Supplementary material

Oxygen-Vacancy V_2O_5 Ultrathin Nanosheets Adorned with PEDOT Film as Anode for High-Energy-Density Asymmetric Supercapacitors

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For the three-electrode system, the specific capacitance (C_{S1}) of the sample was calculated from GCD curves according to the following formula:

$$Cs_1 = \frac{I * \Delta t}{m * \Delta V}$$

where "Cs_1" is the specific capacitance (F g^{-1}), "I" is the charge/discharge current (A), and "Δt" is the discharge time (s), "ΔV" is the voltage window (V), and "m" is the mass loading (g) of the active material.

For the two-electrode system, the specific capacitance (C_{S2}) was calculated by the

following formula:

$$Cs_2 = \frac{I * \Delta t}{m * \Delta V}$$

The I, ΔV, Δt, and m are the discharge current, the voltage window, the discharge time (s), and the mass loading of the active material of the work electrodes, respectively.

The energy density (E) and power density (P) can be calculated by the following two equations:

$$E = \frac{1}{2} * \frac{1}{3.6} * Cs_2 * \Delta v^2$$

$$P = \frac{3600 * E}{\Delta t}$$

The C_{S2}, Δt, and ΔV are specific capacitances, discharge time, and voltage window.

To obtain the maximum cell energy of the prototype supercapacitors, the cathode (represented by "ca") and anode (represented by "an") mass ratio was optimized according to the following formula:

$$\frac{m_{ca}}{m_{an}} = \frac{C_{an} * \Delta U}{C_{ca} * \Delta U}$$

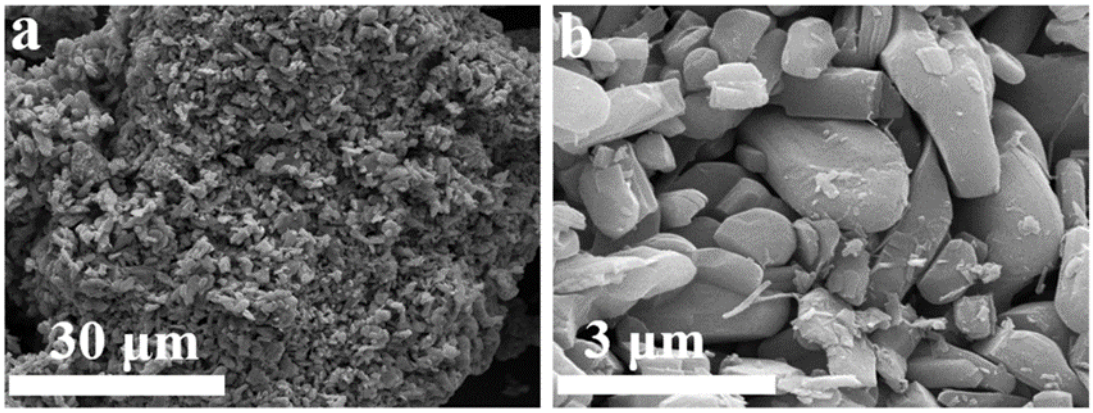

Fig. S1. SEM of bulk V_2O_5.

