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Supporting Information

Rational designed Ni_2P/Ni/C as positive electrode materials for high-performance hybrid supercapacitors

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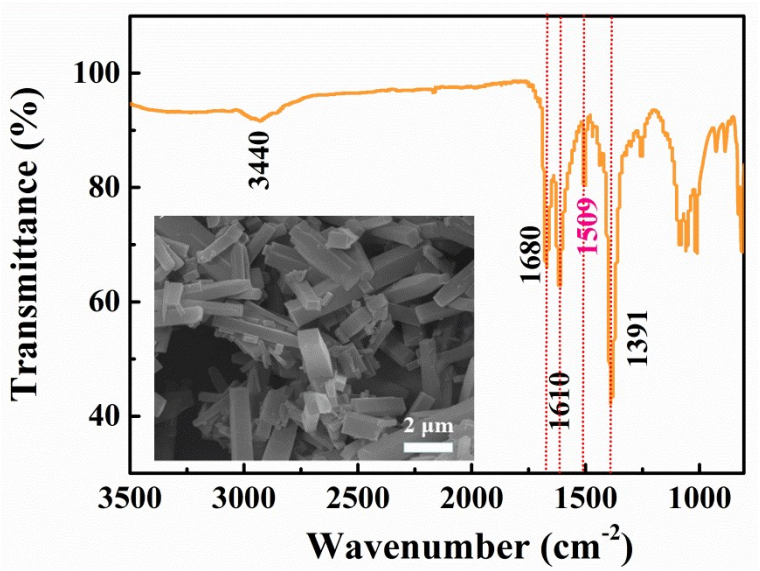

Fig. S1 The FT-IR spectrum of Ni-MOF (inset shows the SEM image of Ni-MOF).

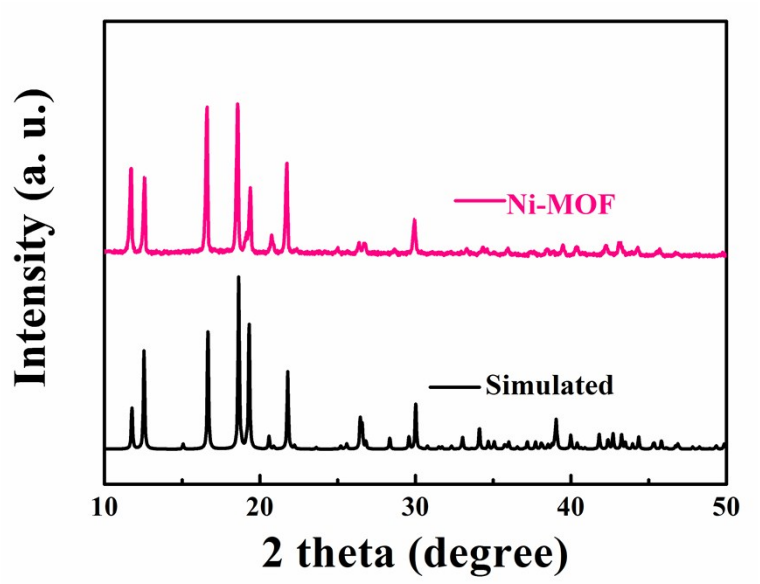

Fig. S2 The XRD patterns of as-prepared Ni-MOF and simulated from the crystal structure data of $\{Ni_2(bdc)_2(ted)\}$

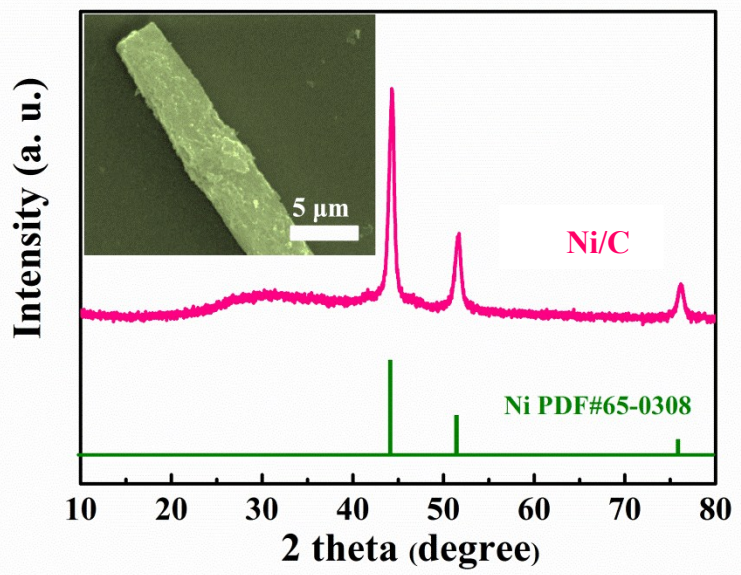

Fig. S3 The XRD pattern of sample is synthesized by annealing Ni-MOF under nitrogen atmosphere (inset shows the SEM image of Ni/C)

