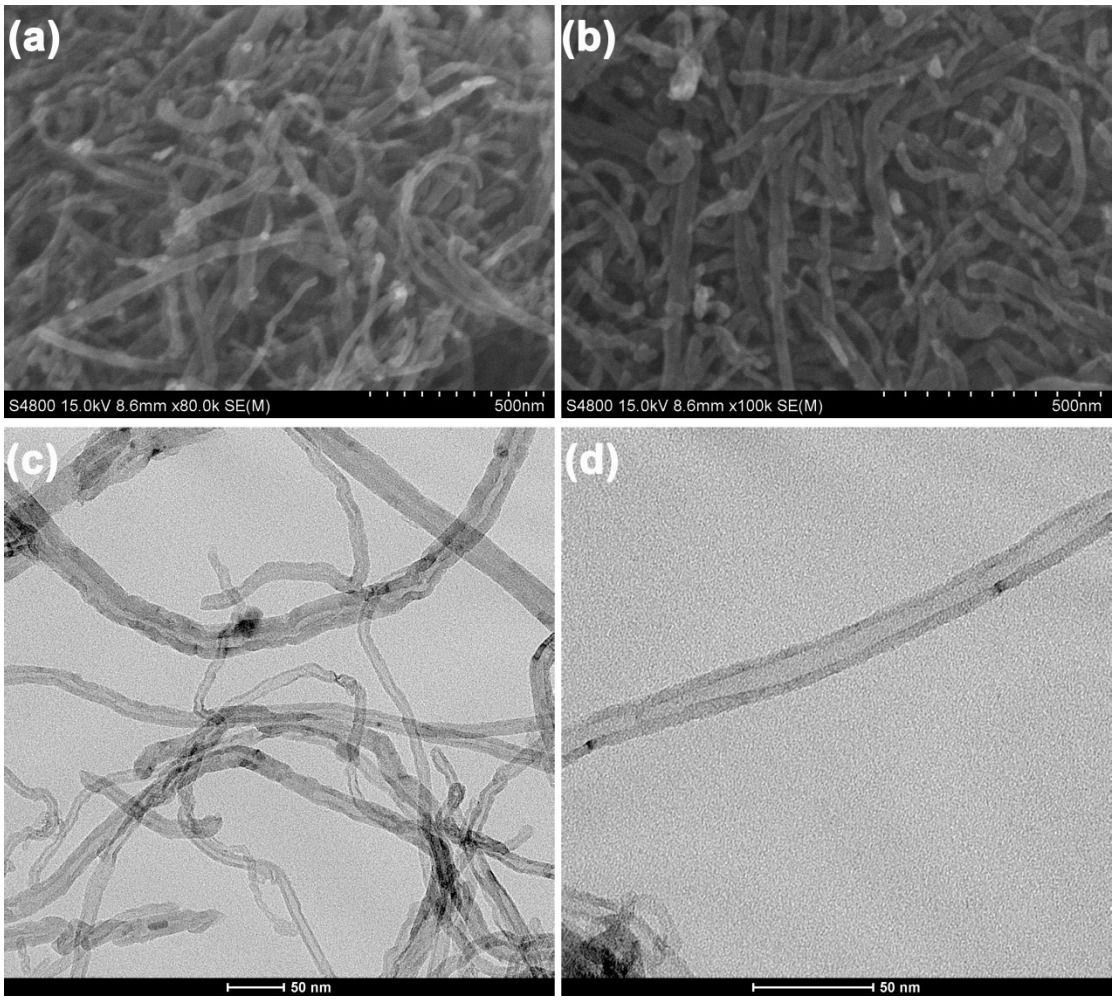

Fig. S4 SEM (a, b) and TEM (c, d) images of CNTs in different scale.

