Supporting Information for

WO_3 nanoflowers with excellent pseudo-capacitive performance and the capacitance contribution analysis

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Calculation methods

Single electrode

For a single electrode, its areal and gravimetric capacitance C_s and C_g can be calculated from the CV curves through the following equation:

$$C_s = \frac{\int IdU}{2vU_p} = \frac{S}{2vU_p}$$

$$C_g = \frac{\int IdU}{2vMU_p} = \frac{S}{2vMU_p}$$

where v is the scan rate, S is the area of the closed CV curve, U_p is the potential window and M is the mass loading of the active material. The area of the covered active material was controlled to be 1 cm^2.

The area capacitance C_s of a single electrode based GCD curves can be calculated from the following equation:

$$C_s = \frac{I \Delta t}{\Delta U}$$

where I is the discharge current, Δt is the discharge time, ΔU is the potential window.

Device

The area capacitance C_d of the device was calculated from the CV curves:

$$C_d = \frac{\int IdU}{2vU_w} = \frac{S}{2vU_w}$$

where v is the scan rate, S is the area of the closed CV curve and U_w is the voltage window.

The volumetric capacitance C_v of device was calculated from the CV curves by the following equation:

$$C_v = \frac{\int IdU}{2vVU_w} = \frac{S}{2vVU_w}$$

where v is the scan rate, S is the area of the closed CV curve ,V is the volume of the whole device, and U_w is the voltage window. The area of the covered active material was controlled to be 1 cm^2.

And the energy density and the average power density can be gained by employing the following equation:

$$E = \frac{C_v U_w^2}{2}$$

$$P = \frac{E}{t}$$

$$t = \frac{U_w}{v}$$

in which C_v is the volumetric capacitance calculated before.

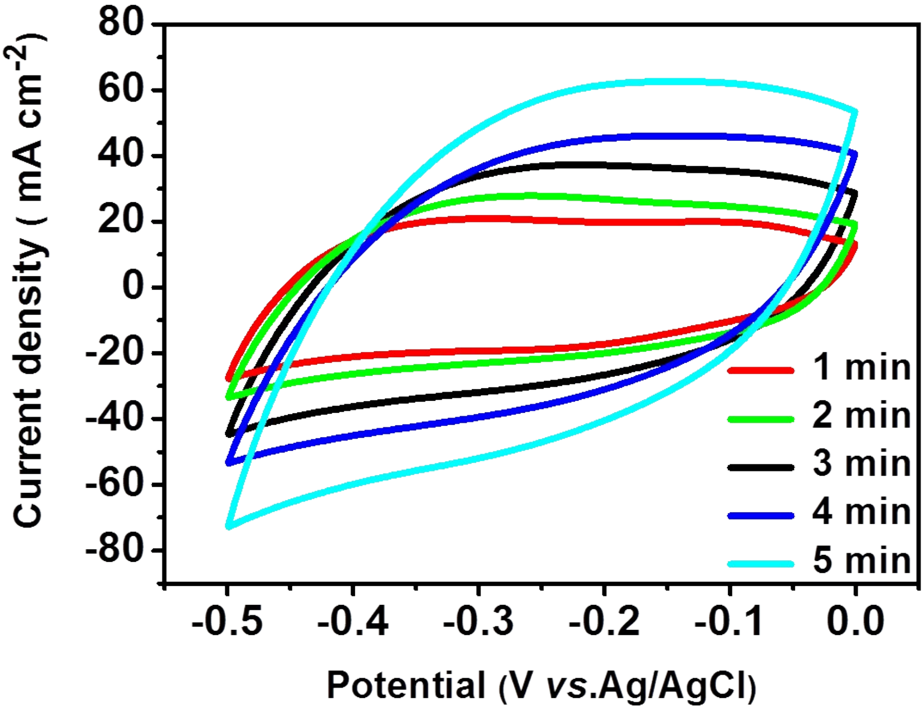

Figure S1 Positive and negative electrodes at a scan rate of 100 mV s^{-1}, representing a proper capacitance ratio for asymmetric supercapacitor.