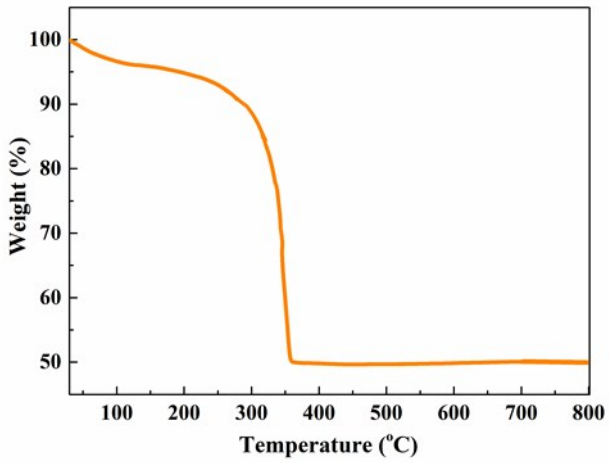

Fig. S4 The TGA curve of Ni_2P/Ni/C.

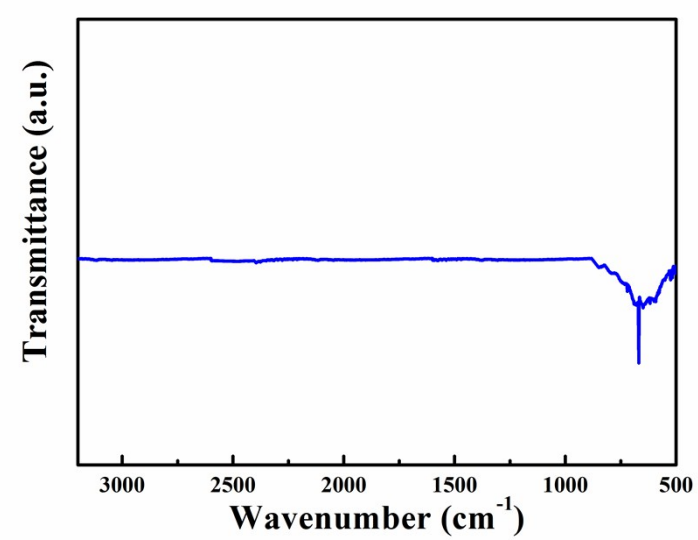

Fig. S5 The FT-IR spectrum of Ni_2P/Ni/C.

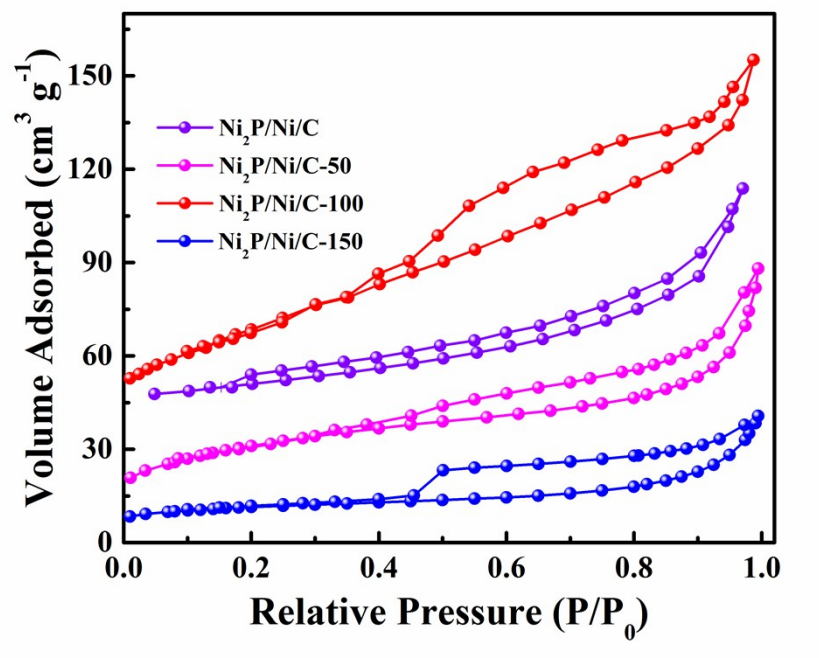

Fig. S6 The Nitrogen absorption and desorption test of four materials.