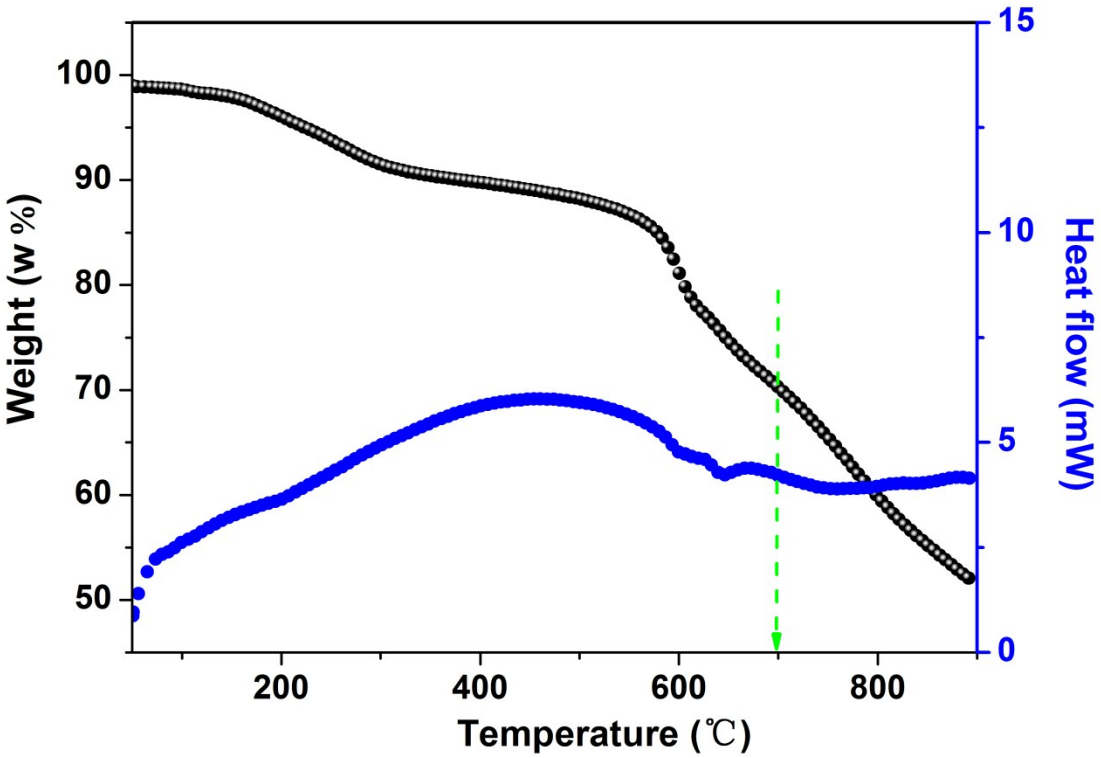

Fig. S5 TGA thermogram of ZIF-8/CNTs at nitrogen atmosphere. Green arrow indicated the target temperature.

