Supporting Information

Nitrogen doped intercalation $TiO_2/TiN/Ti_3C_2T_x$ nanocomposite electrodes with enhanced pseudocapacitance

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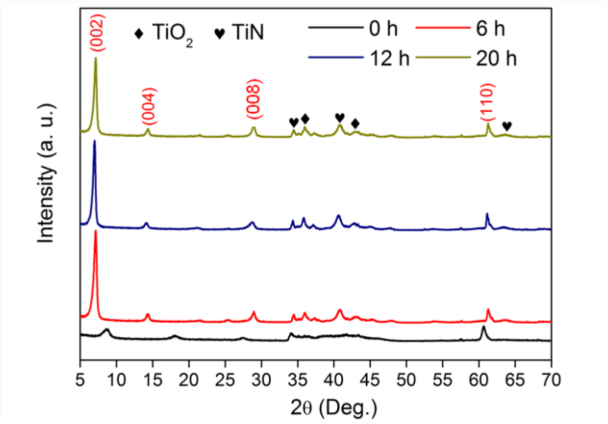

Figure S1. XRD patterns of $Ti_3C_2T_x$ and 6 h, 12 h, 20 h N-TiO_2/TiN/$Ti_3C_2T_x$.

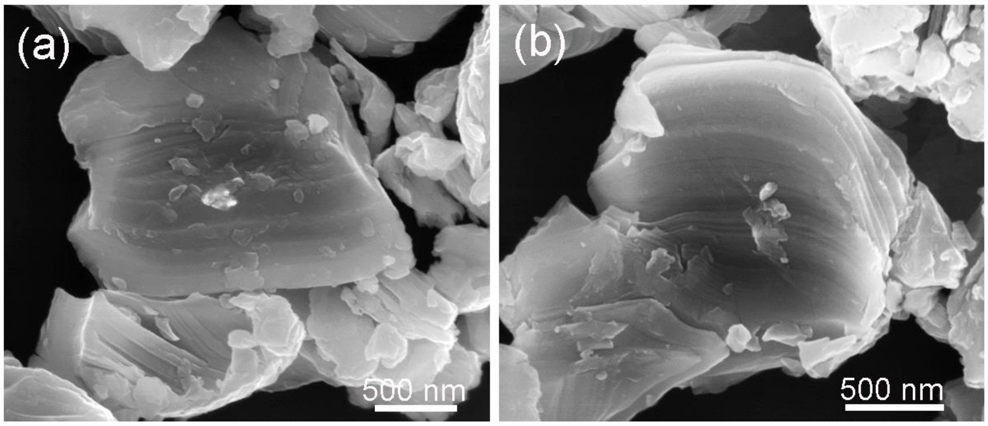

Figure S2. High-magnification SEM images of pristine Ti_3AlC_2.

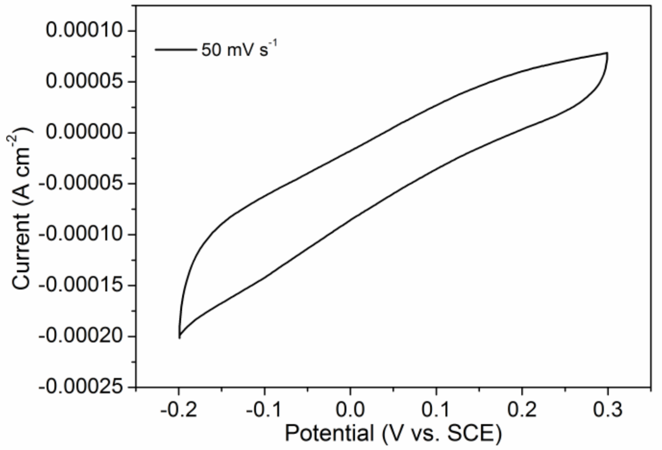

Figure S3. CV curves at scan rate of 50 mV s^{-1} of conductive carbon paper.

