Supplemental Information

Lightweight and Flexible MXene/CNFs/Silver Composite Membranes with Brick-like Structure and High-Performance Electromagnetic-Interference Shielding

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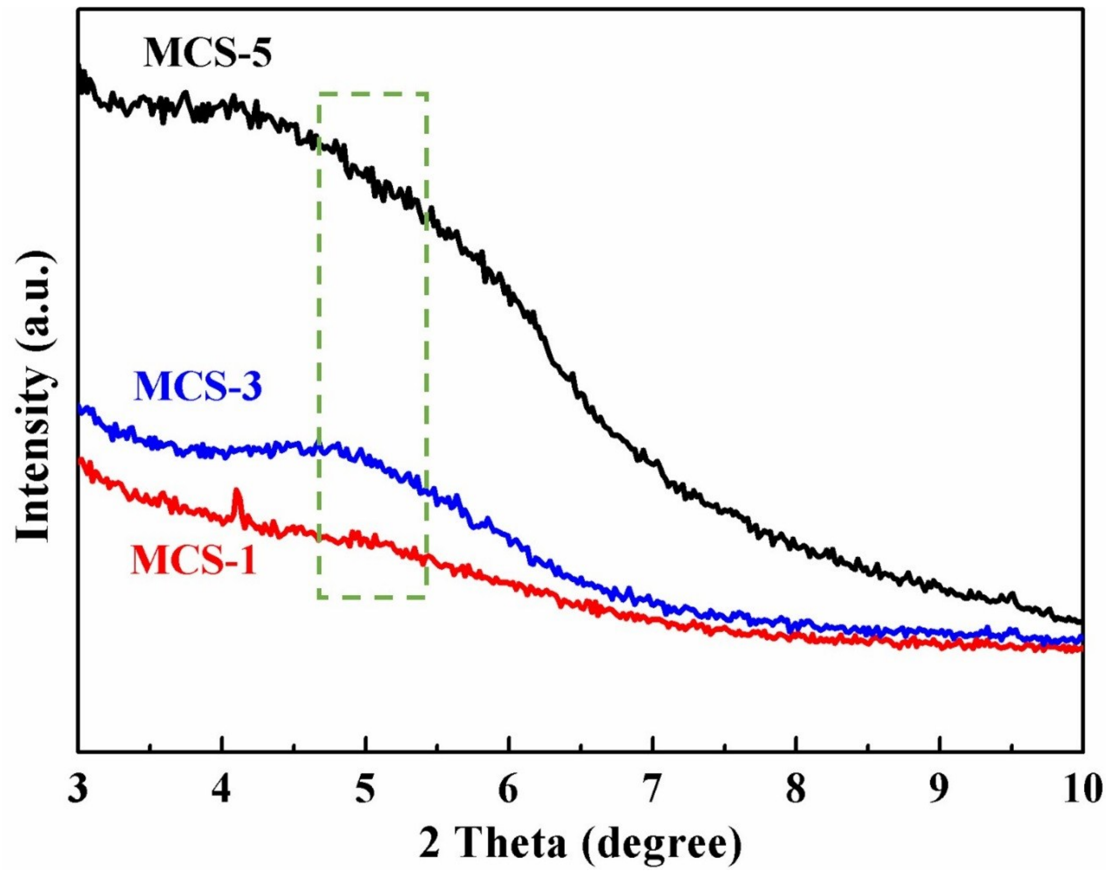


Fig. S1. XRD patterns of MCS-1, MCS-3, and MCS-5.