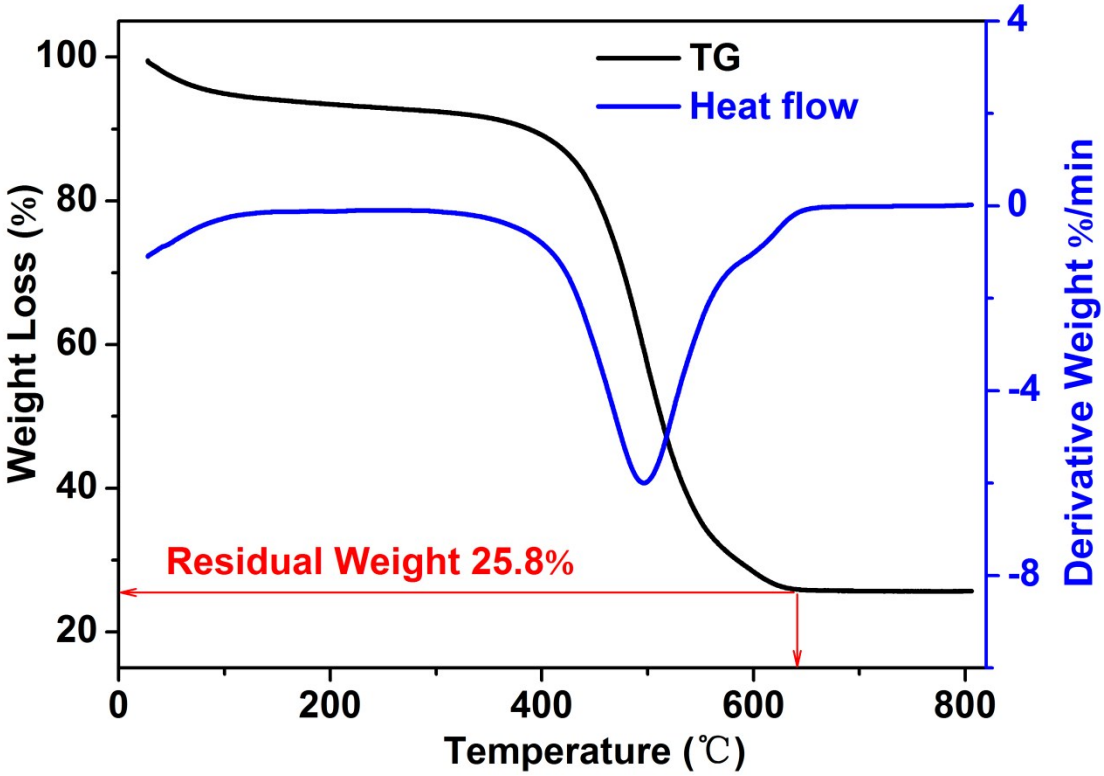

Fig. S6 TGA thermogram of ZnO QDs/carbon/CNTs at O_2 atmosphere.

