Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Strong, flexible, and highly conductive cellulose nanofibril/PEDOT:PSS/MXene nanocomposite films for efficient electromagnetic interference shielding

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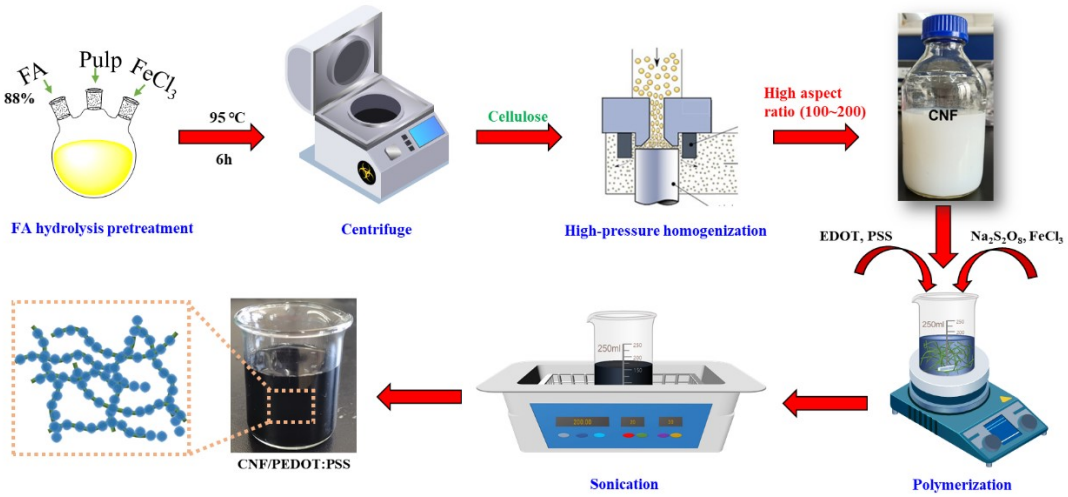

Scheme S1. Schematic illustration of preparation of CNF/PEDOT:PSS.