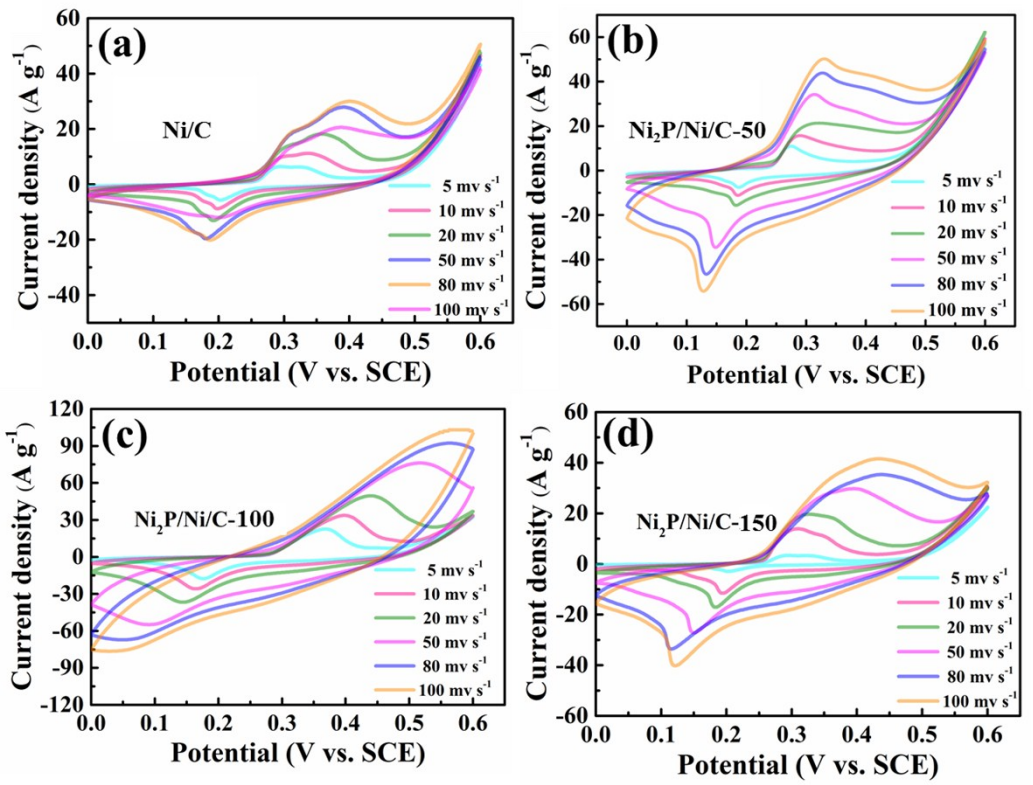

Fig. S7 The CV curves of four samples at various scan rates: (a) Ni/C, (b) Ni_2P/Ni/C-50, (b) Ni_2P/Ni/C-100, (b) Ni_2P/Ni/C-150.

