

Fig. S1 Elemental mapping images of N, P and S.

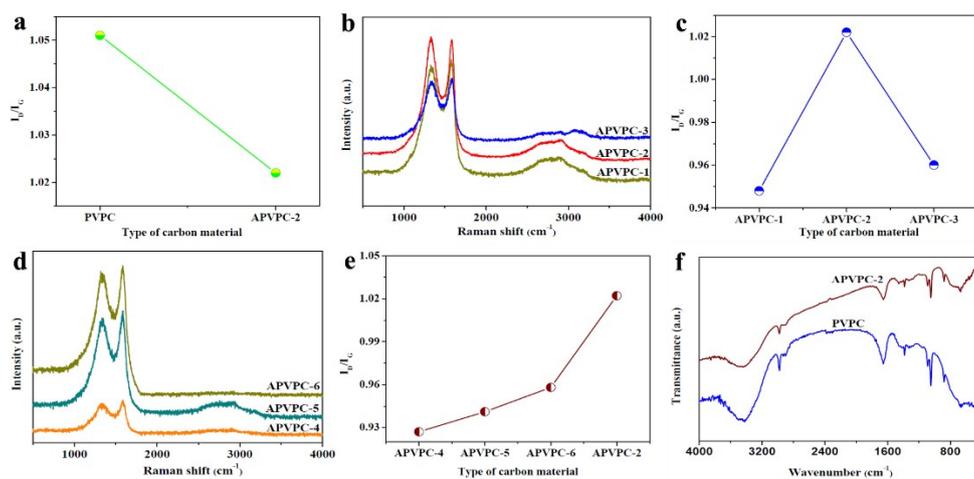


Fig. S2 (a) Ratio of integrated intensities of I_D/I_G for PVPC and APVPC-2. (b) Raman spectrum of APVPC-1, APVPC-2 and APVPC-3. (c) Ratio of integrated intensities of I_D/I_G for APVPC-1, APVPC-2 and APVPC-3. (d) Raman spectrum of APVPC-4, APVPC-5 and APVPC-6. (e) Ratio of integrated intensities of I_D/I_G for APVPC-4, APVPC-5, APVPC-6 and APVPC-2. (f) FT-IR spectra of PVPC and APVPC-2.

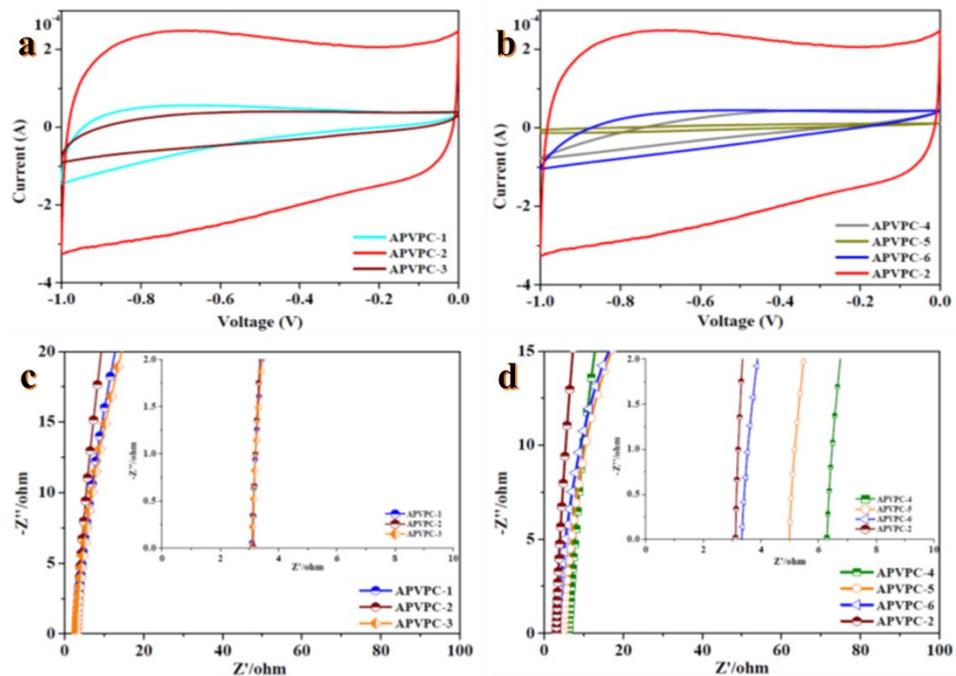


Fig. S3 (a) CV curves of APVPC samples prepared under different reaction times at 100 mV s^{-1} . (b) CV curves of APVPC samples prepared under different concentration of H_3PO_4 at 100 mV s^{-1} . (c) Nyquist plots of APVPC samples prepared under different reaction times. (d) Nyquist plots of APVPC samples prepared under different concentration of H_3PO_4 .

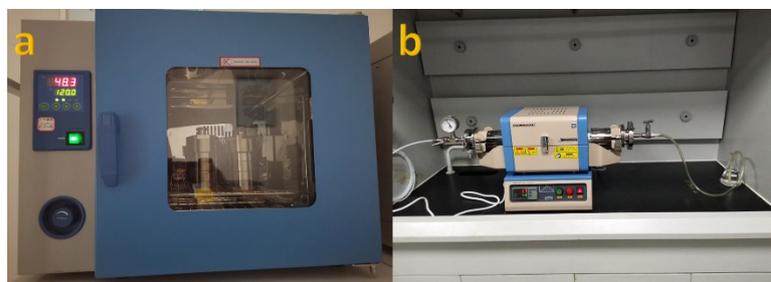


Fig. S4 (a) Electric blast drying oven (DGG-9053A). (b) Tube furnace (OTF-1200X).