Layer-by-layer Assembly of MXene and Carbon Nanotubes on Electrospun Polymer Films for Flexible Energy Storage

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Table S1. Summary of the mass loading of the spray coated active materials (MWCNT/Ti$_3$C$_2$T$_x$) on the composite electrodes estimated by TGA.

| Sample*	Mass loading (wt%)
Ti$_3$C$_2$T$_x$/PCL	14.6
MWCNT/Ti$_3$C$_2$T$_x$/PCL	11.7
(MWCNT/Ti$_3$C$_2$T$_x$)2-PCL	21.5
(MWCNT/Ti$_3$C$_2$T$_x$)3-PCL	24

*: X in the sample labels is the number of cycles that the active materials were spray coated onto the supporting PCL scaffold.
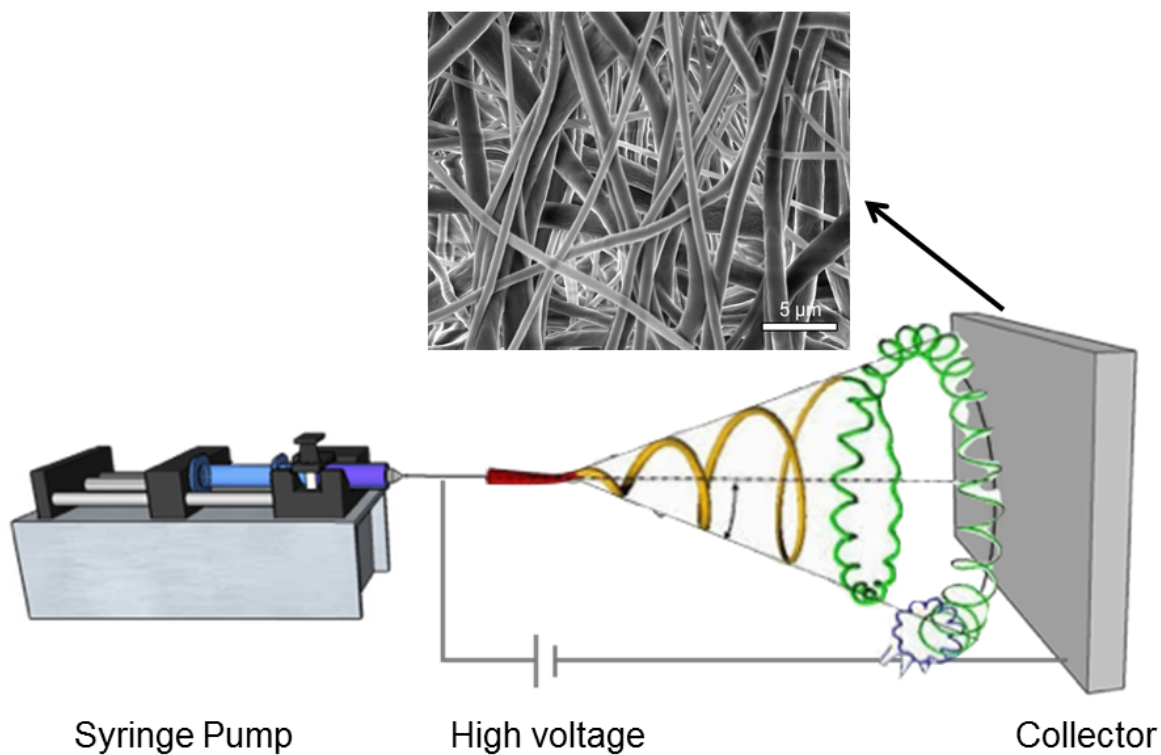
Fig. S1. Electrospinning process of polycaprolactone (PCL) film and the corresponding SEM image.