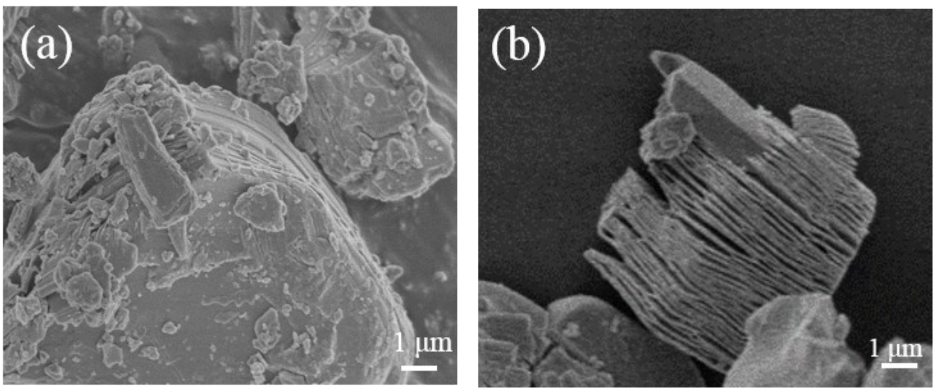


Fig. S2. SEM images of (a) the MAX (Ti_3AlC_2) and (b) the MXene (m-$Ti_3C_2T_x$).

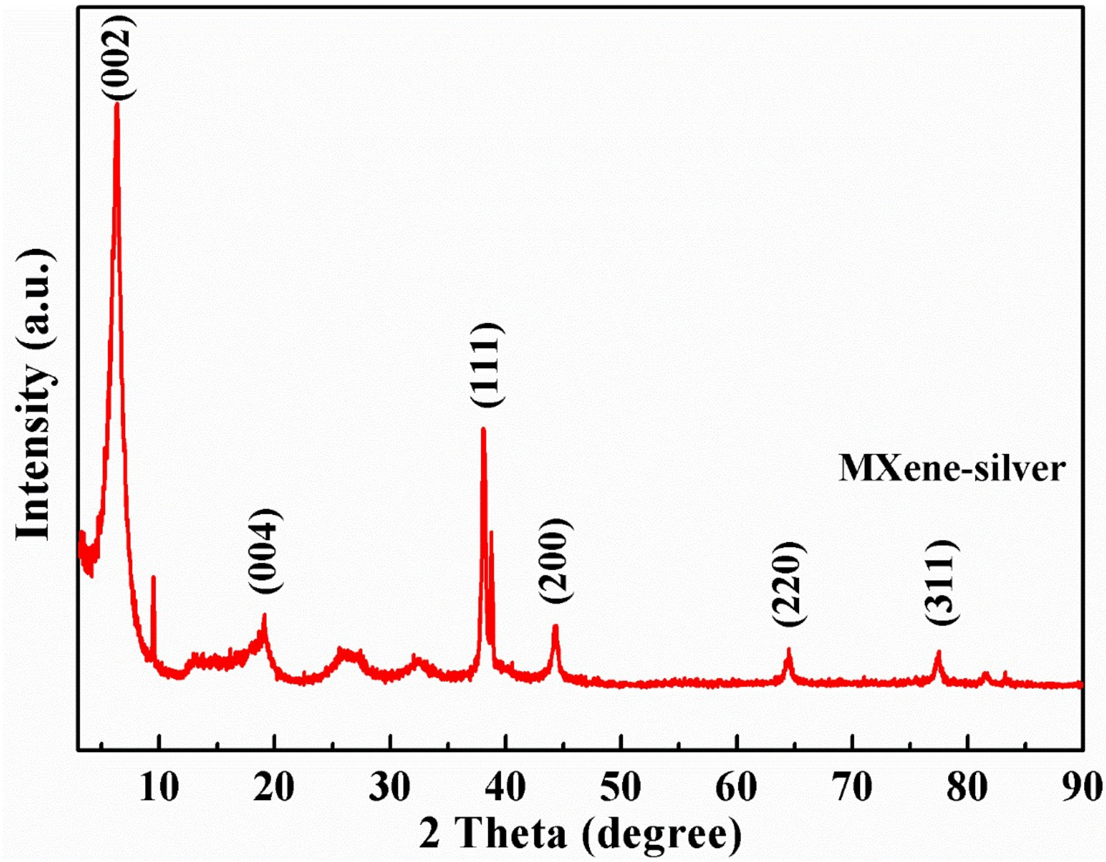


Fig. S3. XRD pattern of MXene/silver composite membranes.