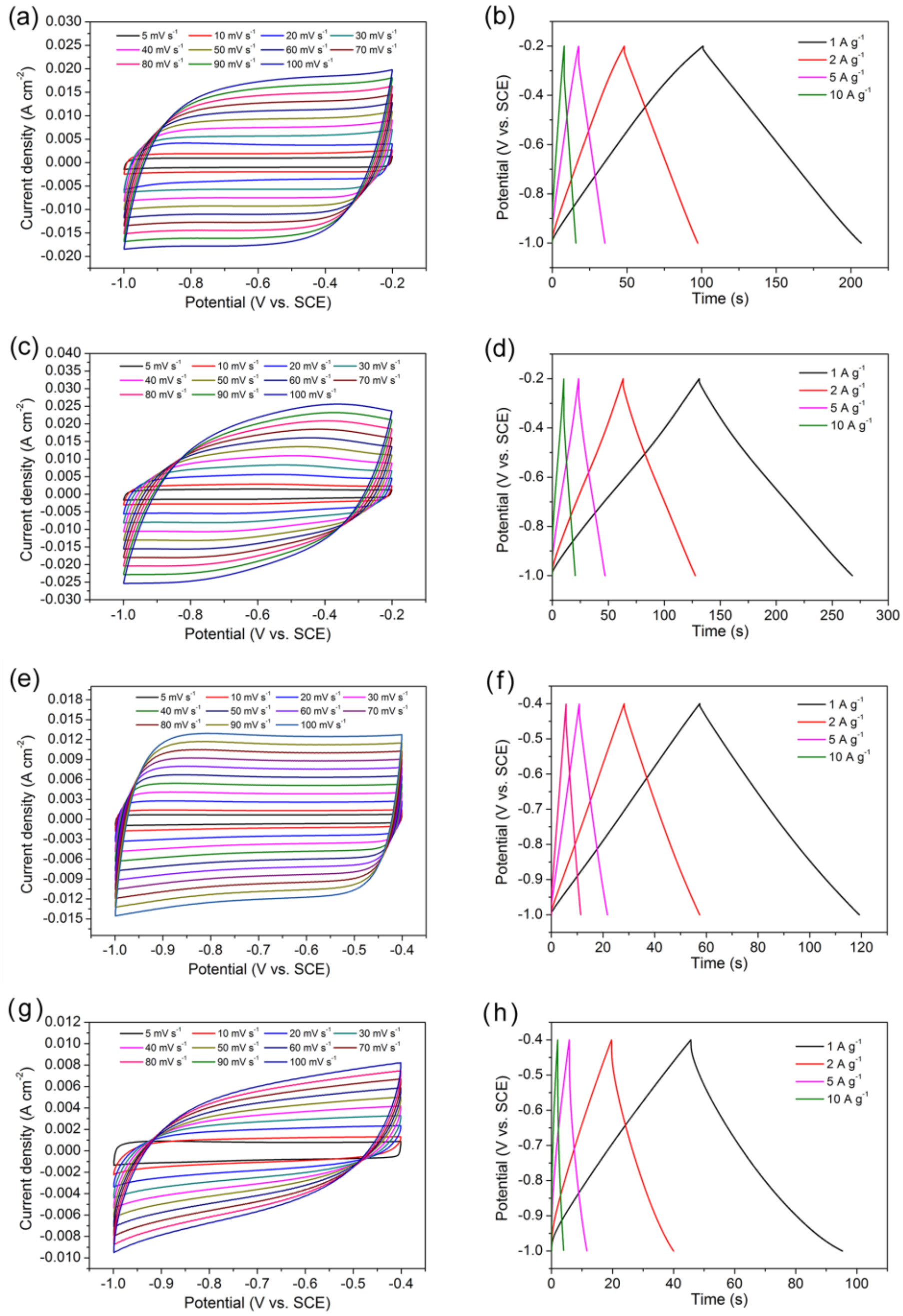

Figure S4. CV and GCD curves of $Ti_3C_2T_x$ in different electrolytes of (a-b) Na_2SO_4, (c-d) Li_2SO_4, (e-f) KOH and (g-h) LiOH.