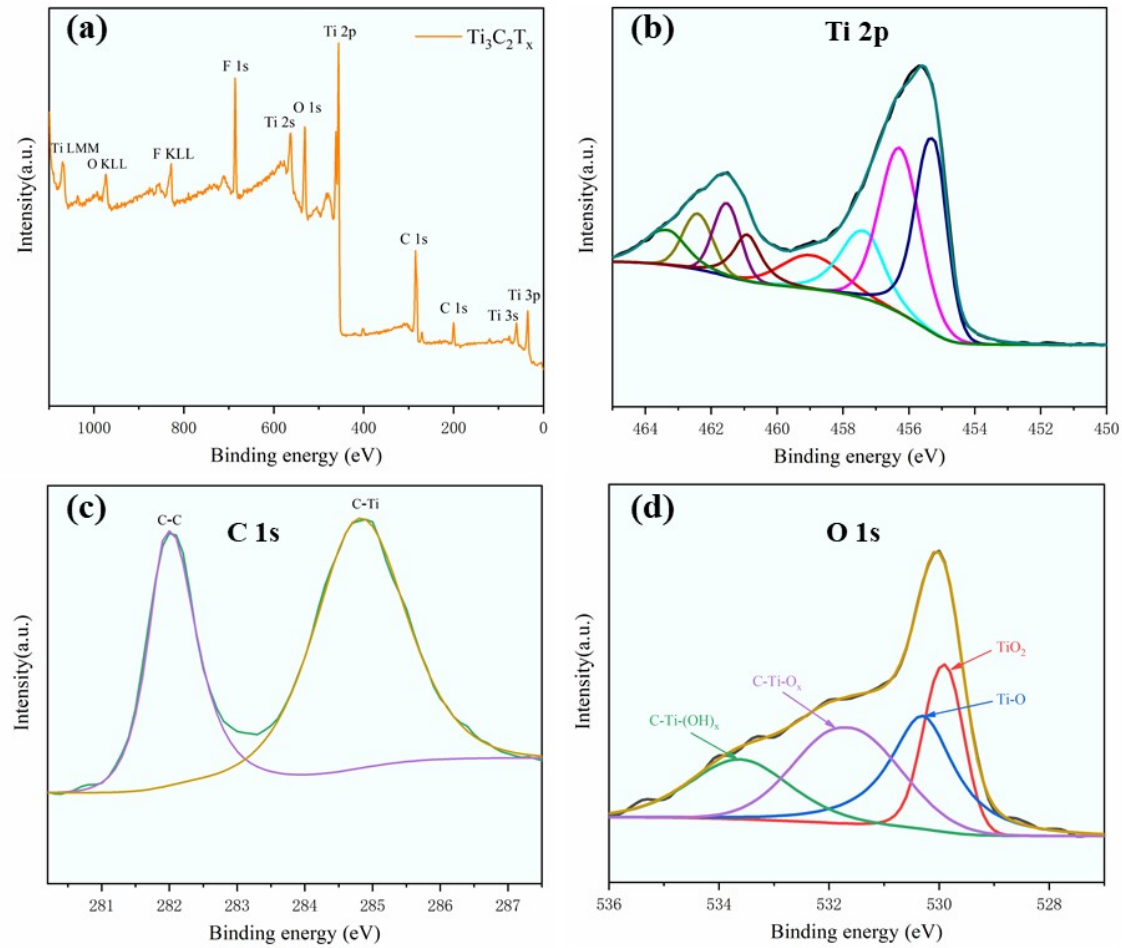

Figure S1. (a) Survey XPS spectrum of the $Ti_3C_2T_x$, (b) Ti 2p spectra, (c) C 1s spectra and (d) O 1s spectra of sample.

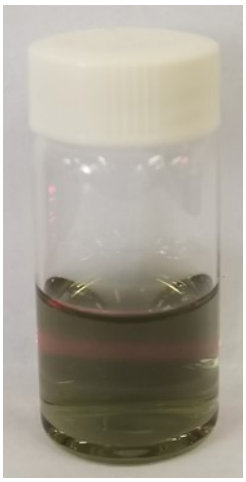

Figure S2. Tyndall effect of $Ti_3C_2T_x$ nanosheet aqueous dispersion.

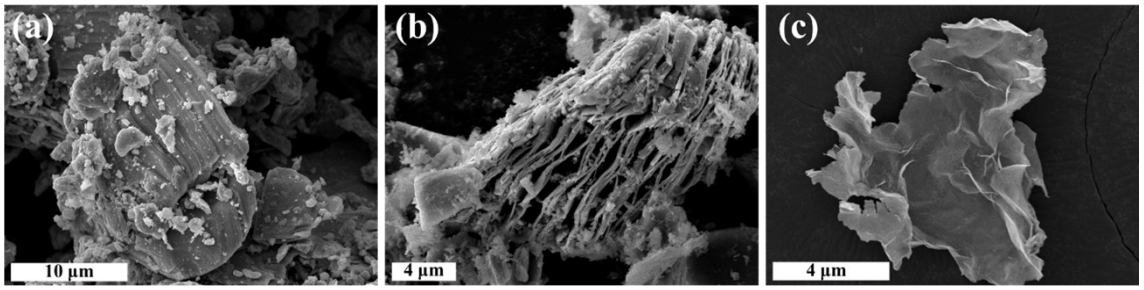

Figure S3. SEM images of Ti_3AlC_2 MAX (a), m-$Ti_3C_2T_x$ (b) and d-$Ti_3C_2T_x$ (c).