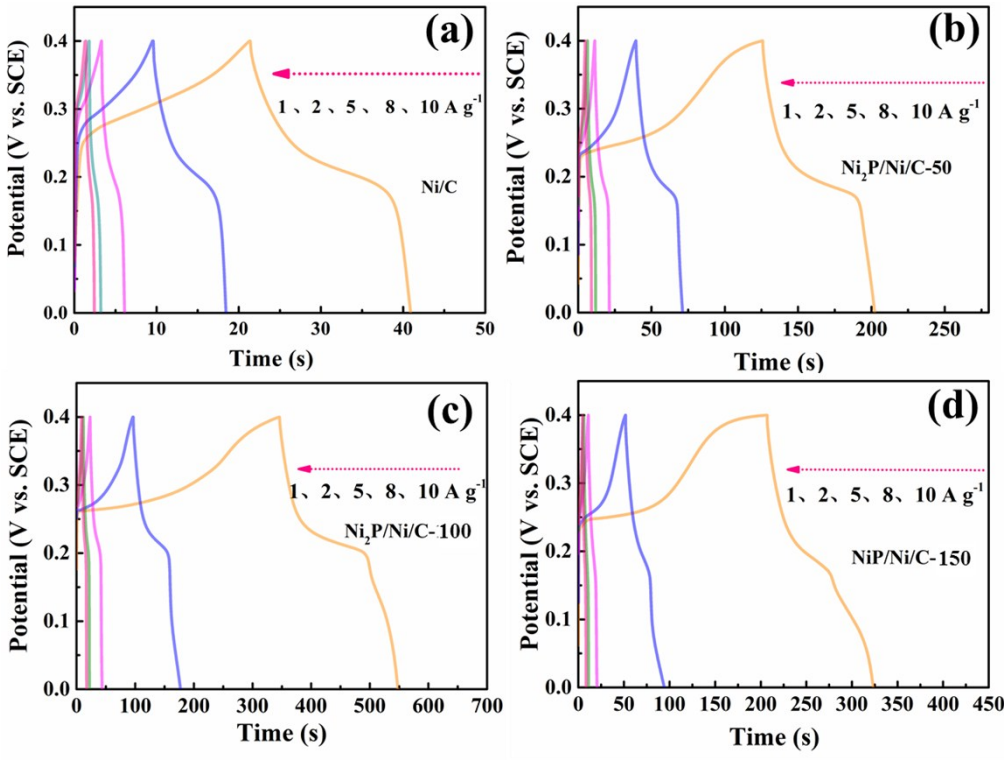

Fig. S8 The GCD curves of four samples at different current densities: (a) Ni/C, (b) Ni_2P/Ni/C-50, (b) Ni_2P/Ni/C-100, (b) Ni_2P/Ni/C-150.

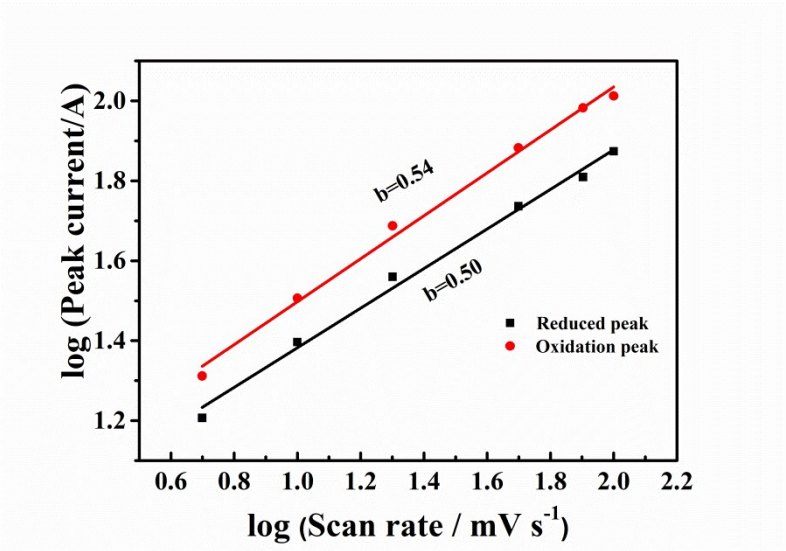

Fig. S9 b values of Ni_2P/Ni/C-100 electrode materials to analyze the diffusion/capacity behaviors

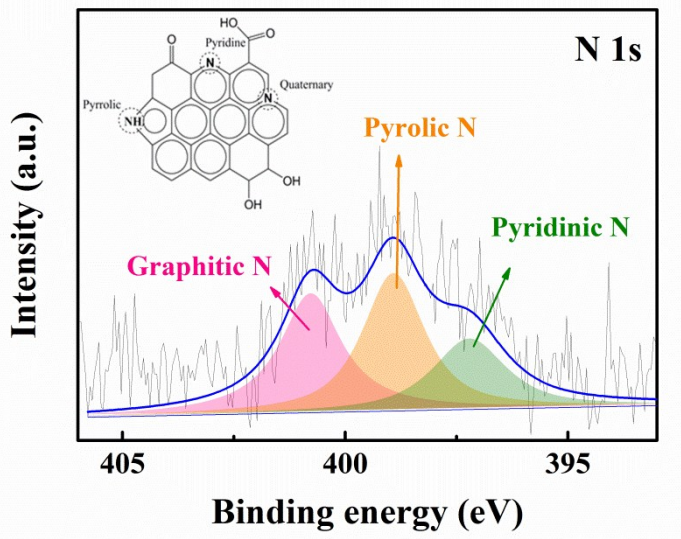

Fig. S10 The N 1s XPS spectra of Ni_2P/Ni/C-100.