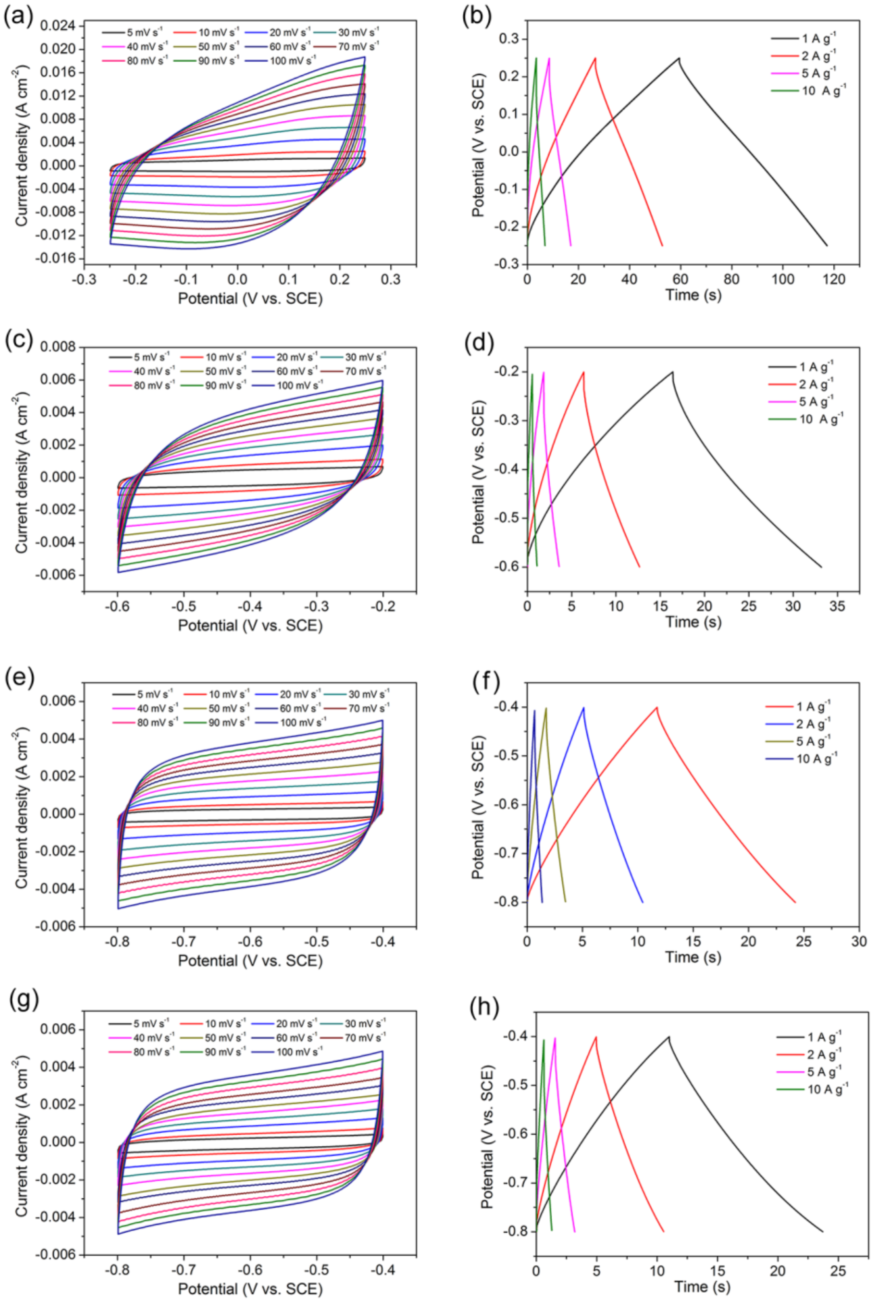

Figure S5. CV and GCD curves of 20 h N-TiO_2/TiN/$Ti_3C_2T_x$ in different electrolytes of (a-b) Na_2SO_4, (c-d) Li_2SO_4, (e-f) KOH and (g-h) LiOH.