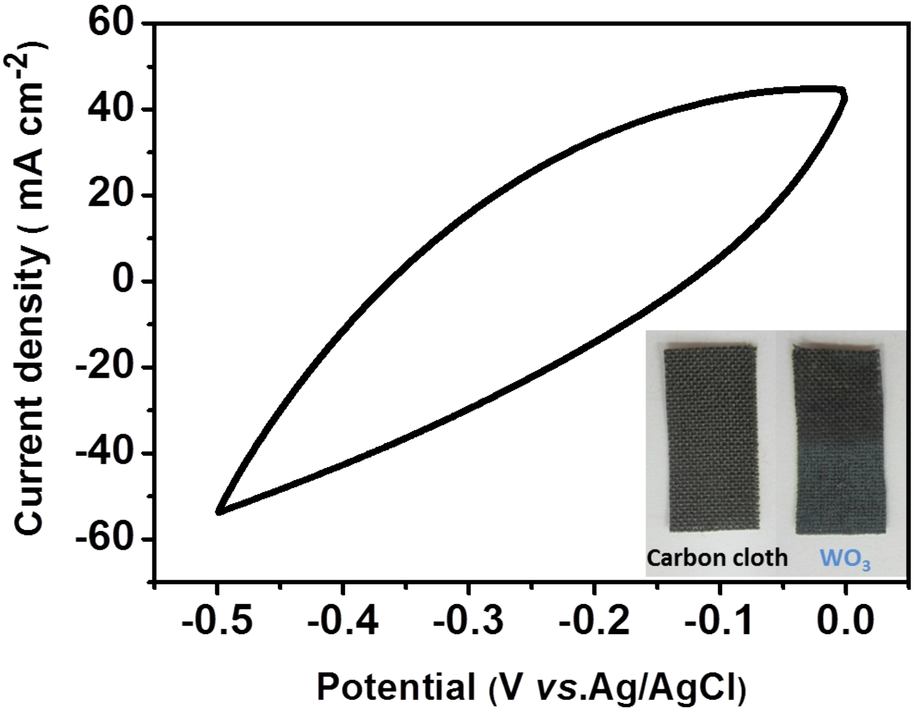

Figure S2 CV curve of WO_3 deposited on carbon cloth, inset shows pictures of pure carbon cloth and WO_3 on it.

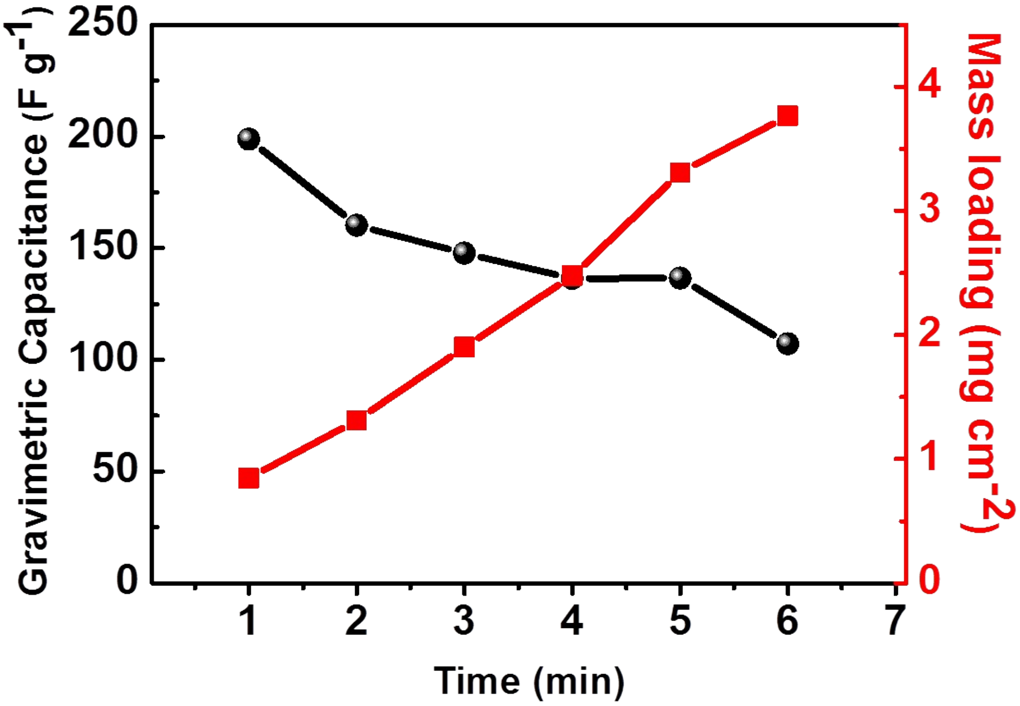

Figure S3 Mass loading and gravimetric capacitance (at a scan rate of 100 mV s^{-1}) of the NFL-WO_3 electrode at different deposition time.