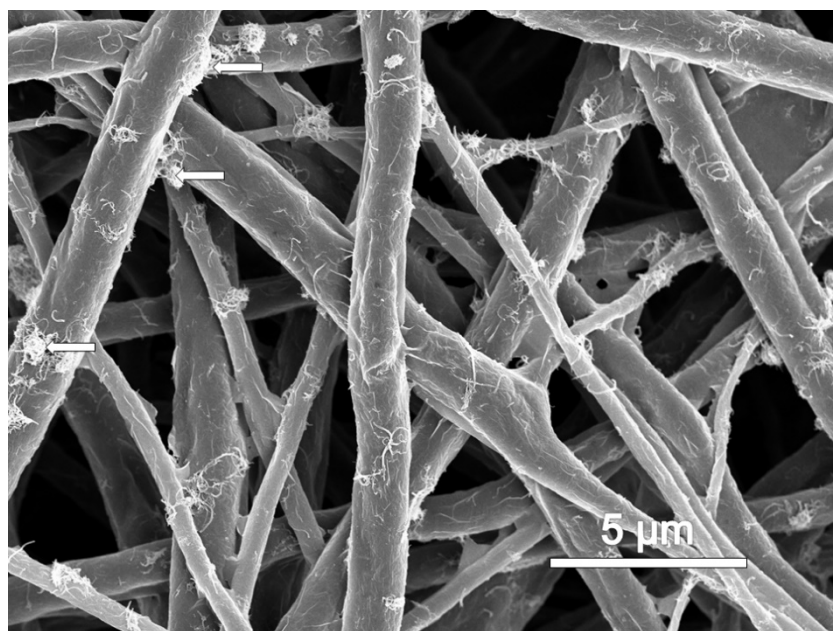

Fig. S2. SEM image of MWCNT/Ti$_3$C$_2$T$_x$/PCL composite film prepared by dip-coating. Regional agglomerations of Ti$_3$C$_2$T$_x$ flakes and MWCNTs are depicted by arrows.
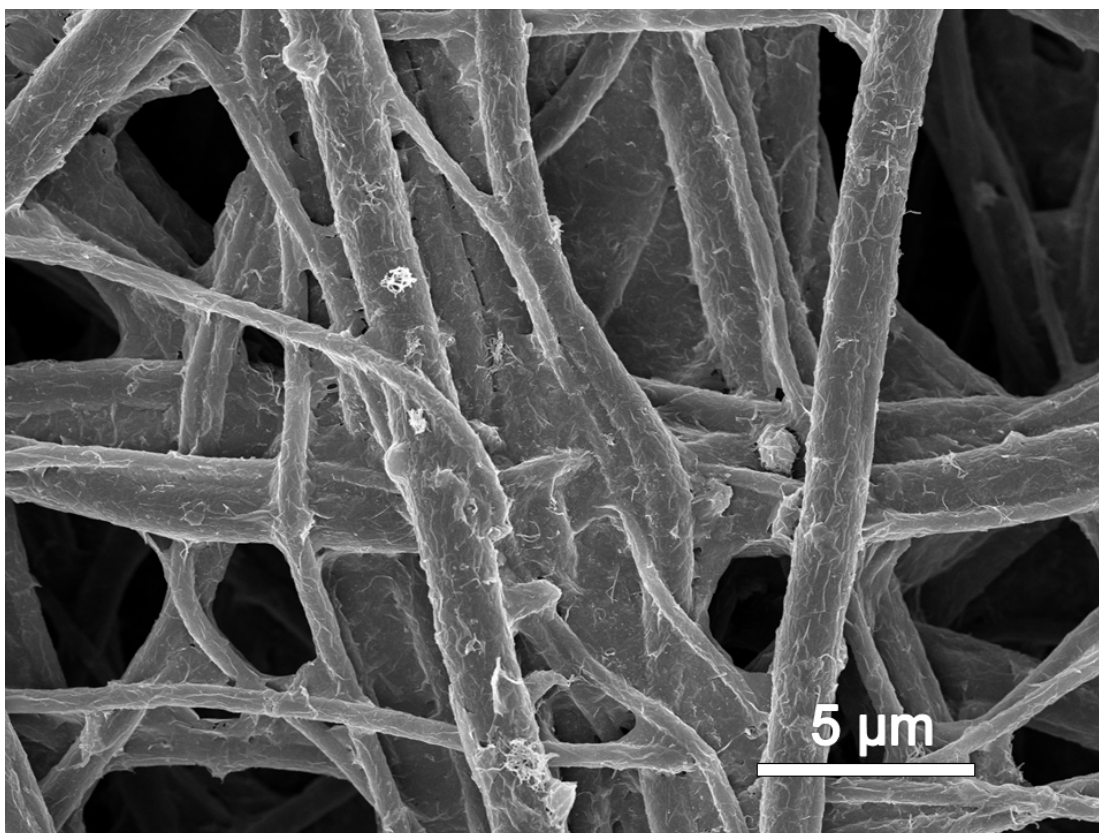
Fig. S3. SEM image of (MWCNT/Ti$_3$C$_2$T$_x$)3-PCL composite film (3 repetition of spraying Ti$_3$C$_2$T$_x$ followed by spraying MWCNTs).