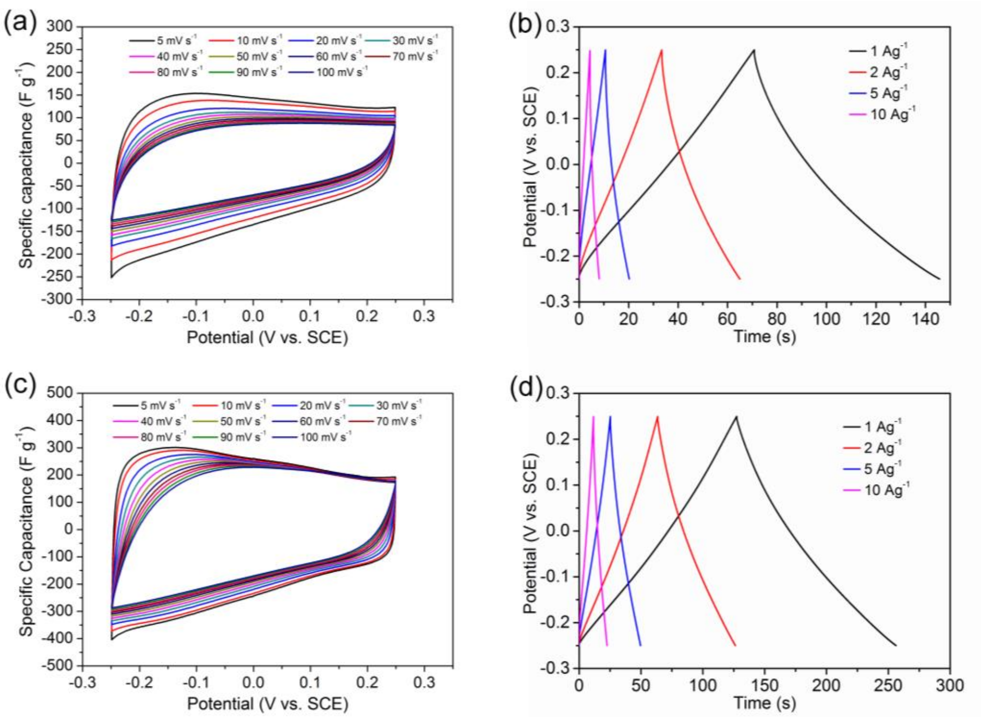

Figure S6. CV and GCD curves of (a-b) 6 h, (c-d) 12 h N-TiO_2/TiN/$Ti_3C_2T_x$ in H_2SO_4 electrolyte.

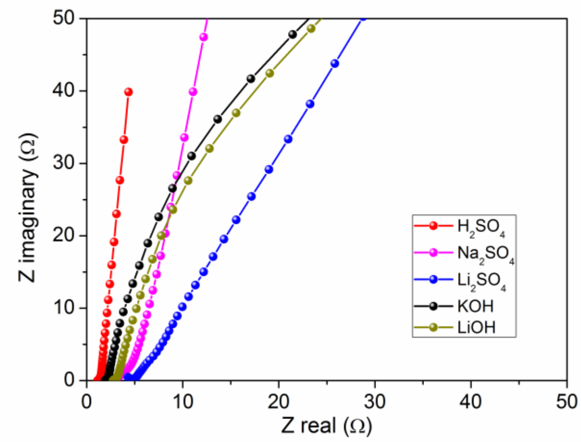

Figure S7. Nyquist plots of 20 h N-TiO_2/TiN/$Ti_3C_2T_x$ in different electrolytes. 1M H_2SO_4 have lower resistance of the bulk electrolyte solution compared with Na_2SO_4, Li_2SO_4, KOH and LiOH.

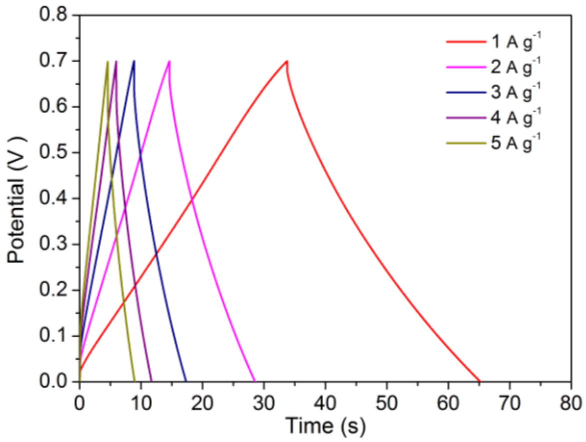

Figure S8. GCD plots at different current densities of the symmetric 20 h N-TiO_2/TiN/$Ti_3C_2T_x$//20 h N-TiO_2/TiN/$Ti_3C_2T_x$ supercapacitor in 1 M H_2SO_4.

Calculation of specific capacitance

CV tests

The specific capacitances *Cs* was calculated by integrating the discharge portions of the CV plot.

$$C_s = \int IdV / (msV) \qquad (1)$$

where Cs is the specific capacitance of the electrode (F g^{-1}), I is the response current under the integrated area of the CV curves (A), m is the mass of the electrode material (g), s is the scan rate (V s^{-1}), and V is the potential window (V).

GCD tests

Based on the charge-discharge curve, the specific capacitances C_s of the electrode can be calculated using:

$$C_s = I\Delta t / (m\Delta V) \qquad (2)$$

where I is the discharge current (A), t is the discharge time (s), m is the mass of the electro-active material (g), and V is the potential window (V).

Calculation of energy and power densities

The energy (*E*) and power densities (*P*) for the supercapacitors was calculated from CV curves at different current densities using equations (3) and (4), respectively.

$$E = \int VdQ = \int VIdt = I\int Vdt = 0.5C_s \times V^2 / 3.6(Wh / kg) \qquad (3)$$

$$P = \frac{E}{t} = E \times \frac{s \times 3.6}{V} (kW / kg) \qquad (4)$$

Where Cs is the specific capacitance (F g^{-1}), I is the current density (A g^{-1}), s is the scan rate (V s^{-1}), V is the potential window (V).