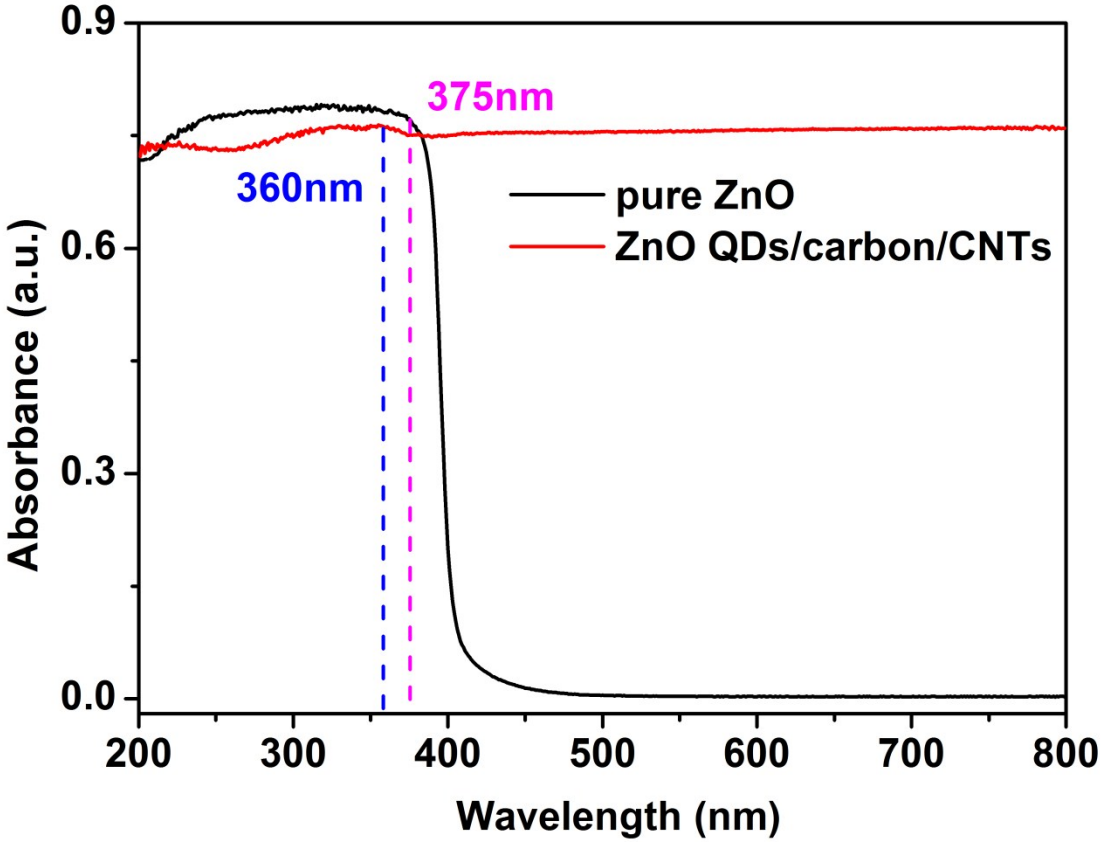

Fig. S7 UV-visible absorption spectrum of pure ZnO and ZnO QDs/carbon/CNTs.

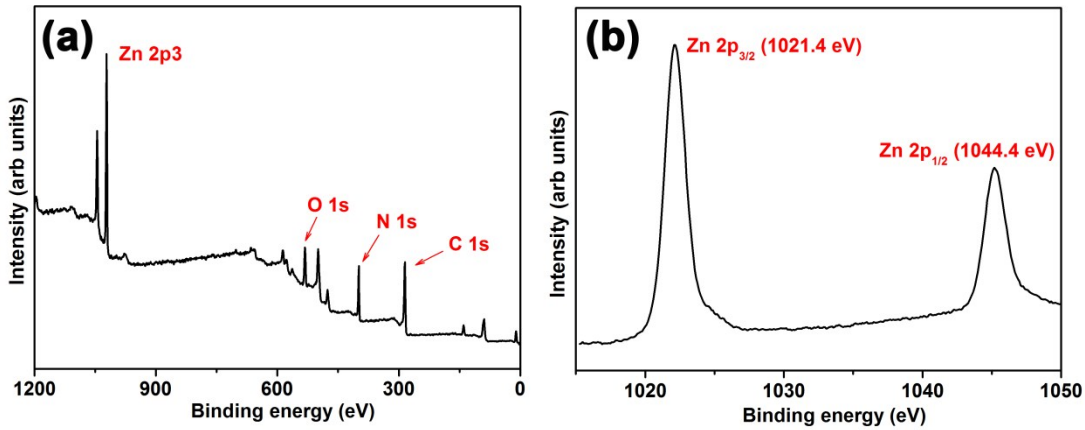

Fig. S8 XPS spectra of ZnO QDs/carbon/CNTs, (a) survey scan, (b) high-resolution spectra of Zn 2p.

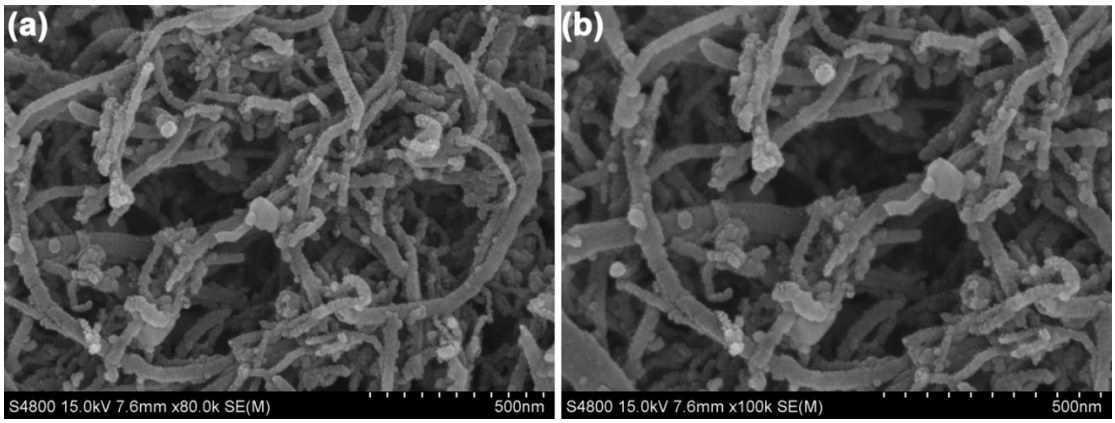

Fig. S9 SEM images of porous ZnO QDs/carbon/CNTs in different scale.

