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Supporting Information

Ultrathin and flexible polyimide/$Ti_3C_2T_X$ MXene composite film for electromagnetic interference shielding with harsh environment tolerance

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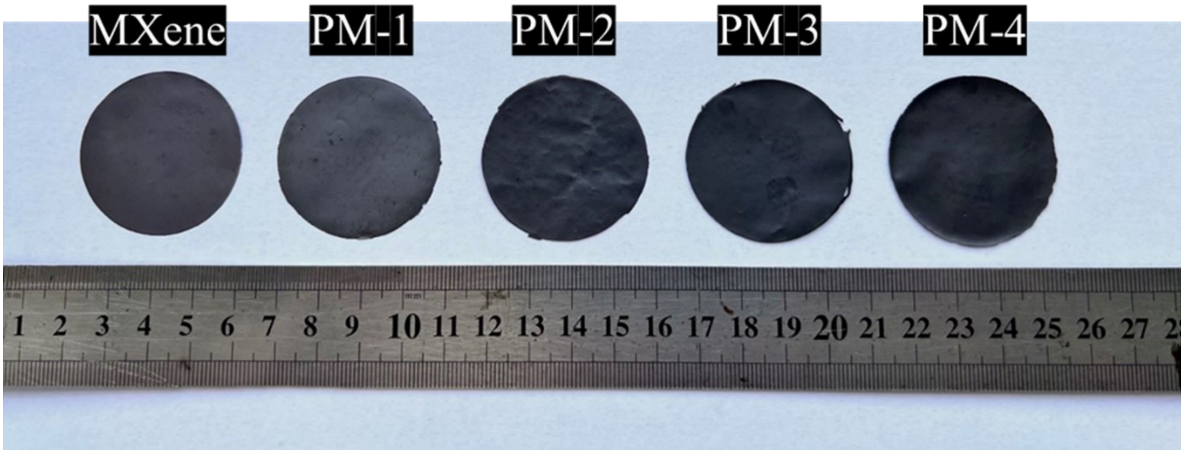

Fig. S1 Digital images of MXene and PM composite films with different PI contents.

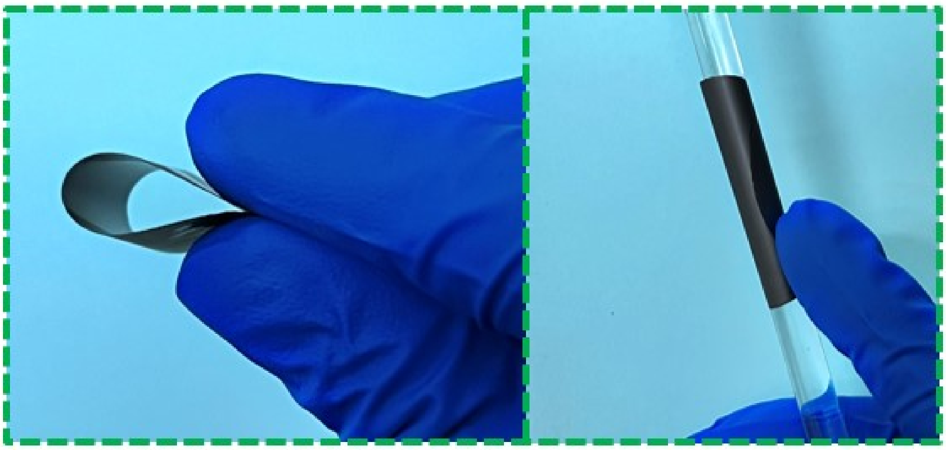

Fig. S2 Digital images show the PM composite film has excellent flexibility.

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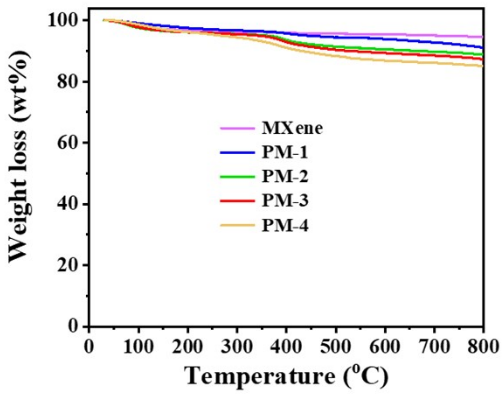

Fig. S3 TGA curves of MXene and PM composite films with different PI contents.

