Supporting Information

Synergy of PVP and ethanol to synthesize Ni_3S_4 quantum dots for high-performance asymmetric supercapacitors

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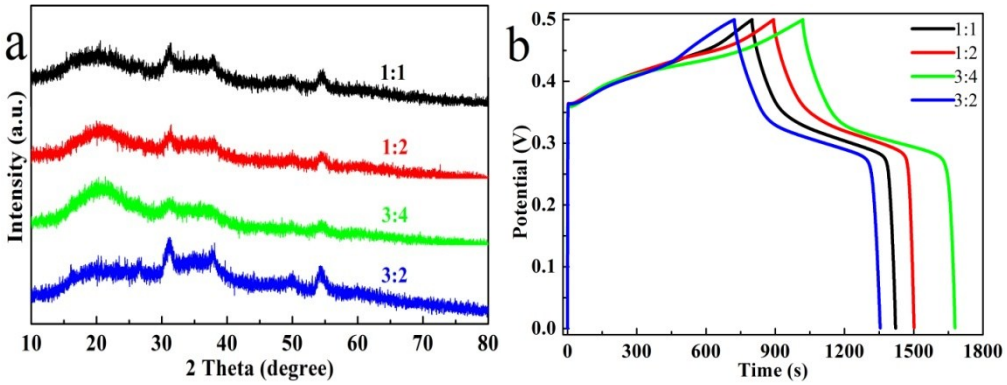


Fig. S1 The amounts of $NiCl_2 \cdot 6H_2O$ and $Na_2S_2O_3 \cdot 5H_2O$ were fixed at 7 mmol and PVP was fixed at 1g. Ni_3S_4 QDs was prepared by adding different ratios of $NiCl_2 \cdot 6H_2O$ and $Na_2S_2O_3 \cdot 5H_2O$, which were 1:1, 1:2, 3:4, 3:2 respectively. The obtained products were Ni_3S_4 by XRD analysis (Fig. a). Fig. b is the charge and discharge curves of the four materials.

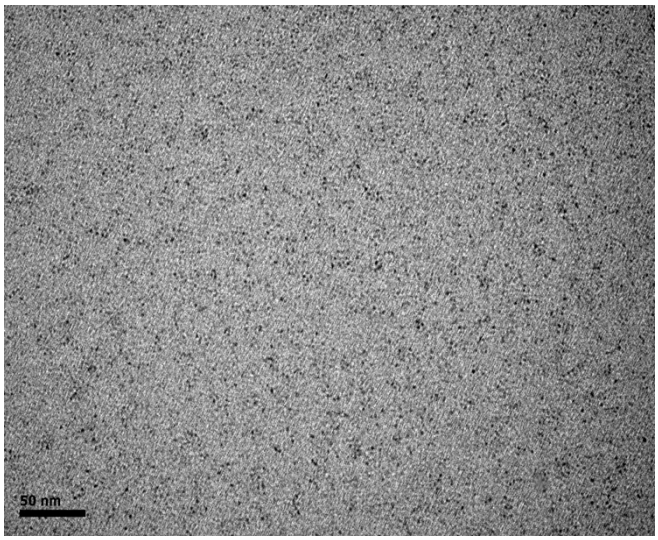


Fig. S2 TEM image of Ni_3S_4 QDs (P1).