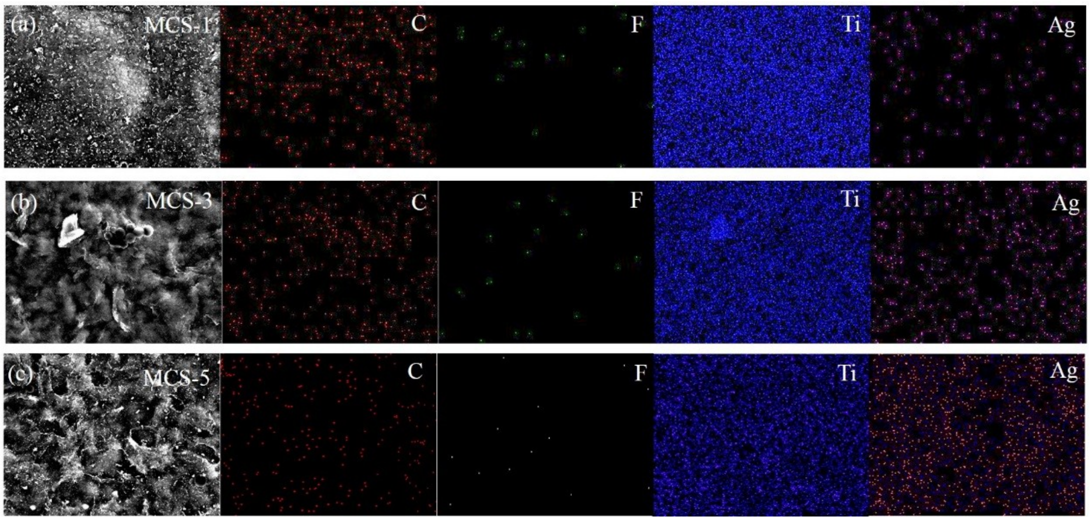


Fig. S4. SEM images of (a) MCS-1, (b) MCS-3, (c) MCS-5, and elemental mapping images of C, F, Ti, and Ag.