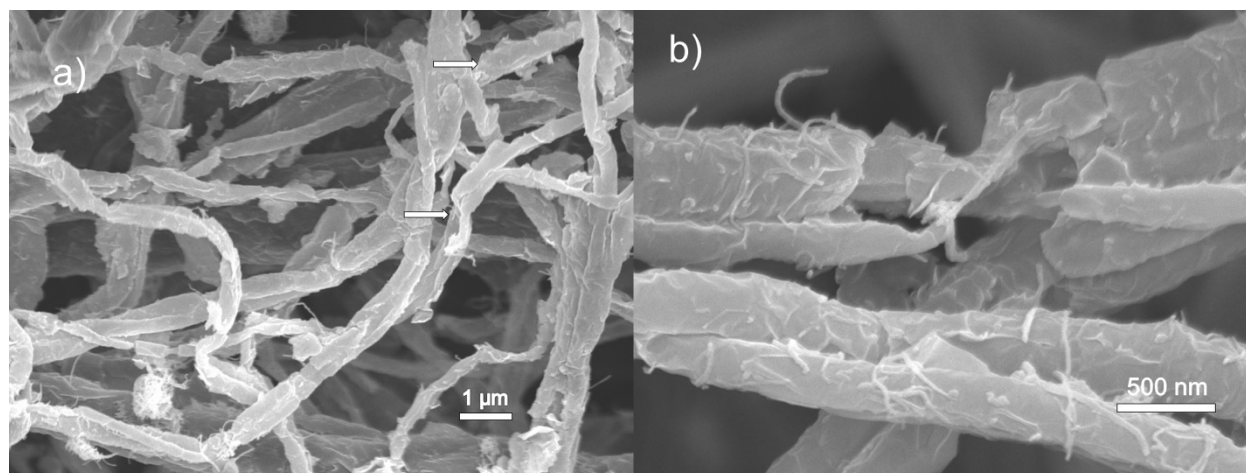
Fig. S4. SEM images of repeatedly folded (MWCNT/Ti$_3$C$_2$T$_x$)2-PCL film. (b) Magnified image of (a) at the fracture spot indicated by the white arrows in (a).