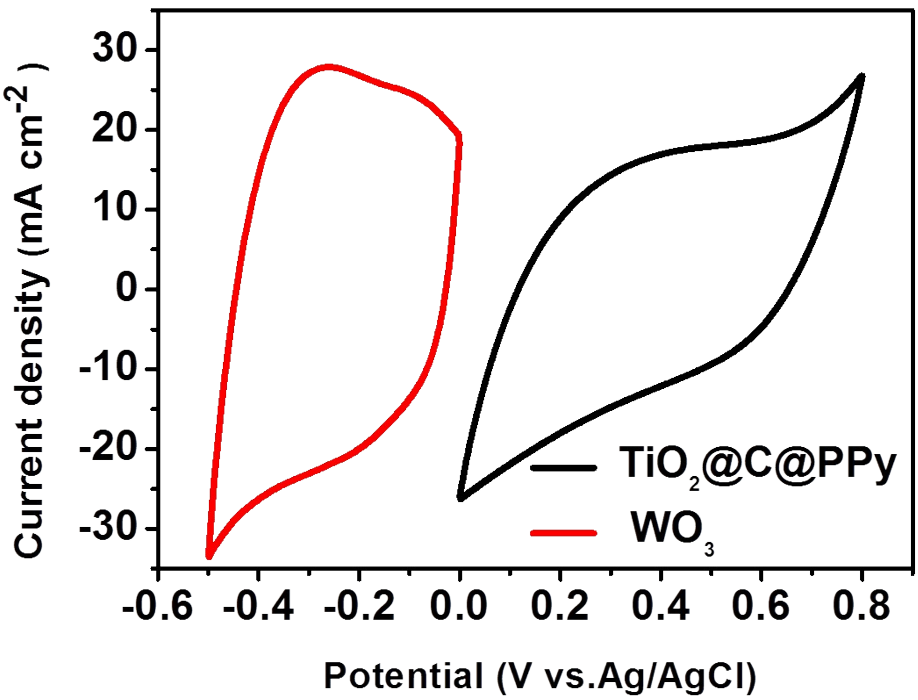

Figure S4 Positive and negative electrodes at a scan rate of 100 mV s^{-1}, representing a proper capacitance ratio for asymmetric supercapacitor.

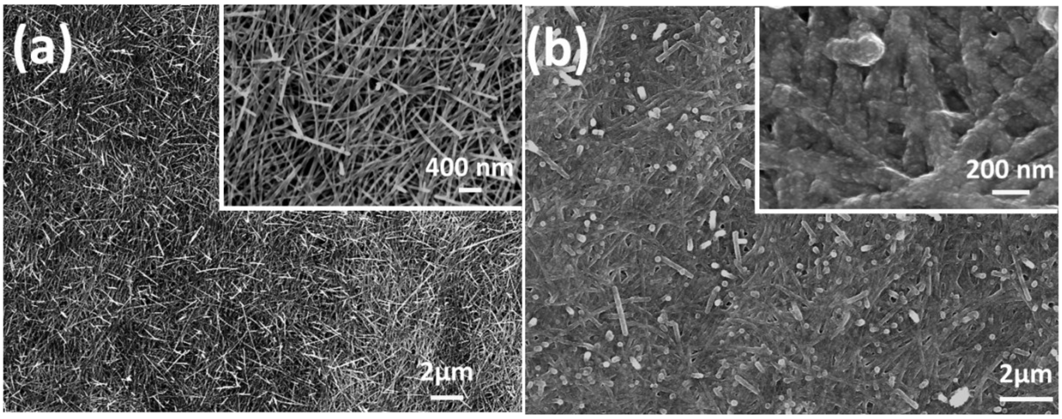

Figure S5 SEM images of the positive electrode. (a) SEM image of the TiO_2@C NWs, inset shows the magnified picture. (b) SEM image of the TiO_2@C@PPy electrode, inset shows the magnified picture.