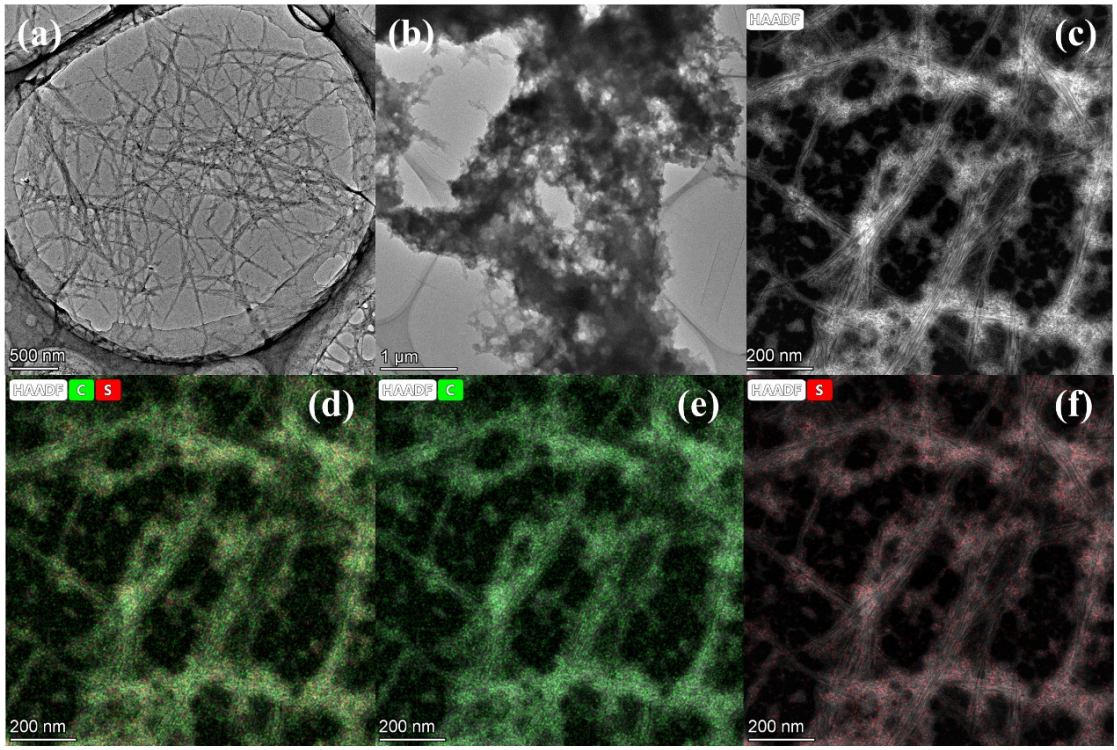

Figure S4. TEM images of CNF (a), PEDOT:PSS (b). HAADF-STEM image of CNF/PEDOT:PSS (c) and the corresponding elemental mappings of C and S (d, f).

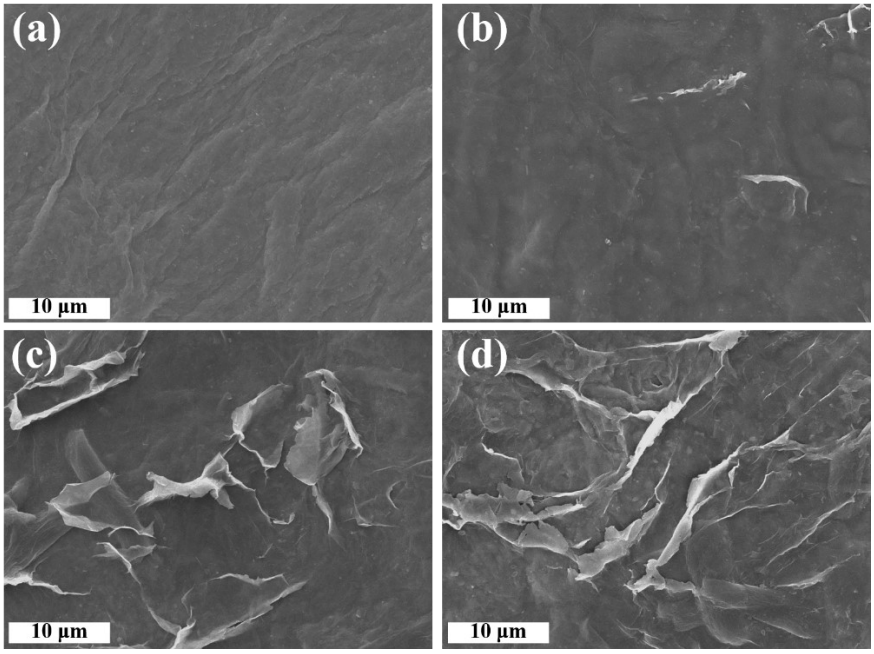

Figure S5. SEM surface images of CNF/PEDOT:PSS film (a), CNF/PEDOT:PSS/MXene-20 (b), CNF/PEDOT:PSS/MXene-50 (c) and CNF/PEDOT:PSS/MXene-80 (d).

