Electronic Supplementary Material (ESI) for Nanoscale.

Surpporting Information

Buckled AgNW/Mxene Hybrid Hierarchical Sponges for High-Performance Electromagnetic Interference Shielding

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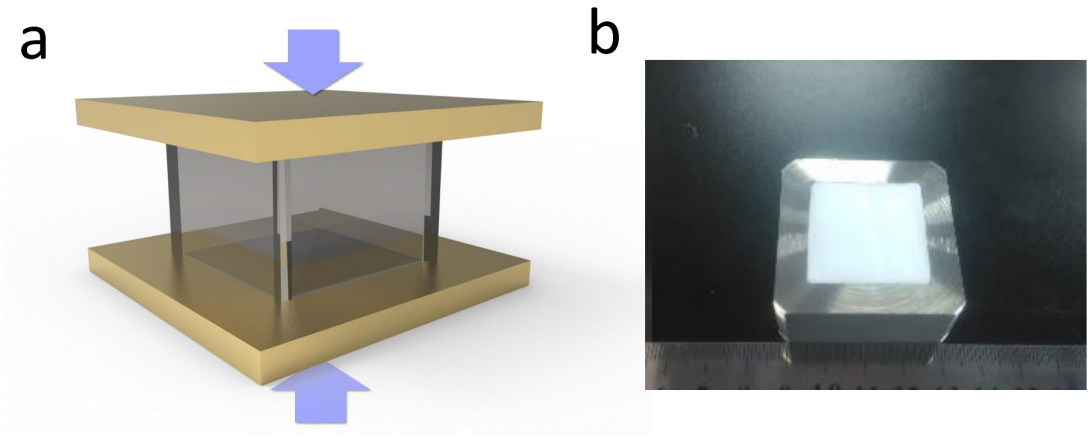

Figure S1. (a) The schematic of hot-pressing process. (b) The digital photo of sample after hot-pressing.

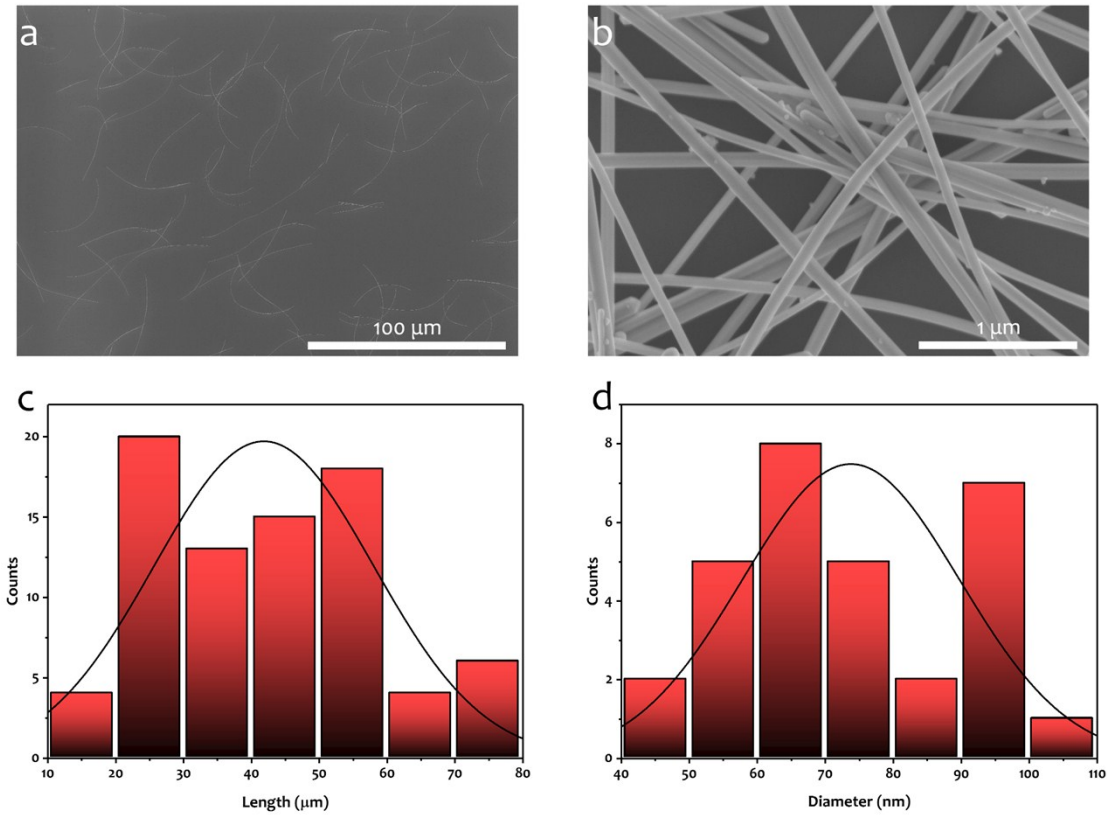

Figure S2. (a) and (b) SEM pictures for AgNW. The distribution of AgNW for (c) length and (d) diameter. The typical length of AgNW is about 41.8 ± 16.2 µm, and the diameter is around 73.8 ± 16.0 nm.