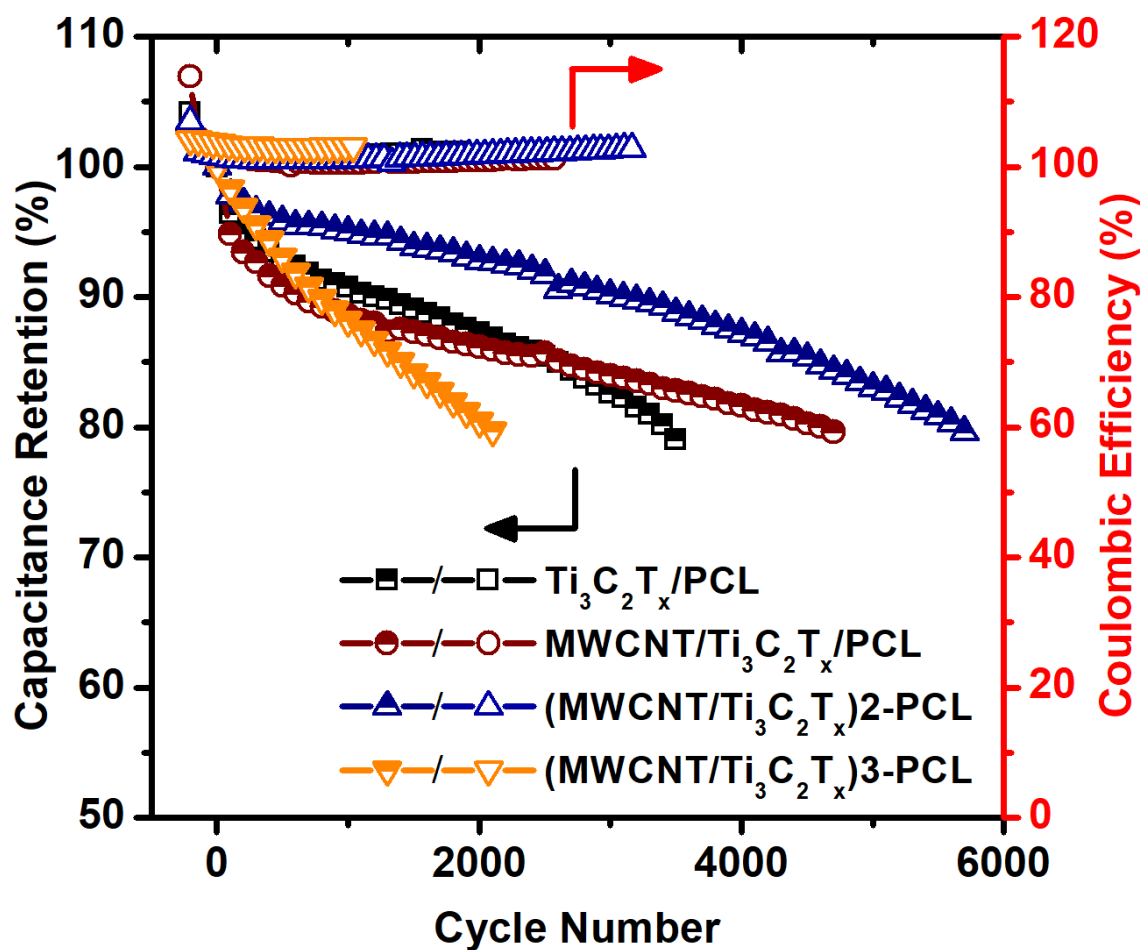
Fig. S5. Cycling lifetime and coulombic efficiency for the $Ti_3C_2T_x$/PCL, MWCNT/$Ti_3C_2T_x$/PCL, (MWCNT/$Ti_3C_2T_x$)2-PCL, and (MWCNT/$Ti_3C_2T_x$)3-PCL composite electrodes in 1 M H_2SO_4 electrolyte.