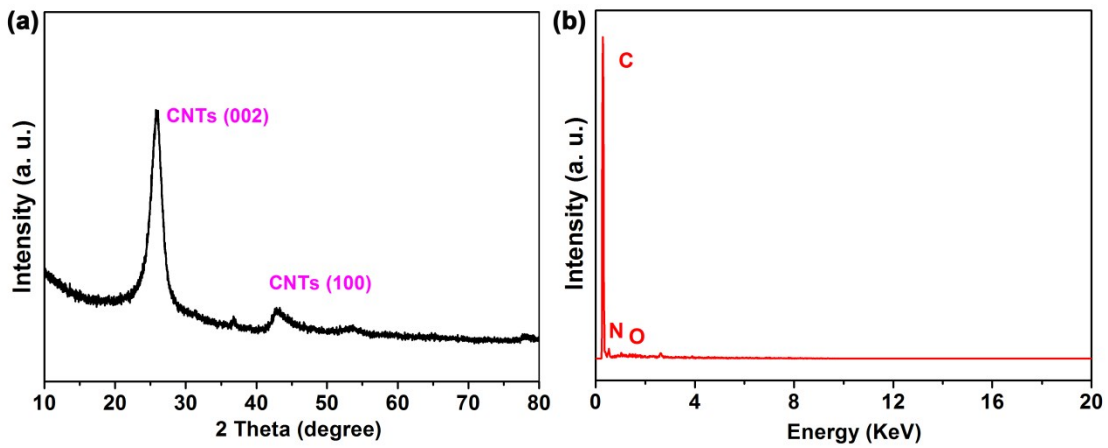

Fig. S10 XRD pattern (a) and EDS measurement (b) of porous N-doped carbon/CNTs.

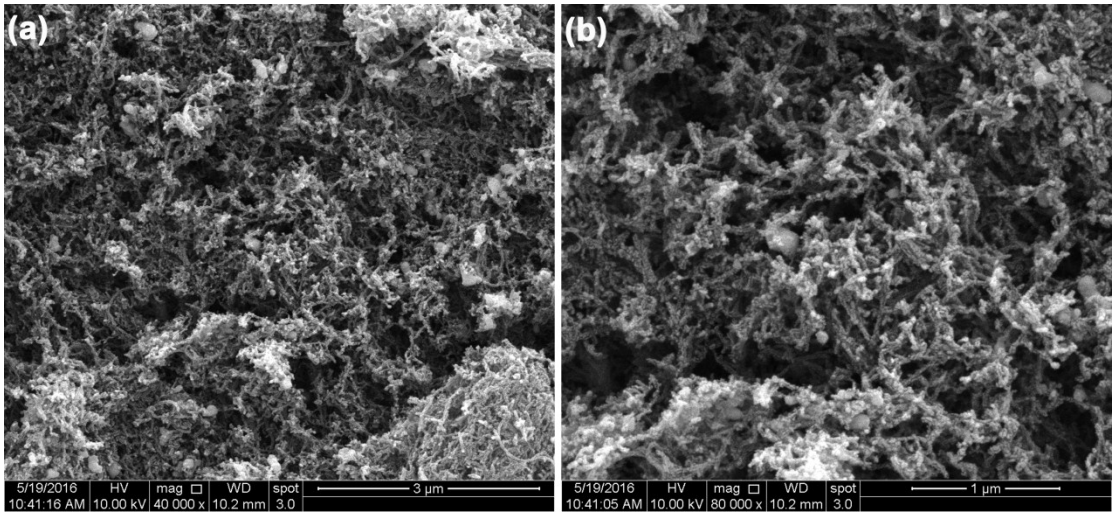

Fig. S11 SEM images of porous N-doped carbon/CNTs in different scale.