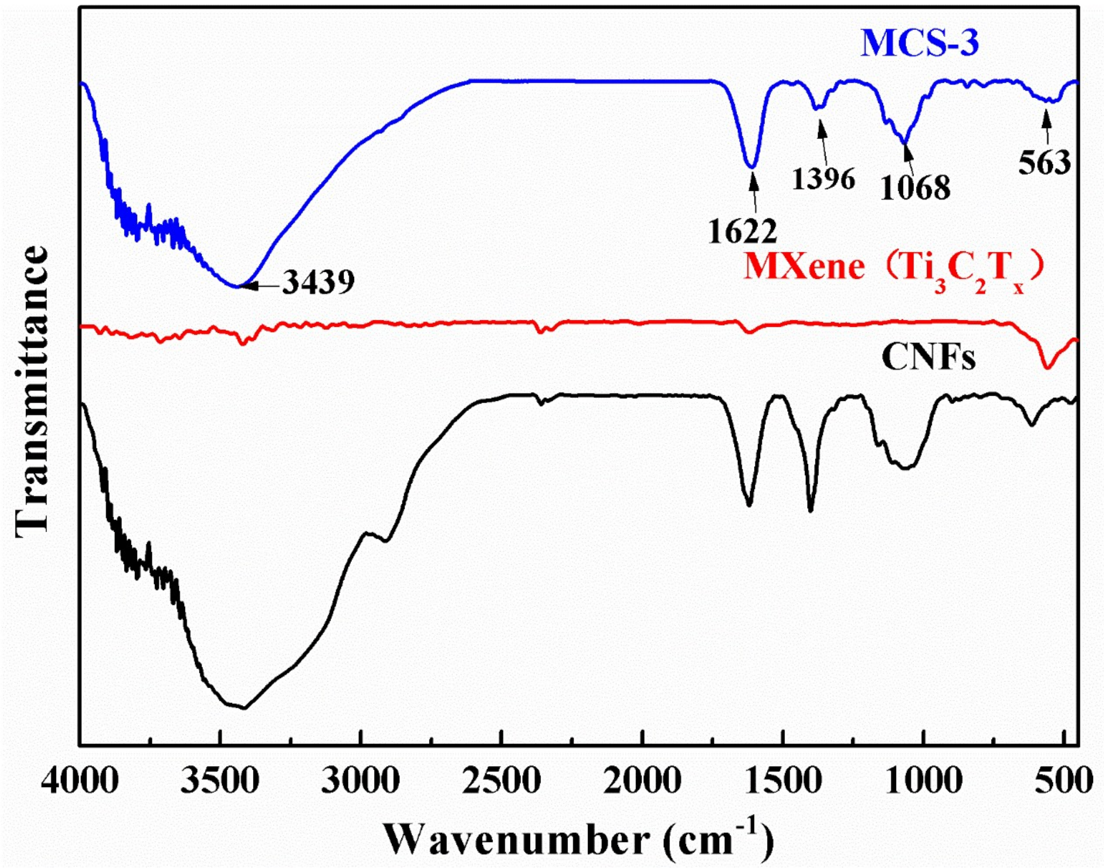


Fig. S5. FTIR spectra of the pure CNFs, pure MXene ($Ti_3C_2T_x$), and MCS-3 composite membranes.

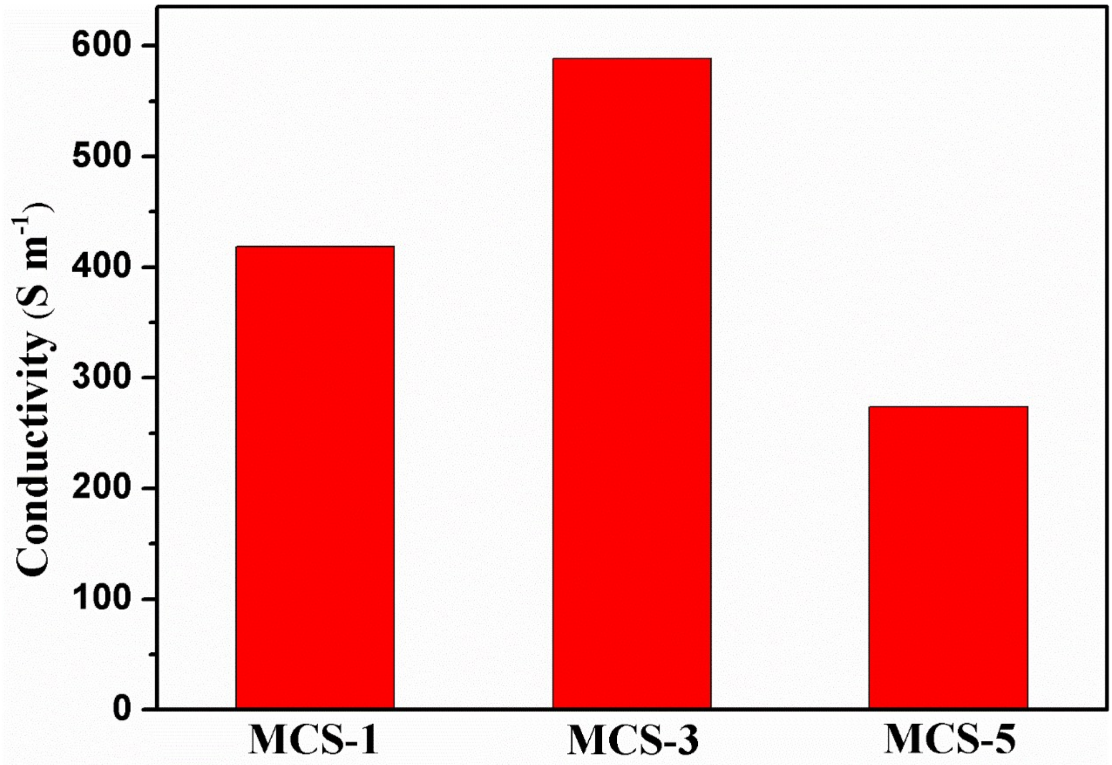


Fig. S6. The electrical conductivity of MCS-1, MCS-3, and MCS-5 composite membranes.