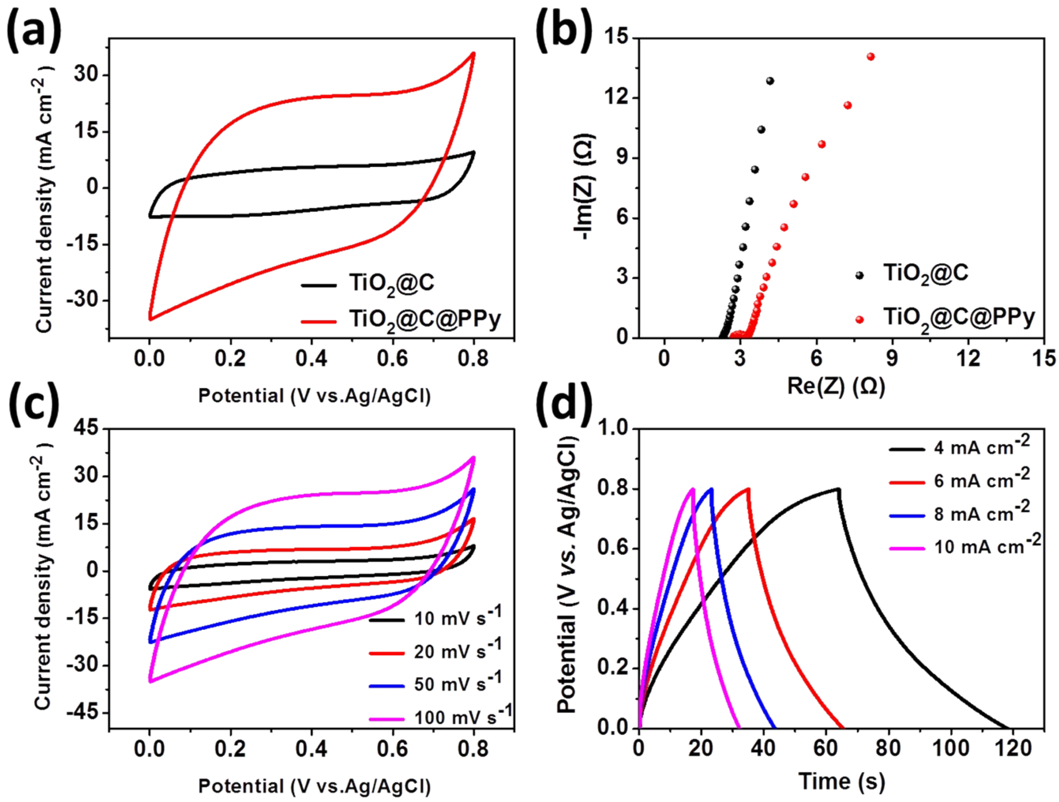

Figure S6 Electrochemical performance of the TiO_2@C@PPy electrode. (a) CV curves of the TiO_2@C and TiO_2@C@PPy electrodes. (b) Nyquist plots of the TiO_2@C and TiO_2@C@PPy. (c) CV curves of the TiO_2@C@PPy electrode at different scan rates. (d) GCD curves of the TiO_2@C@PPy electrode at different current density.

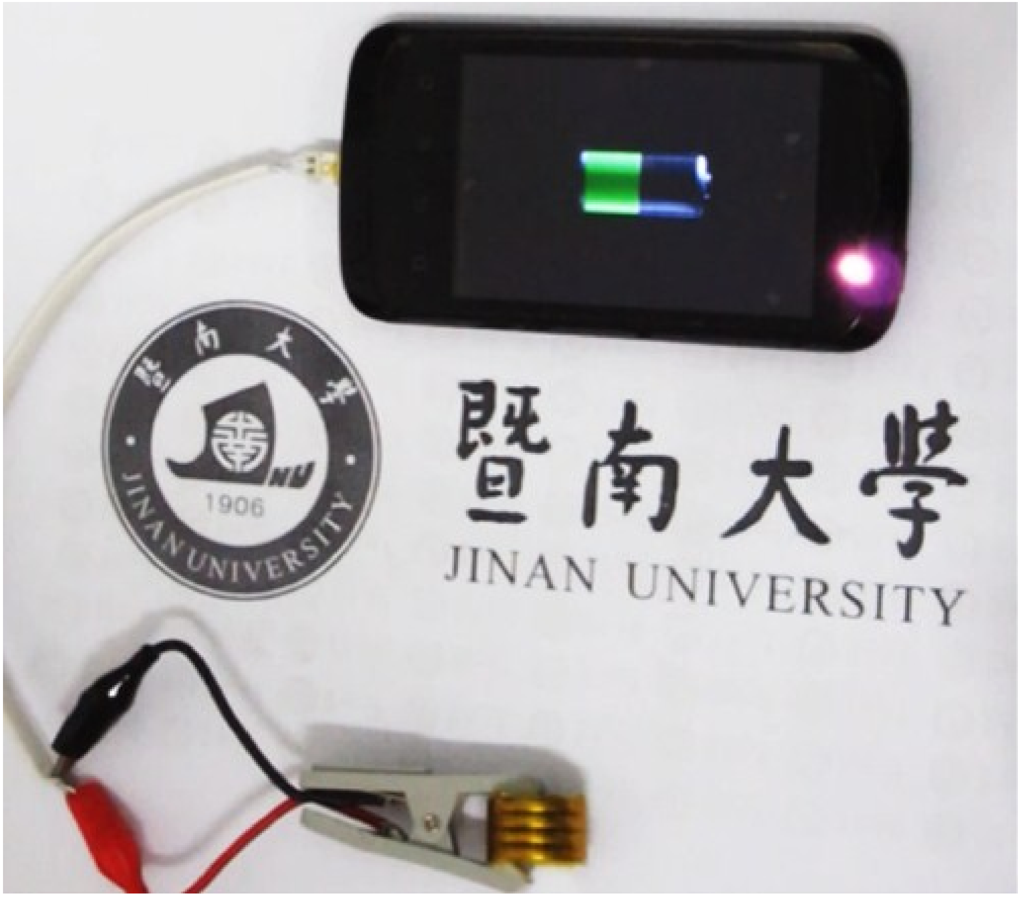

Figure S7 Illustration about the application of tandem ASC devices charging a cellphone.