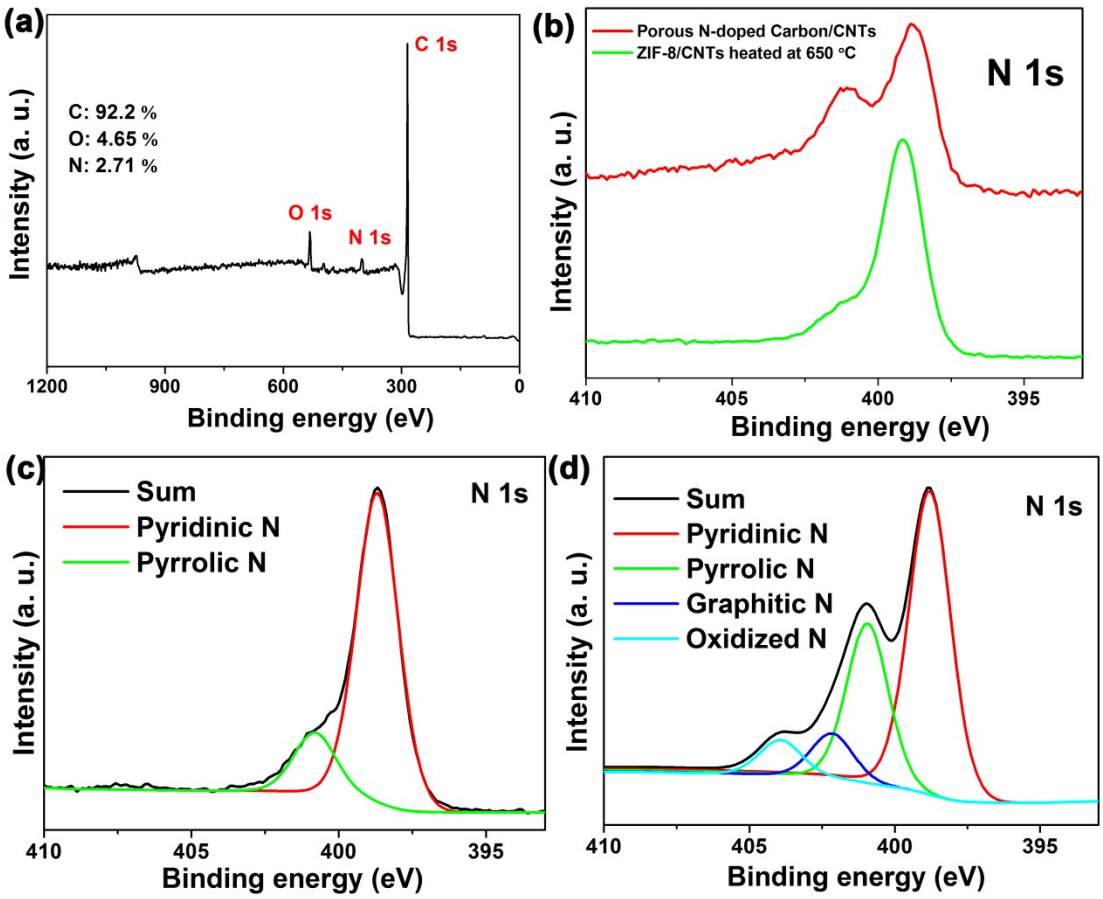

Fig. S12 XPS spectra of porous N-doped carbon/CNTs, (a) survey scan, (b) comparison of high-resolution spectra of N 1s with ZIF-8/CNTs heated at low temperature, (c) high-resolution spectra of N 1s for ZIF-8/CNTs heated at low temperature, (d) high-resolution spectra of N 1s for porous N-doped carbon/CNTs.

