**Supporting Information for**

# One-step phosphating synthesis of CoP nanosheet arrays combine with $Ni_2P$ as high-performance electrode for supercapacitor

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**The synthesis of RGO electrode**

The negative electrode was prepared as follows: reduced graphene oxide (RGO), acetylene black and polyvinylidene fluoride (PVDF) were dispersed by a mass ratio of 8: 1: 1 in N-methyl pyrrolidone (NMP) into the homogenous slurry. Then the slurry was coated on bare Ni foam (1 × 2 $cm^2$), dried in a vacuum and pressed under the pressure of 10 MPa.

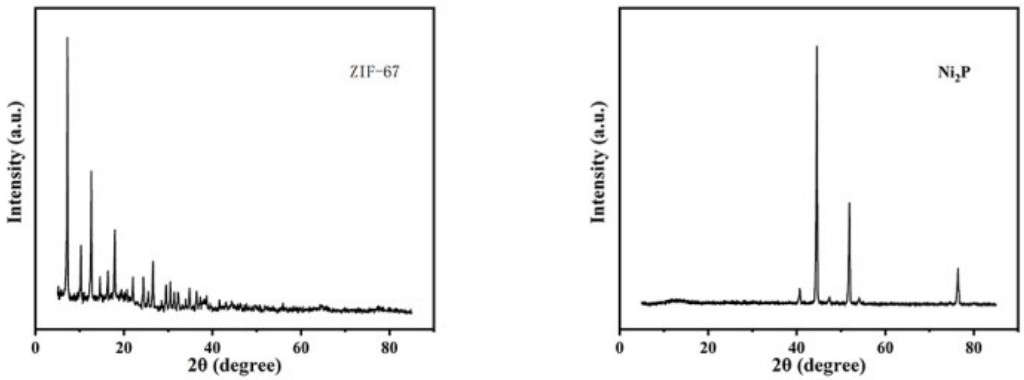


Fig. S1. XRD pattern of ZIF-67 precipitate and $Ni_2P$/NF.

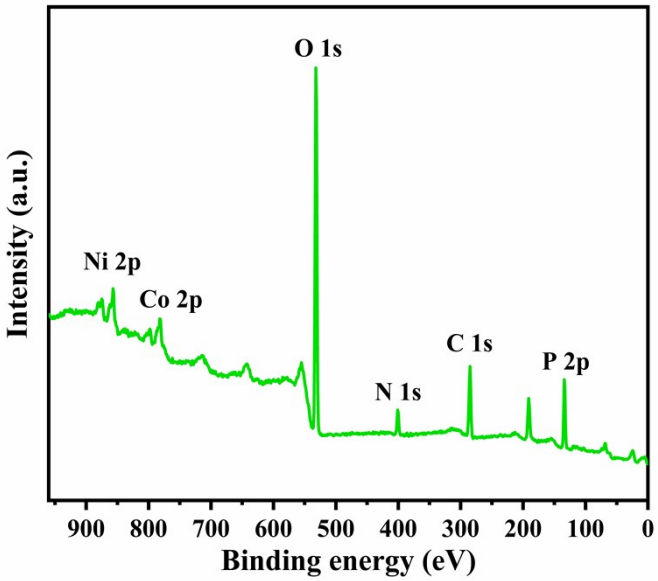


Fig. S2. wide-scan XPS spectrum of NCP/NF

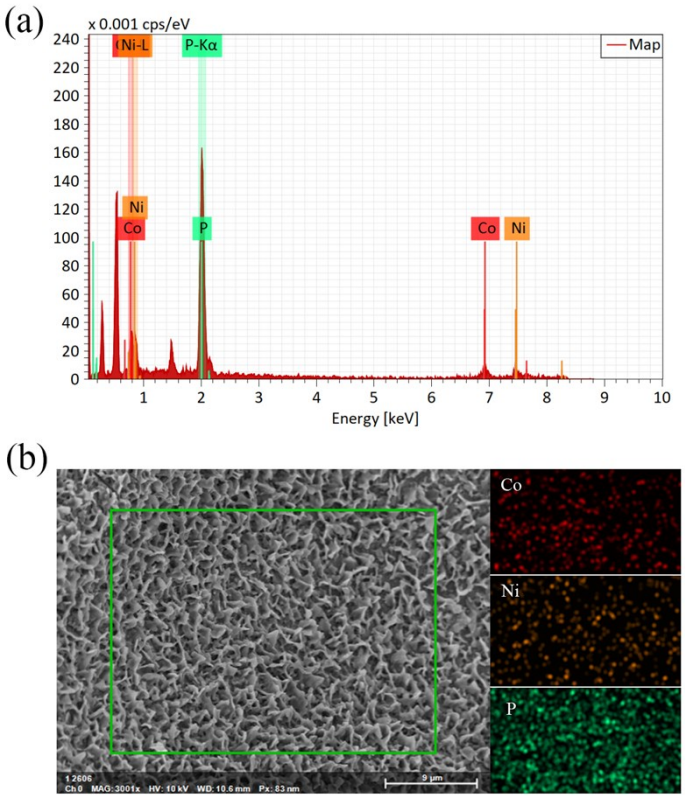


Fig. S3. EDS of NCP/NF.