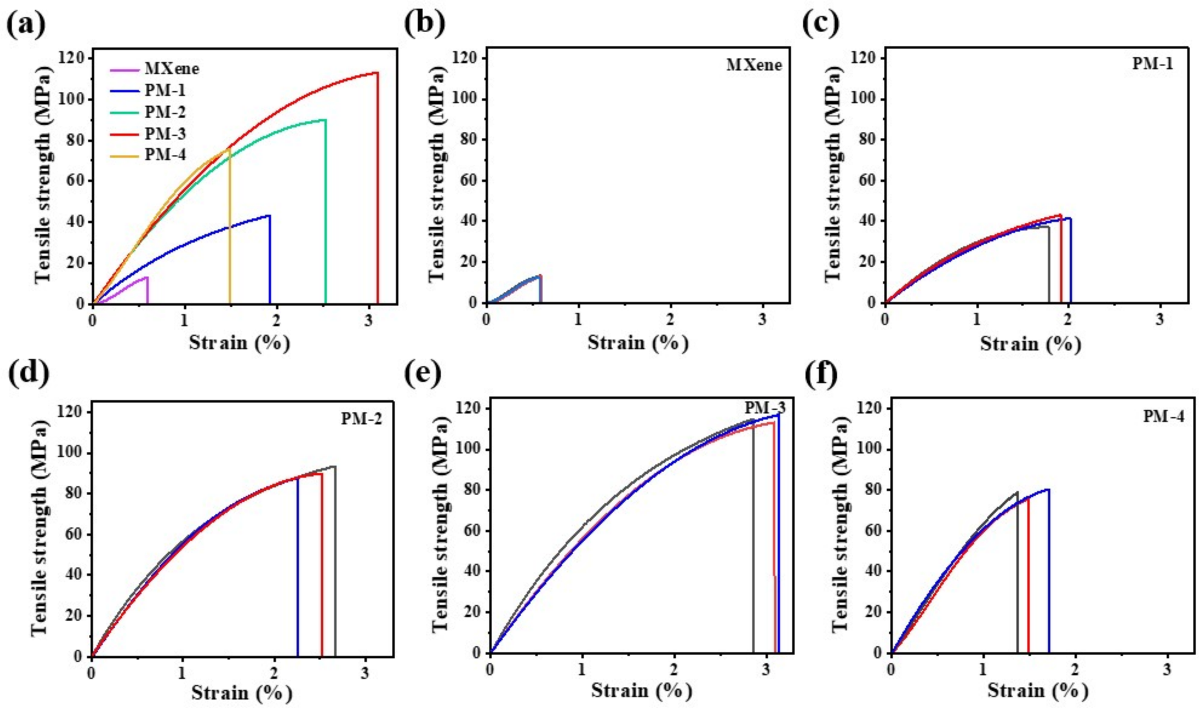

Fig. S4 Tensile stress-strain curves of PM composite films. (a) PM composite films with different PI contents, (b) MXene, (c) PM-1, (d) PM-2, (e) PM-3, and (f) PM-4.

Table S1 Mechanical properties of PM composite films with different PI contents.

Sample	Tensile strength (MPa)	Young's modulus (GPa)	Strain (%)
MXene	12.9 ± 0.5	2.89 ± 0.04	0.58 ± 0.01
PM-1	40.7 ± 2.5	3.13 ± 0.09	1.90 ± 0.10
PM-2	90.4 ± 2.4	5.27 ± 0.16	2.48 ± 0.16
PM-3	114.9 ± 1.6	6.18 ± 0.48	3.02 ± 0.12
PM-4	78.3 ± 2.0	6.37 ± 0.34	1.52 ± 0.14

Table S2 Comparison of the EMI shielding performance of PM composite films and other materials.

Type	Number	Materials	Thickness (mm)	SE (dB)	SE/d (dB/mm)	SSE/t ($dB \cdot cm^2 \cdot g^{-1}$)	Ref.
rGO	1	rGO/WPU	1	34	34	338	S1
	2	rGO-Fe_3O_4/PVC	1.8	13	7.2	49.5	S2
	3	rGO-γ-Fe_2O_3/PVA	0.36	20.3	56.4	416.7	S3
	4	rGO/Fe_3O_4	0.3	24	80	1033	S4
	5	rGO/PEDOT	0.8	70	87.5	841	S5
CNTs	6	MWCNTs/WPU	0.1	21.1	211	5410	S6
	7	MWCNTs/PC	2.1	39	18.6	164	S7
	8	MWCNTs/ABS	1.1	50	45.5	433	S8
	9	MWCNTs/PS	2	30	15	285	S9
	10	CNTs/PC	1.85	25	13.5	112.6	S10
	11	CNTs/PP	1	35	35	372	S11
MXene-based	12	$Ti_3C_2T_X$/PIF	0.256	49.9	194.9	/	S12
	13	$Ti_3C_2T_X$/PEDOT:PSS	0.013	21.6	1661.5	9169.5	S13
	14	d-$Ti_3C_2T_X$/CNF	0.167	25	149.7	1362	S14
			0.074	26	351.4	2154	
			0.047	24	510.6	2647	
	15	CNF@$Ti_3C_2T_X$	0.035	40	1142.8	7029	S15
	16	$Ti_3C_2T_X$/TOCNF	0.047	32.7	695.7	4761	S16
	17	$Ti_3C_2T_X$/ANF	0.017	28.5	1676.5	11554.2	S17
	18	$Ti_3C_2T_X$/CNTs/CNF	0.038	38.4	1010.5	8020	S18
	19	$Ti_3C_2T_X$/PVA	0.027	44.4	1644.4	9343	S19
	20	$Ti_3C_2T_X$/SA	0.014	43.9	3135.7	14830	S20
Metal-based	21	AgNW	0.5	35	70	2416	S21
	22	CuNi-CNT	1.5	54.6	36.4	1580	S22
	23	CF@NiCo/PI	1.08	87	80.6	/	S23
This work	24	PM-1	0.012	44	3666.7	16755	
	25	PM-2	0.013	41	3153.8	12566	
	26	PM-3	0.015	37	2467.7	10332	
	27	PM-4	0.017	28	1647.1	7037	

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