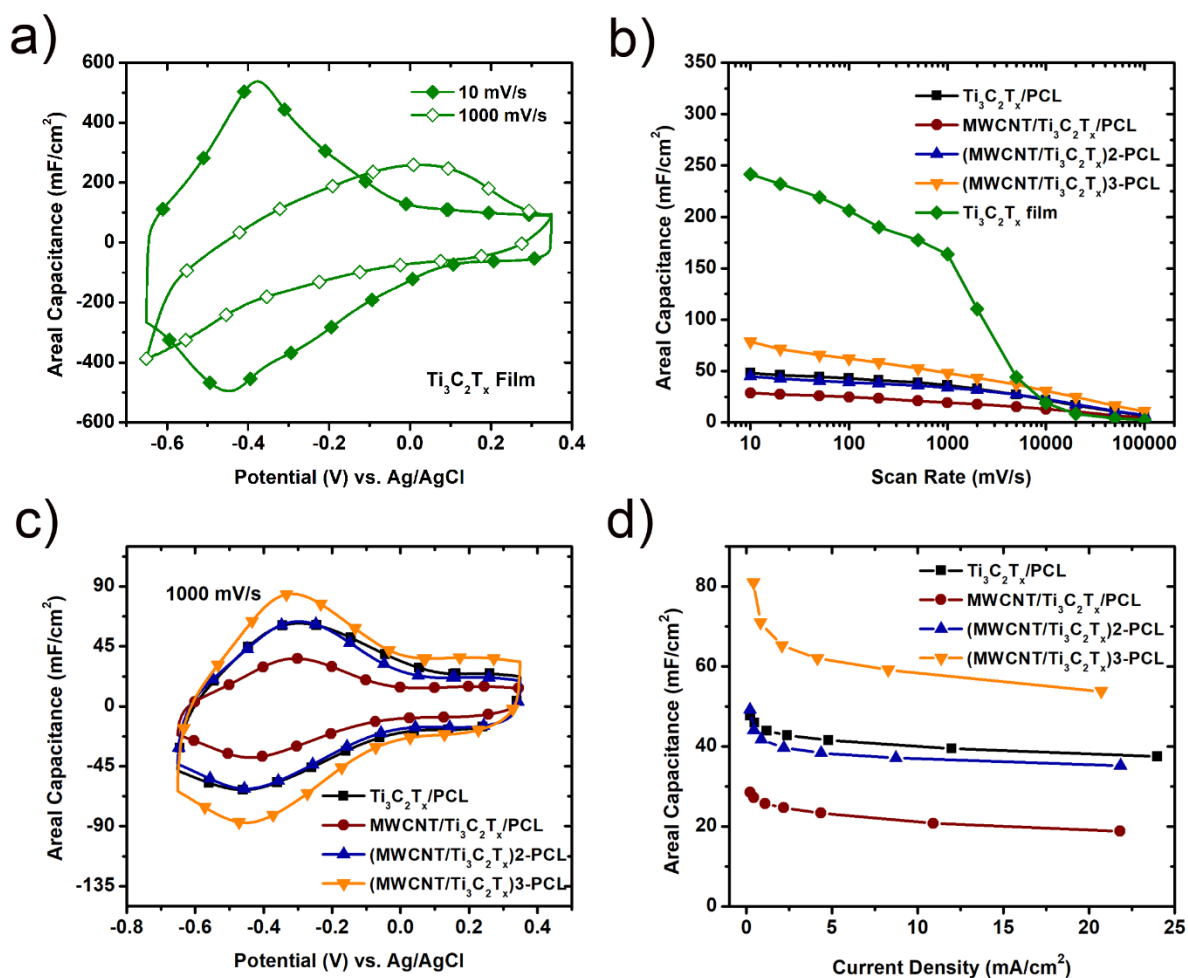
Fig. S6. (a) Cyclic voltammograms for a vacuum filtered $Ti_3C_2T_x$ film electrode at 10 mV/s and 1 V/s. (b) Comparison of the rate handling for the composite MXene/PCL electrodes vs. that of the vacuum filtered MXene electrode. (c) Cyclic voltammograms for different composite electrodes at 1 V/s. (d) Areal capacitance of the composite electrodes calculated from the galvanostatic charge discharge curves.