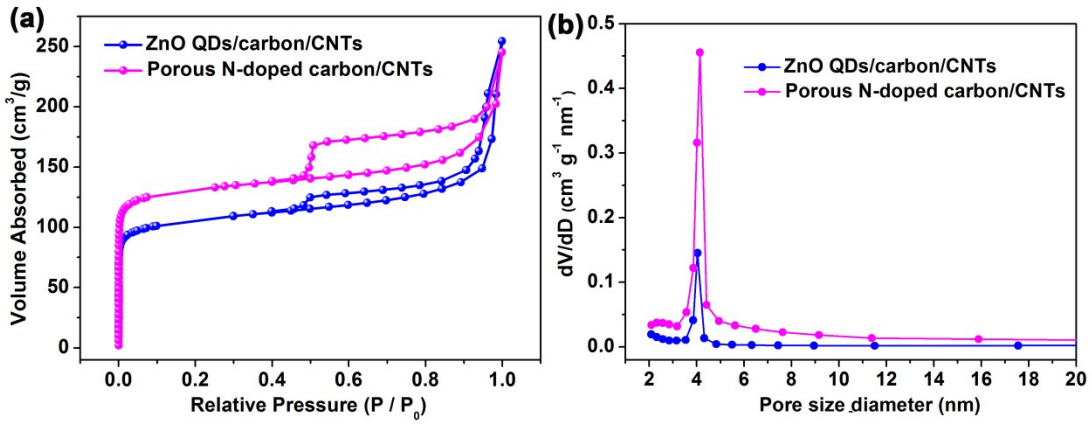

Fig. S13 (a) N_2 adsorption/desorption isotherms of ZnO QDs/carbon/CNTs and porous N-doped carbon/CNTs, (b) the pore size distribution from BJH.