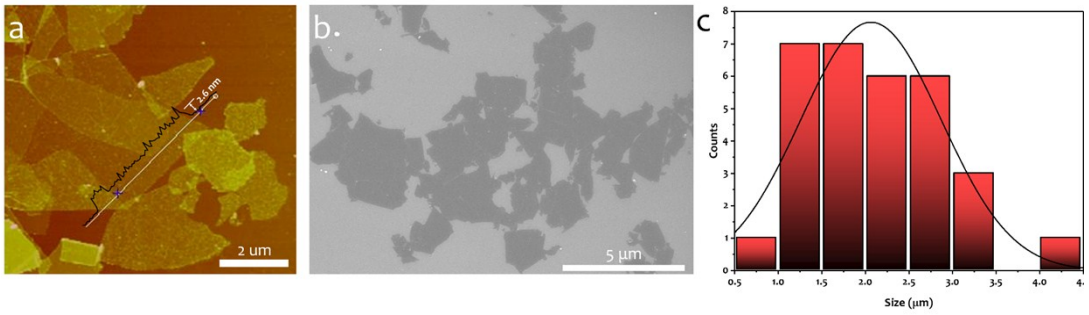

Figure S3. (a) AFM image of the MXene sheets. (b) SEM image of MXene sheets. (c) distribution for lateral size of MXene sheets. The thickness of MXene sheet is about 2.6 nm, and the lateral size is about 2.1 ± 0.8 µm.

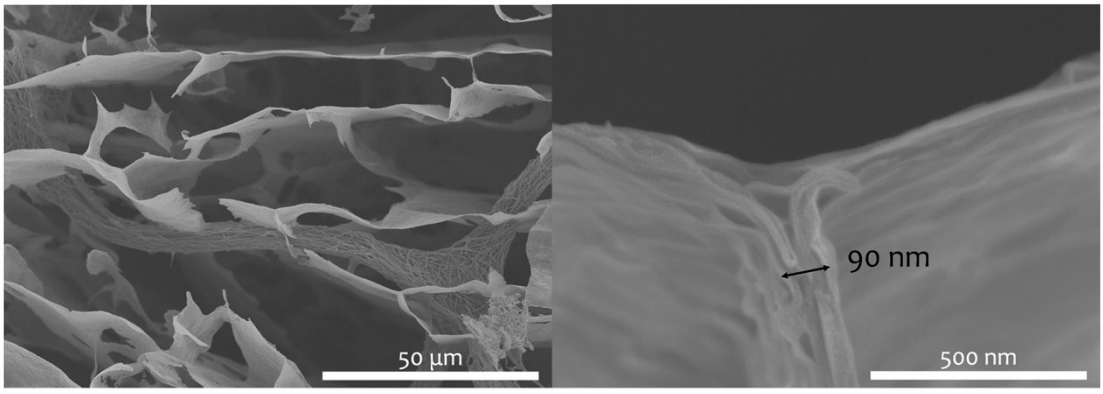

Figure S4. SEM images of BMF/AgNW/MXene sponge (left) and the magnified cell wall (right).