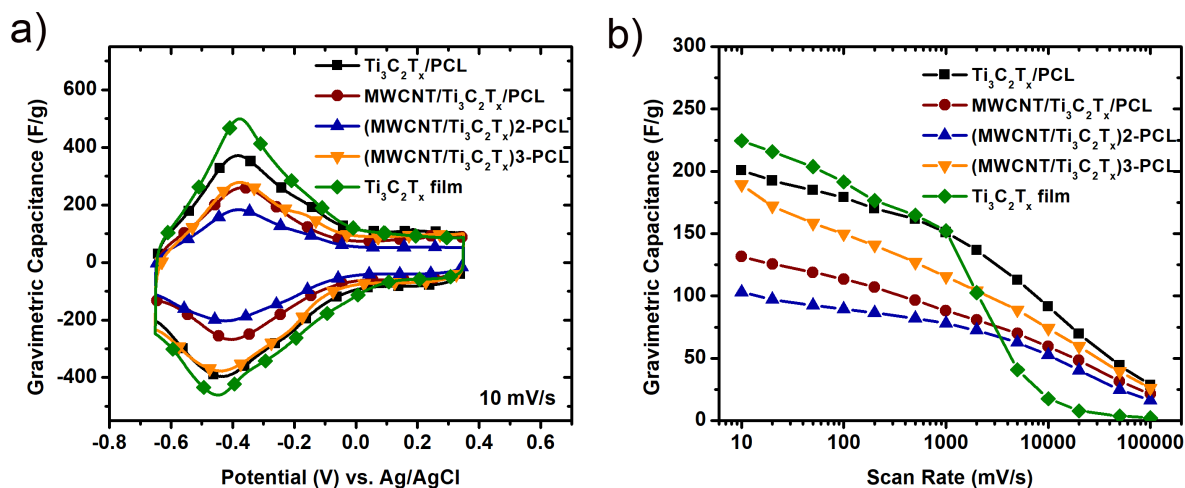
Fig. S7. Cyclic voltammograms (a) and the rate handling performance (b) of all the composite electrodes in comparison with vacuum filtered MXene electrode normalized to the estimated mass of the active material for each electrode.
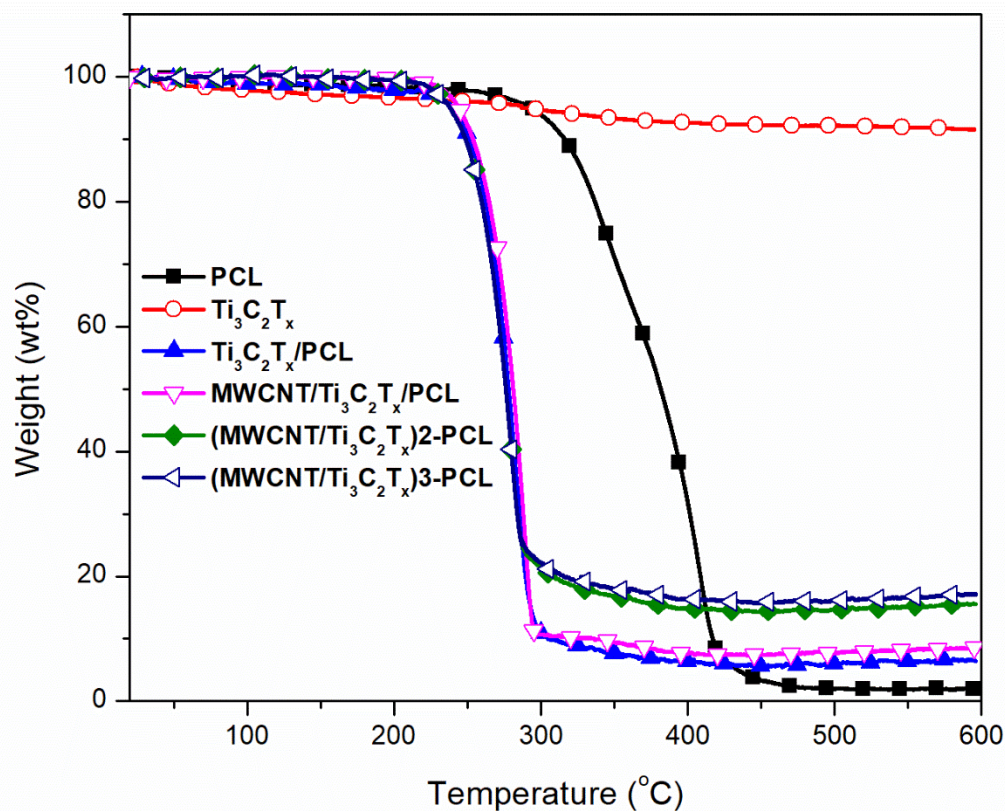
Fig. S8. TGA plots of PCL, $Ti_3C_2T_x$ film, and the $MWCNT/Ti_3C_2T_x/PCL$ composite films with different mass loadings of $Ti_3C_2T_x$ in N_2 at the heating rate of 5 $^oC/min$.