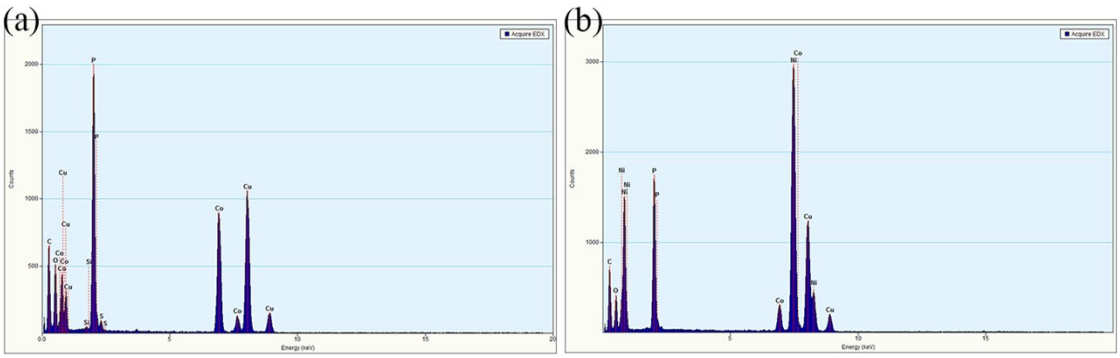


Fig. S4. EDS of (a) CoP and (b) $Ni_2P$.

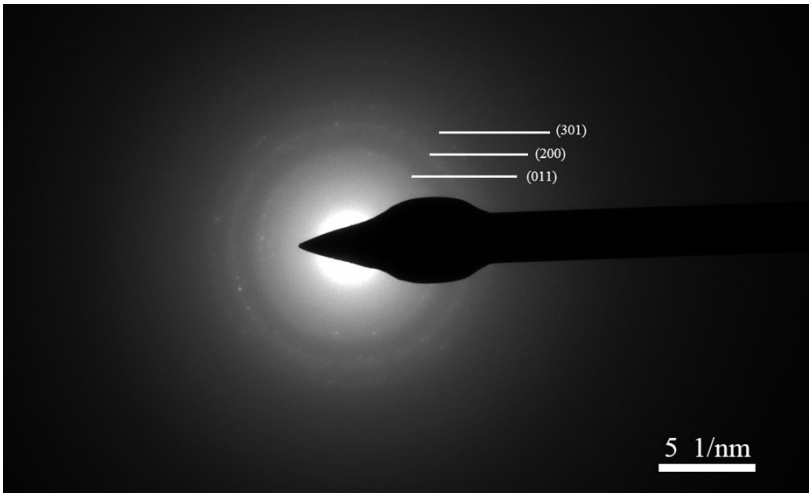


Fig. S5 The selected area electron diffraction (SAED) of CoP

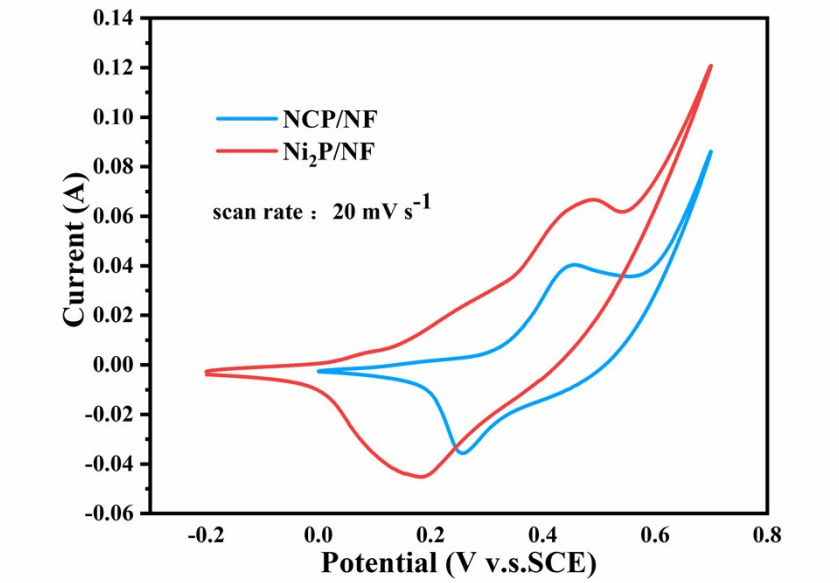


Fig. S6 CV curves of NCP/NF and $Ni_2P$/NF at 20 mV $s^{-1}$.