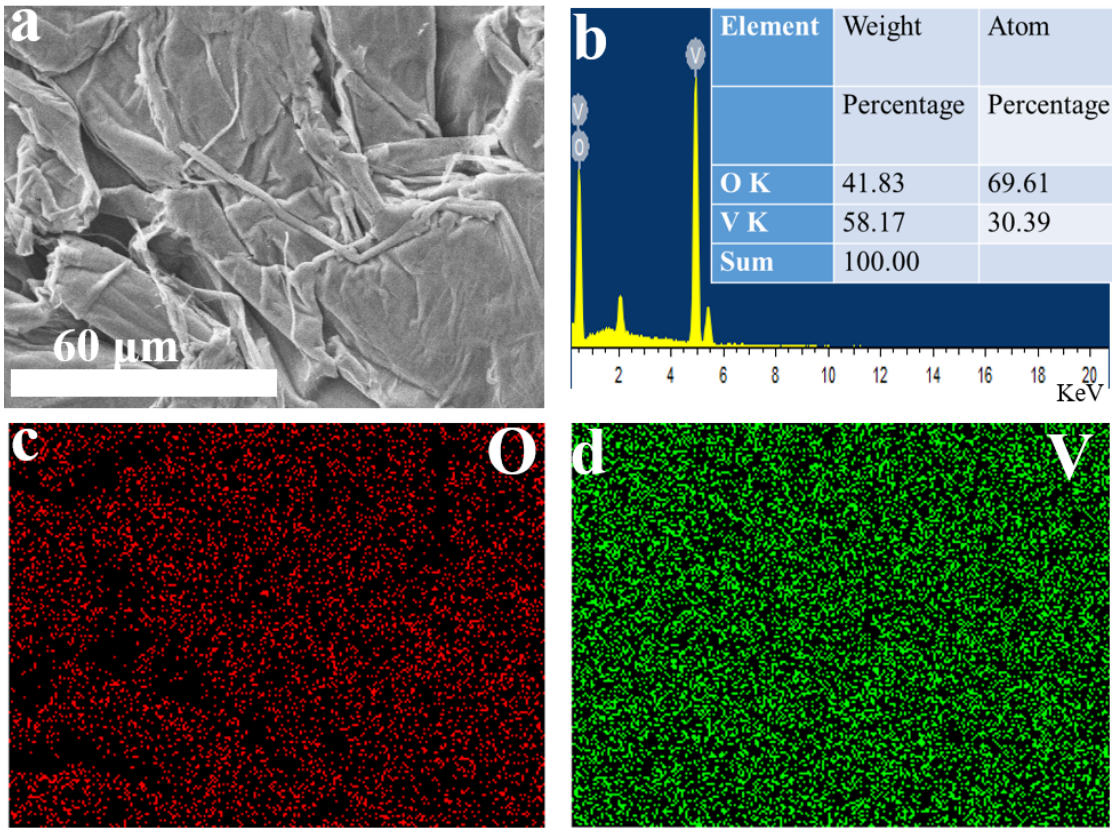

Fig. S2. SEM (a), EDS (b) and elements mapping of V_2O_5.

Fig. S3. The digital camera diagram of V_2O_5 before and after electrochemical measure in different electrolytes.