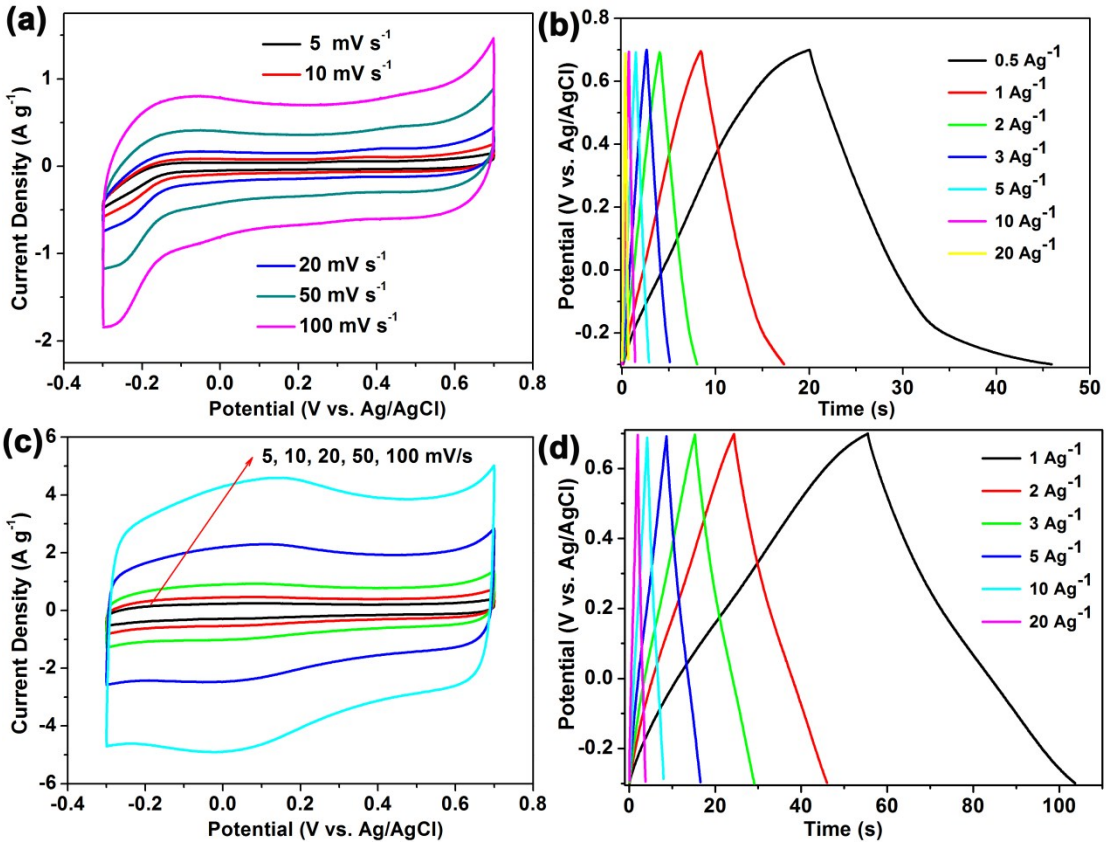

Fig. S14 (a) CV and (b) galvanostatic charge-discharge profiles of pure ZnO in three electrode system, (c) CV and (d) galvanostatic charge-discharge profiles of pure CNTs in three electrode system.

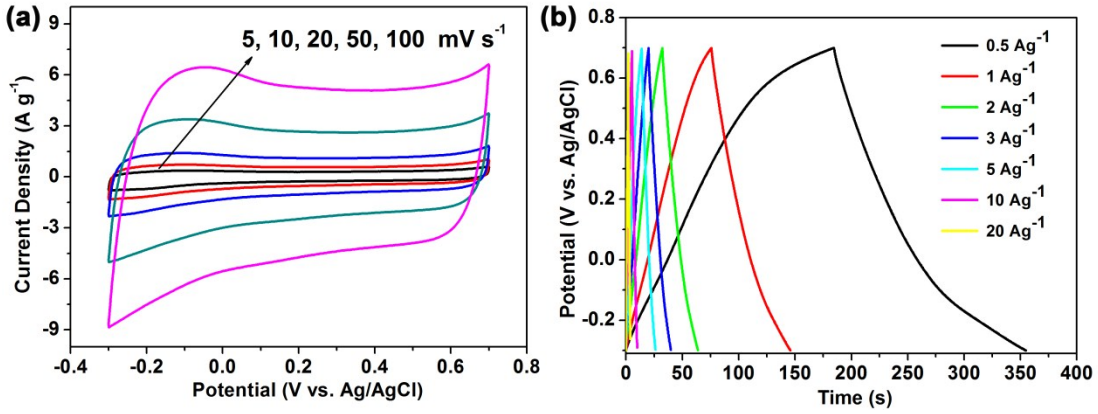

Fig. S15 (a) CV and (b) galvanostatic charge-discharge profiles of ZnO QDs/carbon in three electrode system.

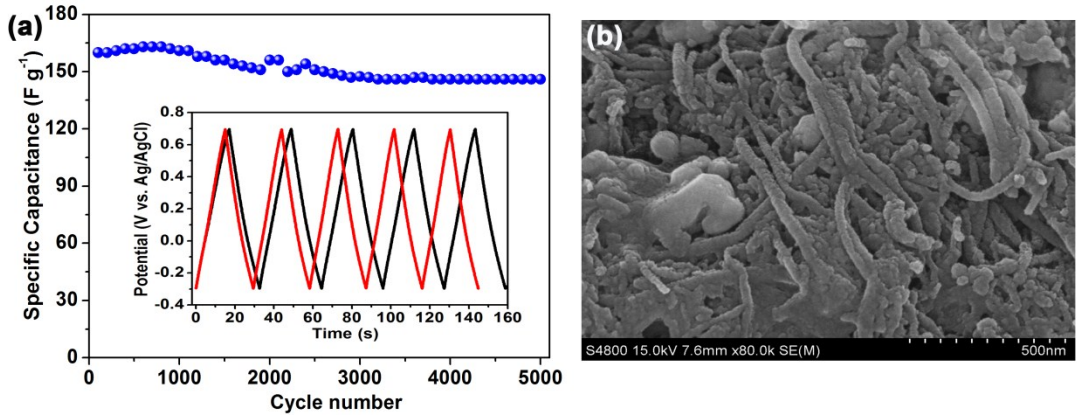

Fig. S16 (a) cycling performance and (b) the corresponding SEM image after cycling of ZnO QDs/carbon/CNTs in three electrode system.