| Electrode | Synthetic method | Capacitance/capacity | Reference |
|---|---|---|---|
| $Ni_2P$-NF | Hydrothermal and CVD | 2031 mF $cm^{-2}$ at 1mA $cm^{-2}$ | 48 |
| CoP | mechanical alloying method | 447.5 F $g^{-1}$ at 1 A $g^{-1}$ | 51 |
| CoP Microcubes | low-temperature phosphorization | 560 F $g^{-1}$ at 1 A $g^{-1}$ | 52 |
| urchin-like Ni2P/CoP | CVD | 1038 F $g^{1}$ at 1 A $g^{-1}$ | 56 |
| Co2P nanoflowers | Chemical method | 416 F $g^{-1}$ at 1 A $g^{-1}$ | 57 |
| Hollow Co2P nanoflowers | Thermal decomposition | 412.7 F $g^{-1}$ at 1 A $g^{-1}$ | 58 |
| This work | CVD | 1.43 C $cm^{-2}$ (3575 mF $cm^{-2}$) | |

Table 1. Materials for transition metal phosphides electrodes prepared by different methods and their electrochemical performance as a super capacitor.

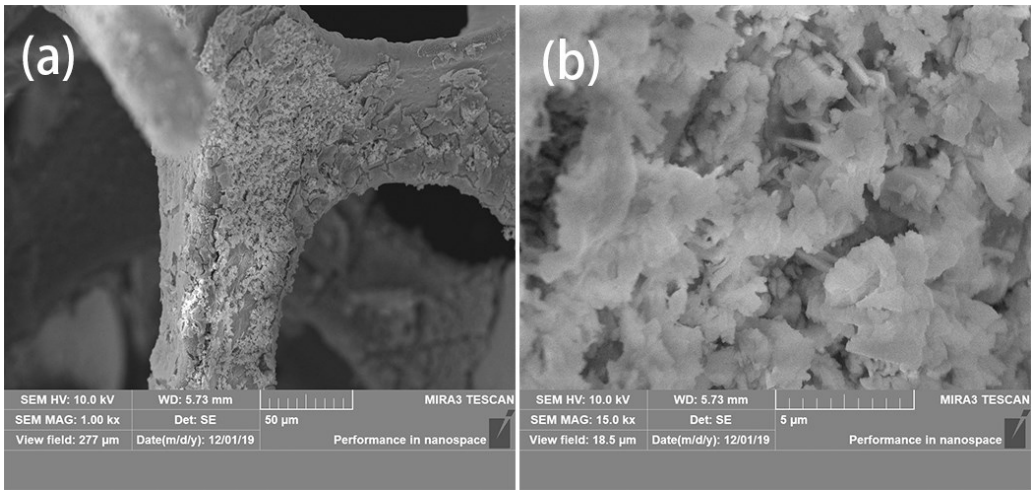


Fig. S7. SEM image of NCP/NF after 5000 cycles at different magnification.