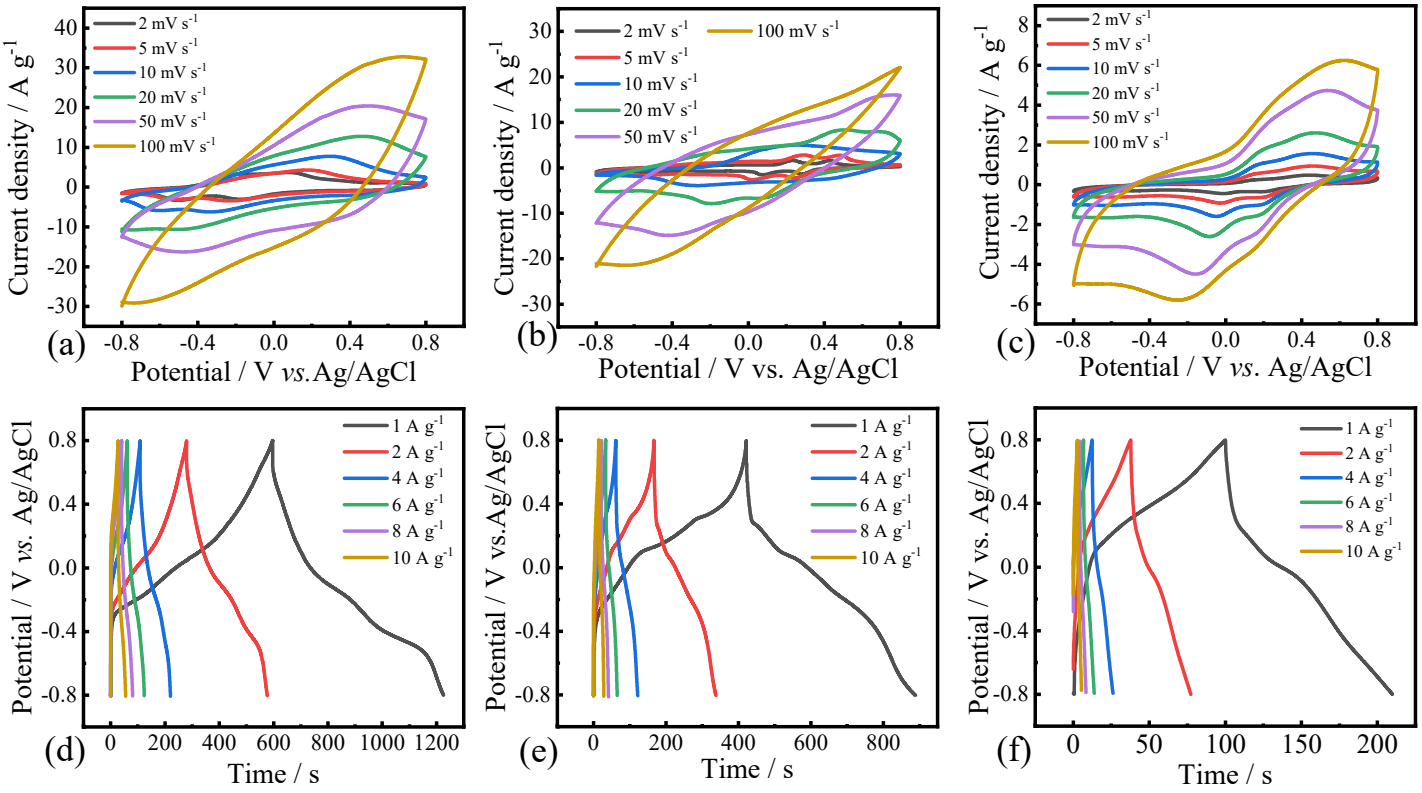

Fig. S4. CV curves (a-c) at different scan rates and GCD curves (d-f) at different current density of PEDOT/V_2O_5 aerogel, V_2O_5 aerogel, bulk V_2O_5, respectively.