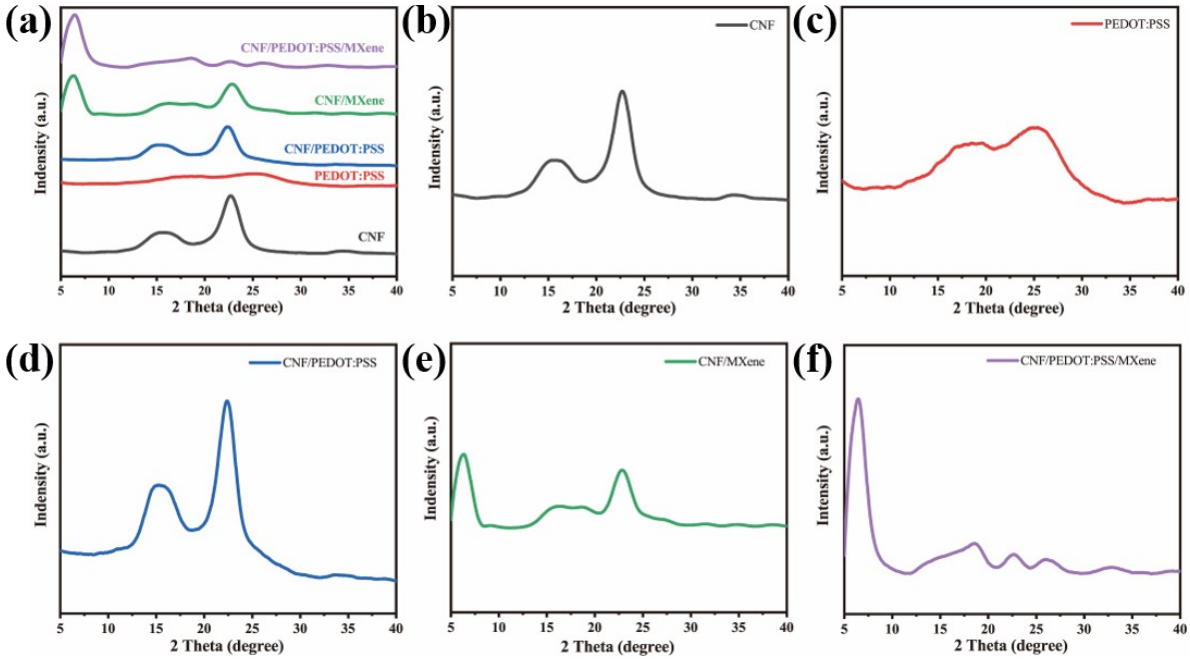

Figure S6. XRD patterns of CNF, PEDOT:PSS, MXene and their nanocomposite films.