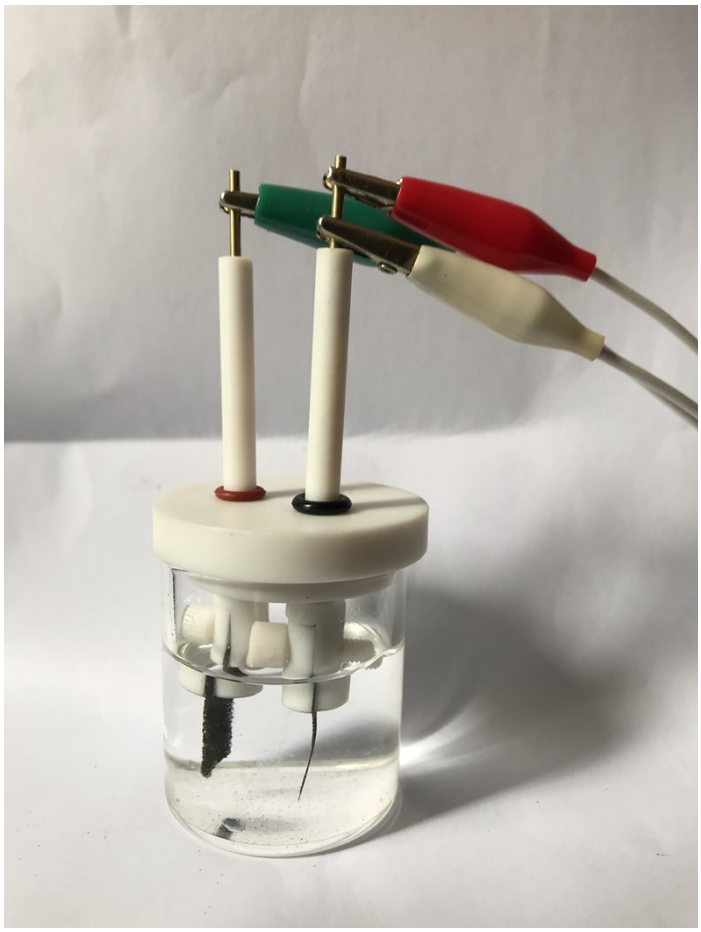

Fig. S8 The digital photograph of ASC.