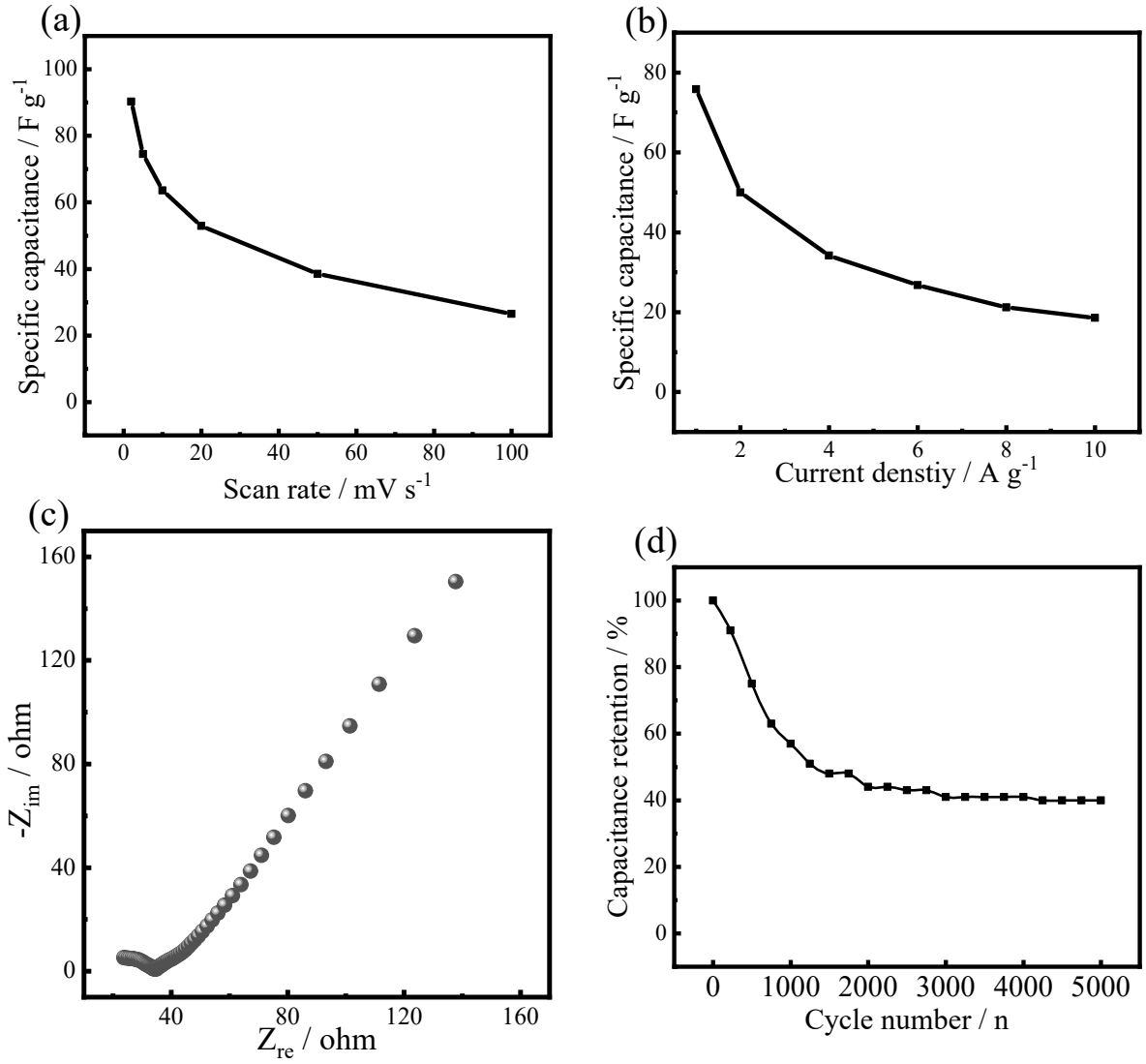

Fig. S5. The electrochemical measurements of bulk V_2O_5 in 1 M $LiClO_4$/EC+DMC: specific capacitance at different scan rate (a) and current density (b), EIS plots (c) and cycling ability at 20 A g^{-1} (d).

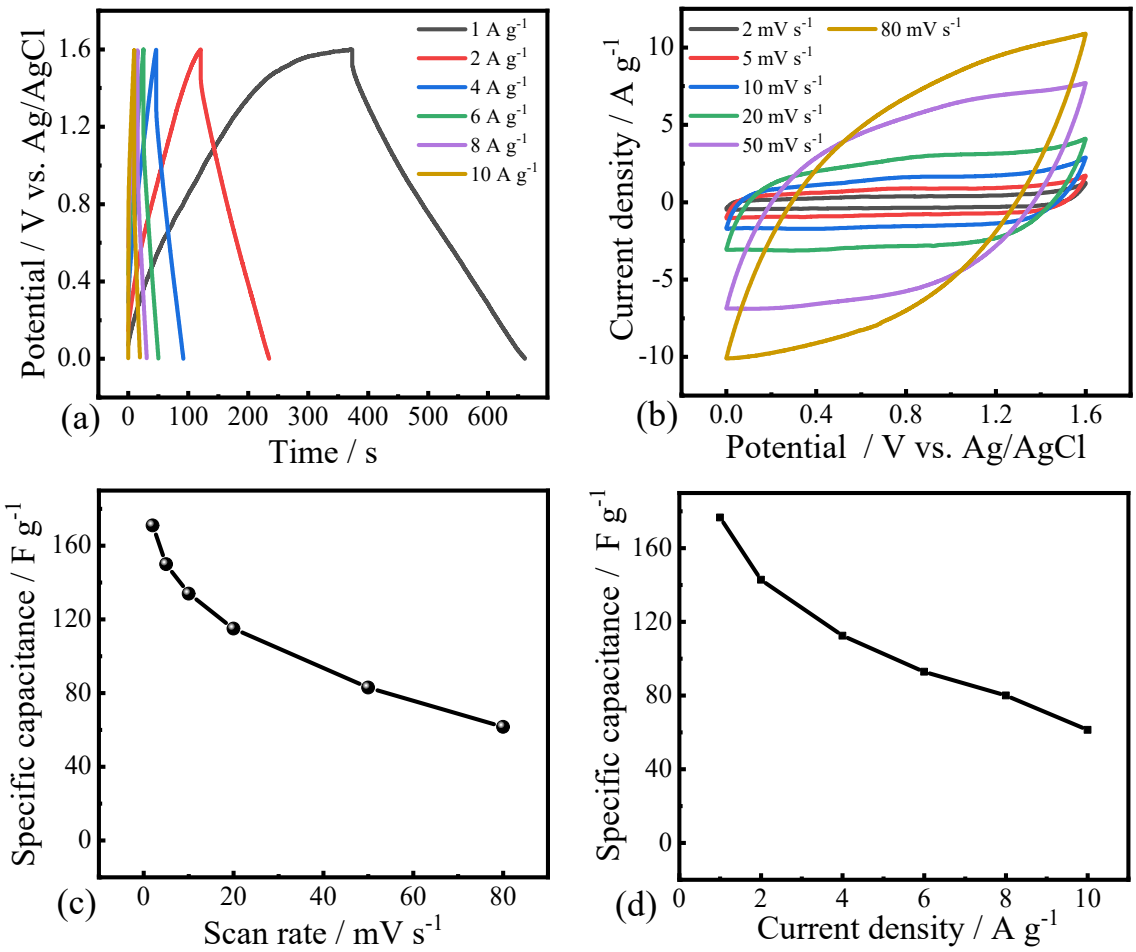

Fig. S6. The electrochemical measurements of active carbon in 1 M $LiClO_4$/EC+DMC: (a) the curves of CV at different scan rate, (c) the curves of GCD at various current densities, specific capacitance at different scan rate (c) and current density (d).