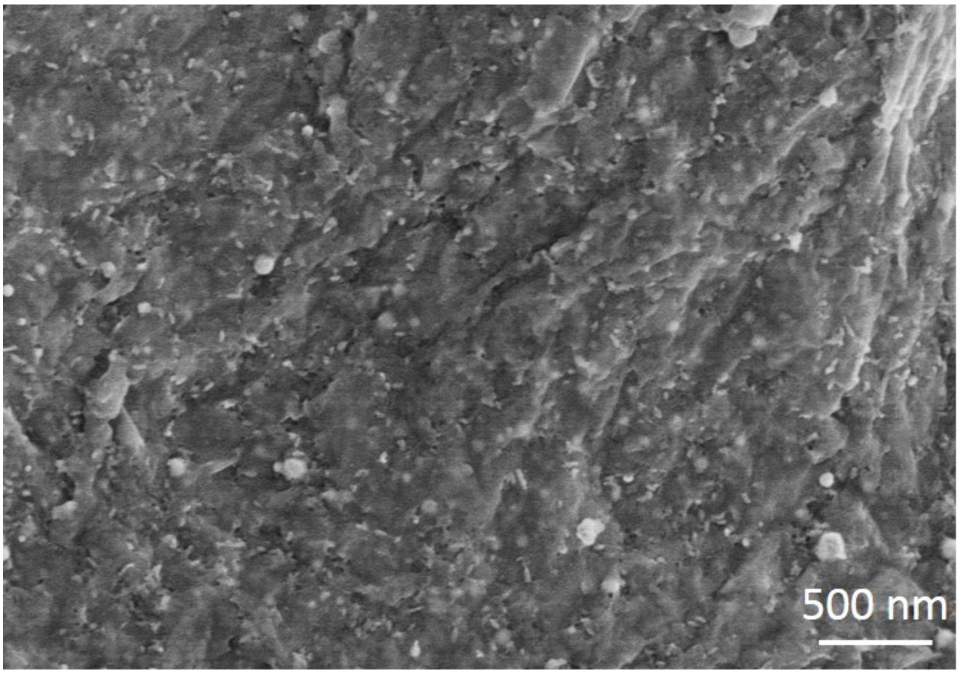


Fig. S7. SEM image of the MCS-5 composite membranes.

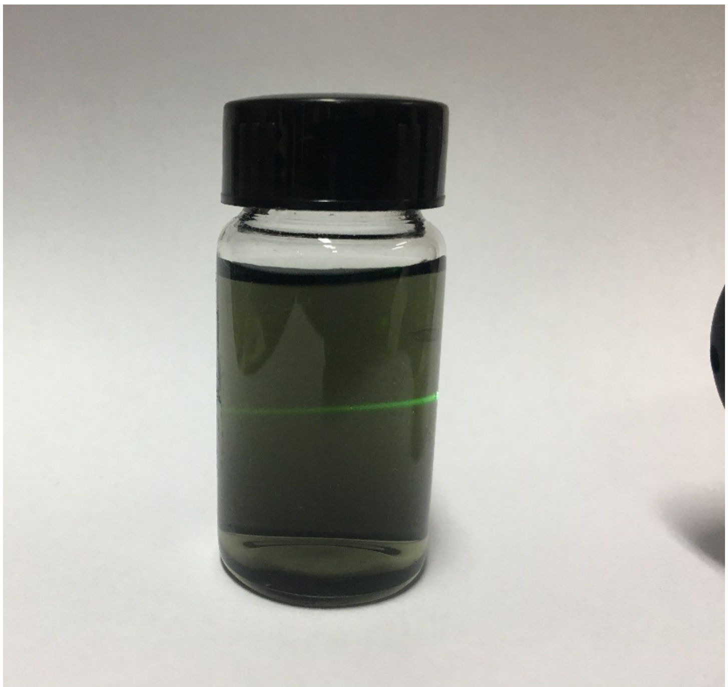


Fig. S8. Digital image of MCS-3 suspension produced the Tyndall effect.