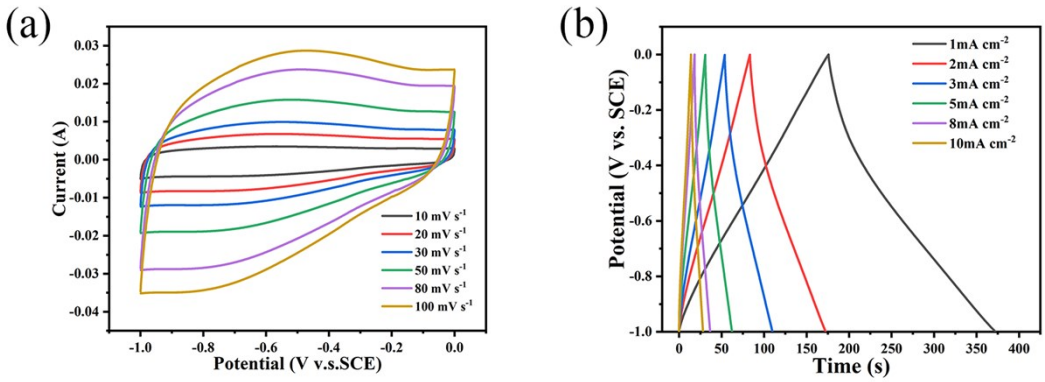


Fig. S9. (a) CV and (b) GCD curves of the RGO electrode

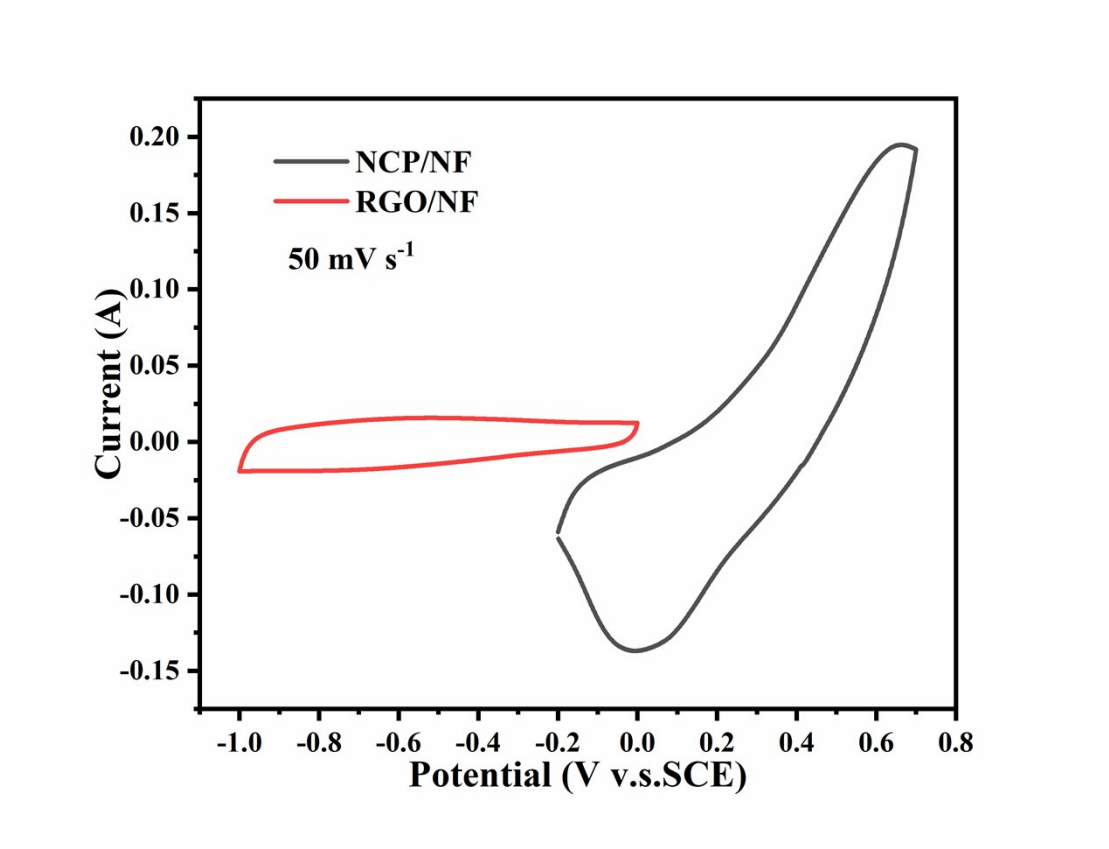


Fig. S10. CV curves of the anode and cathode

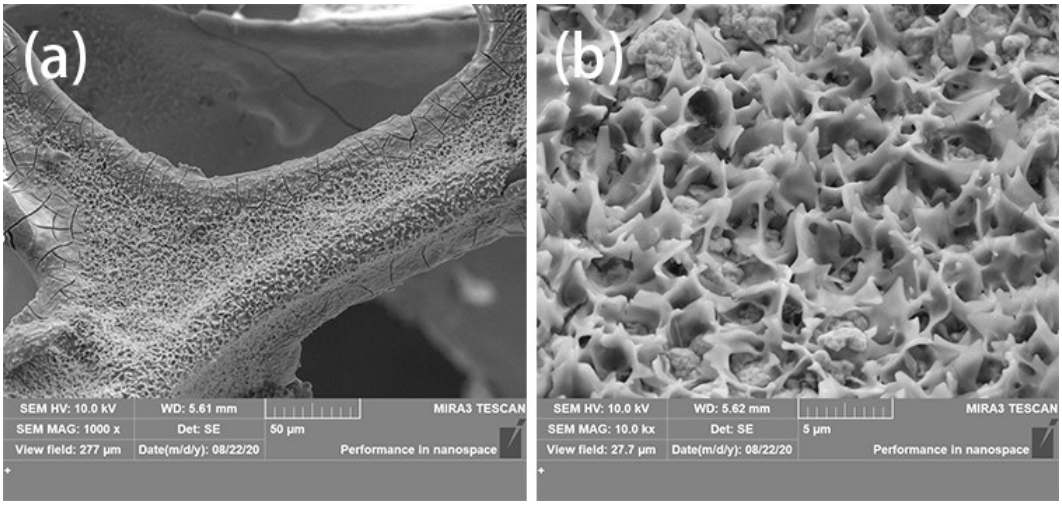


Fig. S11. SEM image of ASC after 5000 cycles.

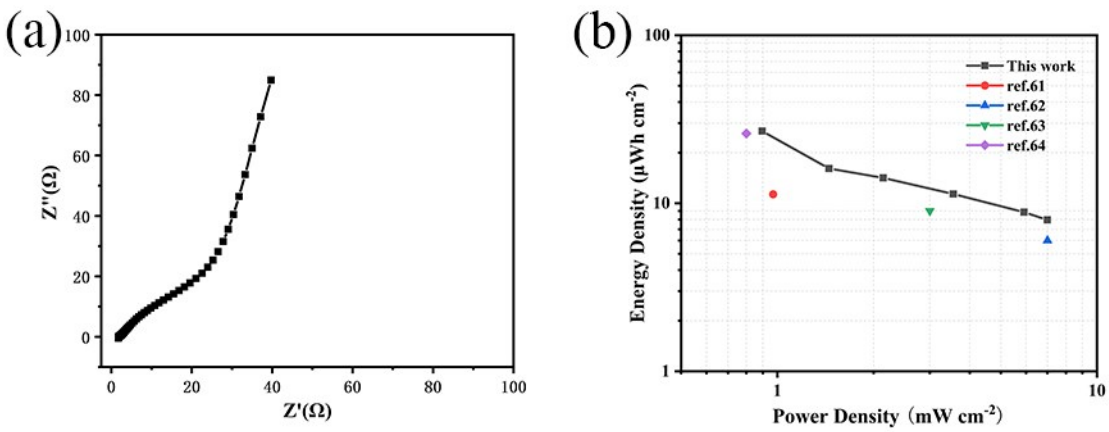


Fig. S12. The (a) Nyquist plots and (b) Ragone plot of ACS.