Preparation of negative electrode and its electrochemical performances:

ZIF-8 materials were prepared by a simple reaction of 2-methylimidazole with $Zn(NO_3)_2$. The carbonization of ZIF-8 at 950 ^oC gives porous carbon.

The negative electrode for the asymmetric supercapacitor (ASC) was prepared by mixing ZiF-8 derived porous carbon (PC) , carbon black, polyvinylene difluoride (PVDF) (in the weight ratio of 8: 1: 1) together using NMP as solvent. The mixture was coated onto the cleaned Ni foam (1×1 cm^2) and was kept for drying at 80 °C overnight. Then the electrode was used as the working electrode. 3 M KOH solution, saturated calomel electrode (SCE) and platinum foil were used as the electrolytes, reference and counter electrodes, respectively. The PC electrode shows excellent electric double-layer capacitance property with a nearly rectangular shape (Fig. S6a). The specific capacitance of PC can be calculated from Fig. S6b and the value reach up

to 112 F g^{-1} at 1 A g^{-1} (Fig. S6c). Meanwhile, the PC has the small charge transfer resistance and equivalent series resistance, which is beneficial to the effective transmission of electrons. (Fig. S6d).

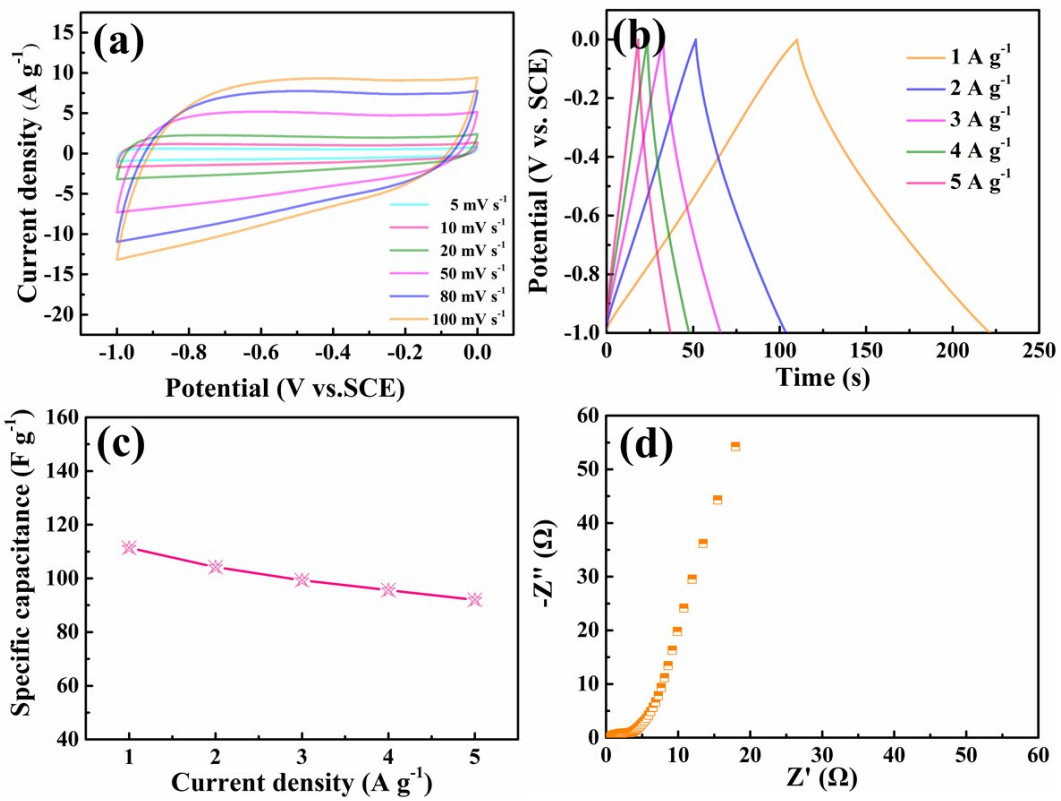

Fig. S11 The electrochemical performance of porous carbon: (a) CV curves at various scan rates, (b) GCD curves at various current densities, (c) Specific capacitance of porous carbon as a function of discharge current density, (d) Nyquist plots.