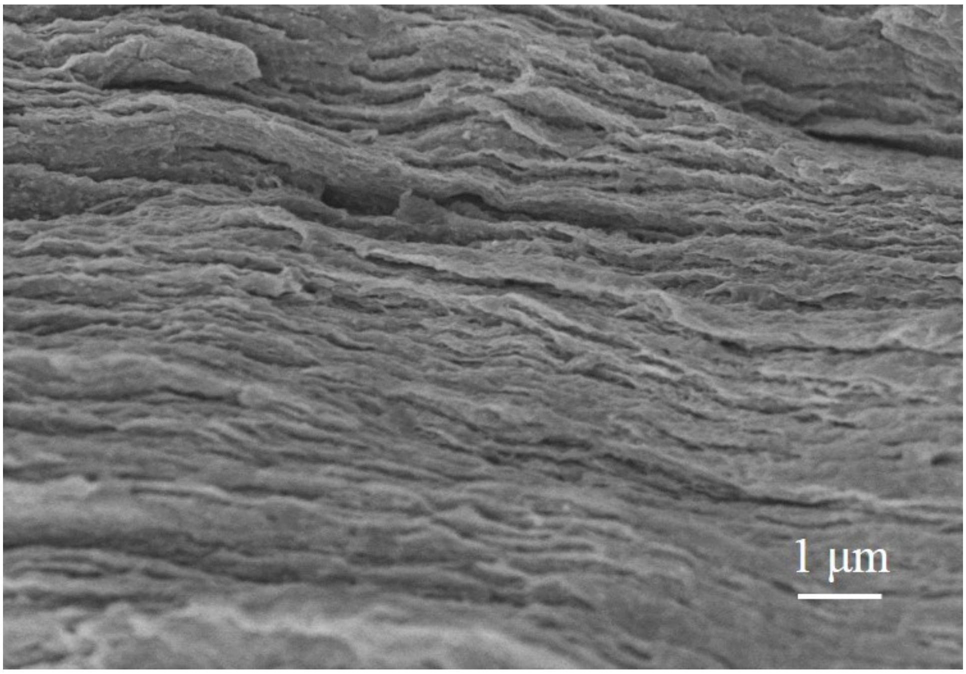
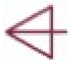
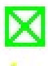
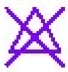
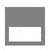
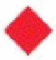
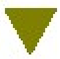
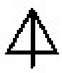
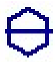
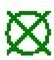


Fig. S9. SEM micrograph of the fracture surface of the MCS-5 composite membranes.

Table S1. Comparison of the EMI shielding performance of the MXene/CNFs/silver (MCS) composite membranes and other materials.

Sample	***Symbols***	***Materials***	***SE (dB)***	***Thickness (mm)***	***Ref.***
1		MWCNT/epoxy	19	0.35	1
2		PMMA/CNT	29	0.57	2
3		MCMB/MWCNT	31	0.6	3
4		Polyimide/graphene	17	0.8	4
5		$Ti_3C_2T_x$	32	1	5
6		CNT/PS foam	18.2	1.2	6
7		CNT/epoxy	48	1.5	7
8		C foam	40.1	2	8
9		SiC_f/SiC/PyC	25	2	9
10		RGO/epoxy	21	2	10
11		RGO/PS	48	2.5	11
12		PS/Graphene	29	2.5	12
13		Fe_3O_4/rGO PEI	14.3	2.5	13

14	▶	CF/PES	41.8	2.82	14
15	⬟	MWCNT/PP	28	2.8	15
16	◀	rGO/PMMA	30	3.4	16
17	Δ	MXene/CNFs/Ag	27.5	0.045	This work
18	O	MXene/CNFs/Ag	28	0.047	This work
19	⬟	MXene/CNFs/Ag	50.7	0.046	This work

CNT: carbon nanotube; CNFs: cellulose nanofibers; PES: polyethersulfone; rGO: reduced graphene oxide; MWCNT: multi-walled carbon nanotube; PP: polypropylene; PMMA: poly(methyl methacrylate); CF: carbon fibers; PS: polystyrene.

Table S2. The mechanical properties of the MXene/CNFs/silver (MCS) composite membranes.

Sample	***Tensile strength (Mpa)***
MXene	1.80 ± 0.16
MCS-1	13.90 ± 0.38
MCS-3	32.10 ± 3.80
MCS-5	34.20 ± 7.20

Table S3. The content of silver nitrate solution and percentage of residual mass (%) in MXene/CNFs/silver (MCS) composite membranes.

Sample	*Nominal content of silver nitrate solution (mL)*	*The percentage of residual mass (%) determined by TGA*
MXene-CNFs	0	73.7%
MCS-1	1	77.7%
MCS-3	3	79.2%
MCS-5	5	83.1%

3. Supplementary References

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