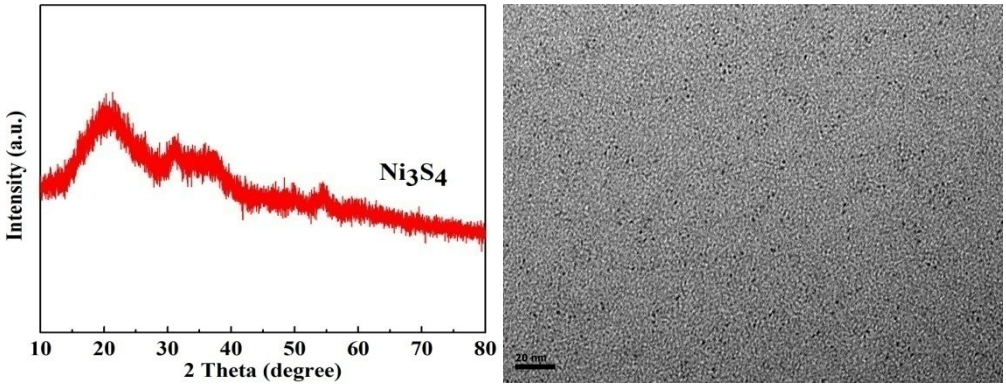


Fig. S3 In the process of preparing Ni_3S_4 QDs, 1 g of PVP was added, and the obtained product was analyzed by XRD and TEM.

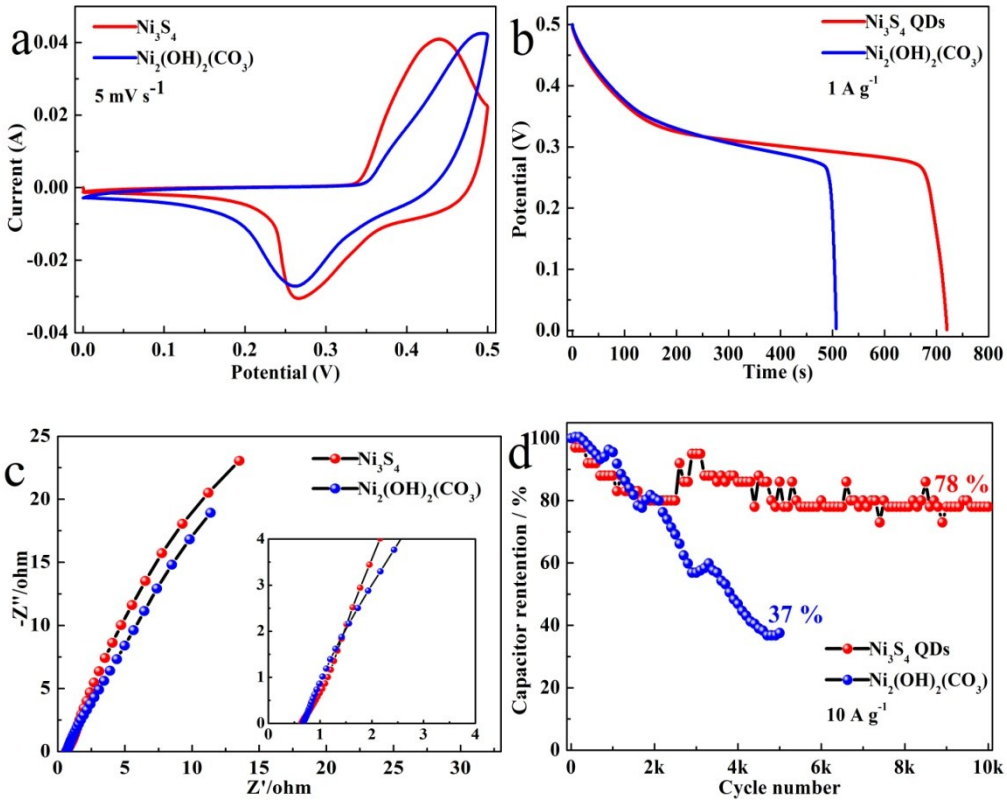
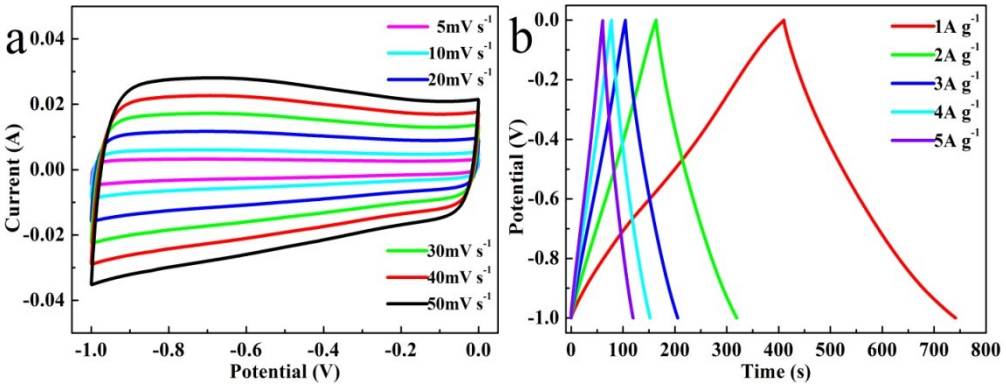