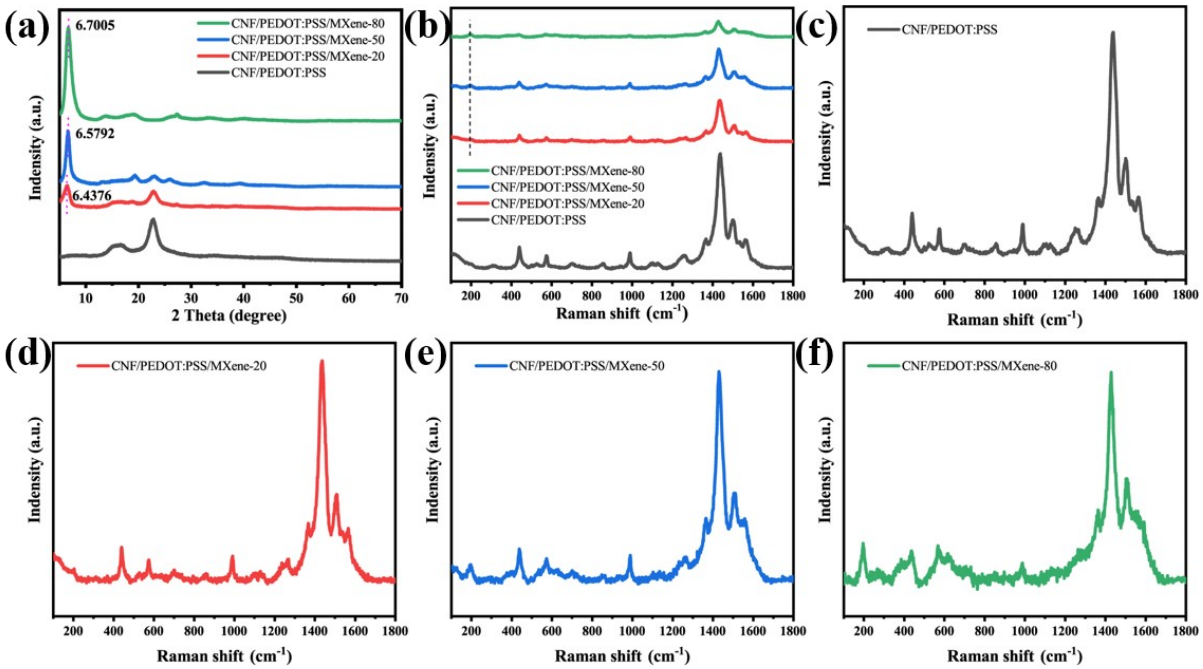

Figure S7. (a) XRD patterns and (b-f) Raman spectroscopy of CNF/PEDOT:PSS/MXene nanocomposite films.

Table S1. The comparison of EMI shielding performances and mechanical properties between CNF /PEDOT: PSS-MXene composite film and other MXene based film materials.

Materials	Thickness (μm)	SE (dB)	Conductivity (S cm^{-1})	Tensile strength (MPa)	Frequency (GHz)	Ref.
$Ti_3C_2T_x$/chitosan	37	34.7	14.02	-	8.2–12.4	[1]
$Ti_3C_2T_x$/PVA	27	44.4	7.16	-	8.2–12.4	[2]
$Ti_3C_2T_x$/PEDOT:PSS	11	42.1	340.50	13.71	8.2–12.4	[3]
$Ti_3C_2T_x$/AgNW/nanocellulose	17	42.74	300.00	63.8	8.2–12.4	[4]
$Ti_3C_2T_x$/PANI	40	36	24.40	19.9	8.2–12.4	[5]
$Ti_3C_2T_x$/PEDOT:PSS	6.6	40.5	675.20	38.5	8.2–12.4	[6]
$Ti_3C_2T_x$/Al	39	80	2656.00	83.2	8.2–12.4	[7]
$Ti_3C_2T_x$/CNF	167	25	7.394	135.4	8.2–12.4	[8]
$Ti_3C_2T_x$/TOCNF	38	39.6	28.37	212	8.2–12.4	[9]
$Ti_3C_2T_x$/CNF/AgNW	46	50.7	5.882	32.1	8.2–12.4	[10]
$Ti_3C_2T_x$/aramid nanofibers	12	34.7	-	46.5	8.2–12.4	[11]
$Ti_3C_2T_x$/CNT/CNF	38	38.4	25.07	97.9	8.2–12.4	[12]
$Ti_3C_2T_x$/polyacrylonitrile/TiO_2 /polydopamine	45	32	92.68	93.55	8.2–12.4	[13]
$Ti_3C_2T_x$/AgNW/PVDF	300	25.87	1.08	-	8.2–12.4	[14]
CNT/cellulose	150	35	20	26.9	8.2–12.4	[15]
CNT/CNF	150	46.4	31.87	48	8.2–12.4	[16]
$Ti_3C_2T_x$/CNF	192	29.3	-	-	8.2–12.4	[17]

$Ti_3C_2T_x$/CNF	40	30	140.85	35	8.2–12.4	[18]
CNF/PEDOT:PSS/$Ti_3C_2T_x$	44	76.99	2640.55	25.5	8.2–12.4	This work
CNF/PEDOT:PSS/$Ti_3C_2T_x$	58	76.99	1903.02	59.99	8.2–12.4	This work
CNF/PEDOT:PSS/$Ti_3C_2T_x$	63	39.78	21.9	73.86	8.2–12.4	This work

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