Fig. S4 Comparing the electrochemical properties of Ni_3S_4 QDs and $Ni_2(OH)_2(CO_3)$: (a) CV curve, (b) Discharge curve, (c) Nyquist plot of EIS, (d) Cyclic stability. It can be seen from the figure that Ni_3S_4 QDs has better electrochemical performance than $Ni_2(OH)_2(CO_3)$.



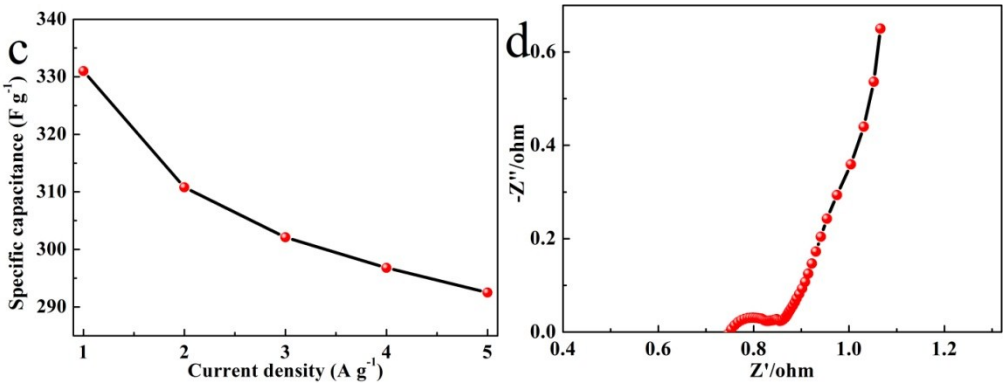


Fig. S5 Electrochemical properties of activated carbon (AC, YEC-8A). (a) CV curve, (b) GCD curve, (c) Specific capacitance at different current densities, (d) Nyquist plot of EIS. It can be seen from Fig. a that all CV curves are rectangular, and there is no redox peak, showing the characteristics of a typical electric double layer capacitor. As shown in Fig. b, all GCD curves are almost symmetrical at different current densities, confirming that AC has good reversibility. As shown in Fig c, the specific capacitance value of AC can reach 331 F g^{-1} at a current density of 1 A g^{-1}. Fig. d is the EIS spectra of AC, the low equivalent series resistance reflects the easy transmission of electrons.

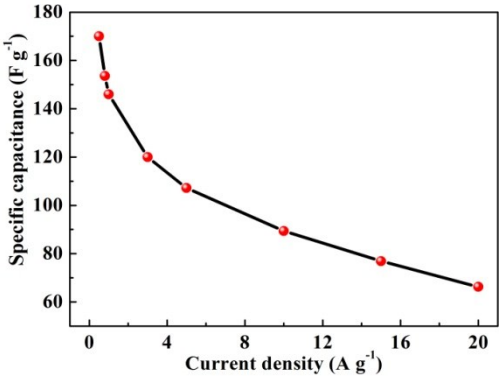


Fig. S6 Specific capacitance of Ni_3S_4 QDs//AC-ASC at different current densities.