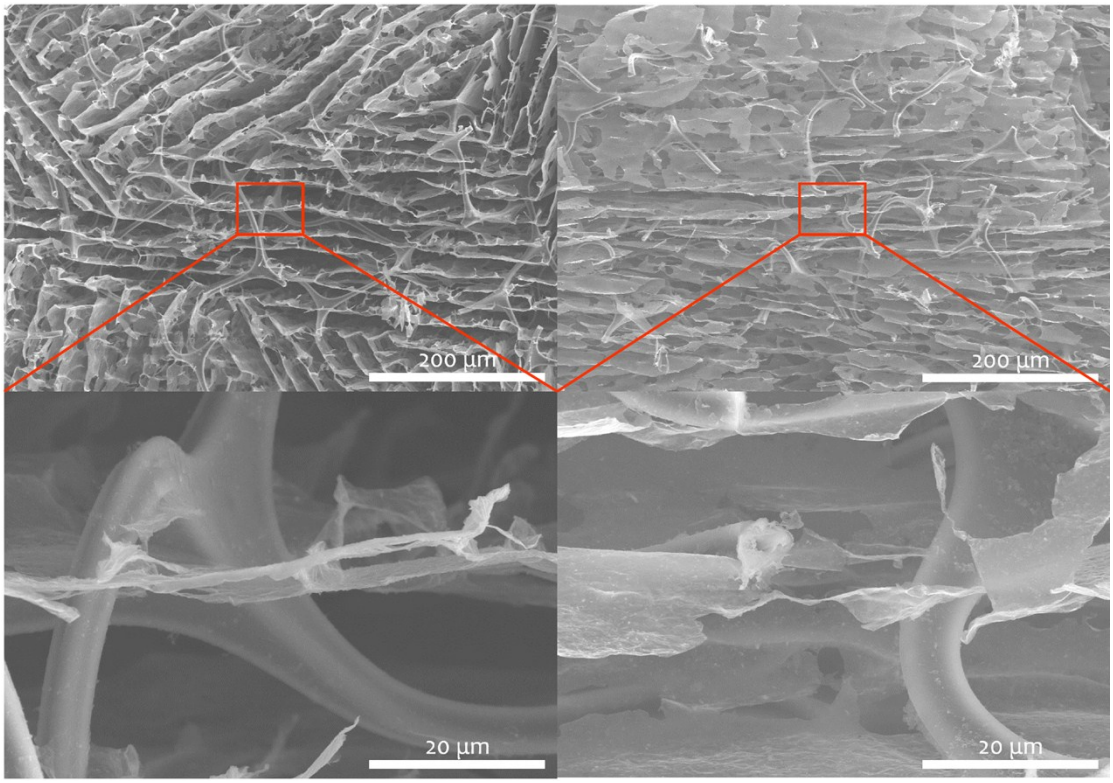

Figure S5. SEM views of the BMF/MXene foam along the out-of-plane direction (left) and in-plane direction (right).

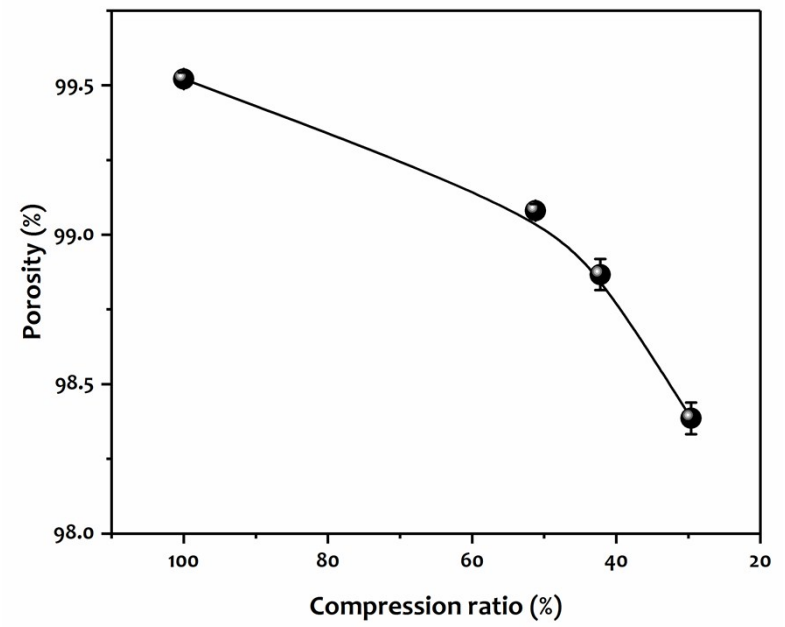

Figure S6. The porosity of BMF sponges with different compression ratios [the porosity is calculated based on the density of the sponge, and the equation can be described as:

$p = (1 - \frac{\rho_0}{\rho}) * 100\%$. Here, the *P* is the porosity, ρ_0 is the density of the sponge, ρ is the density of the melamine resin (1.57 g/cm^3)][1].

Table S1. EMI shielding performance of various aerogel/foam/sponge materials (G: graphene; CNT: carbon nanotube; SF: silver plating foam; EP: epoxy; PS: polystyrene; PVDF: polyvinylidene fluoride; PI: polyimide; WPU: water polyurethane; PEI: polyetherimide; PMMA: polymethyl methacrylate).[2-24]

Methods	Materails	Density (mg/cm^3)	Thickness (cm)	EMI SE (dB)	EMI SE/t (dB/mm)	SSE (dB·cm^{3}g^{-1})	SSE/t (dB·cm^{2}g^{-1})	Reference
Foaming & Phase separating	SWCNT/PS	560	0.12	18.5	15.4	33	275	2
	MWCNTs-Fe_3O_4/PMMA	262	0.25	13.1	5.24	50	200	3
	PS/G	270	0.25	17.3	6.9	64	256	4
		450	0.25	29.3	11.7	65	256	
	PEI/G	290	0.23	20	8.7	69	68	5
	G-Fe_3O_4/PEI	400	0.25	19	7.6	47.5	190	6
	PI/G	280	0.08	17	21.25	61	759	7
		280	0.08	21	26.25	75	937	
	MWCNT/PVDF	790	0.2	56.7	28.35	72	360	8
	SF-EP-CNT	609.9	0.2	68.1	34.05	111.66	558.3	9
Carbonizing & CVD	Carbon foam	220	0.5	17.2	3.44	78	156	10
		220	0.4	16.3	4	74	185	
		220	0.3	15.7	5.23	71	236.7	
	C/AgNWs	130	0.45	60	13.3	461	1023	11
	Graphite/PDMS	170	0.45	31.1	6.9	183	406.6	12
		190	0.45	33.7	7.8	177.4	394	
		220	0.45	35.8	7.9	162.7	361	
	PDMS/G	60	0.1	20	20	333	3333	13
	G/PDMS	90	0.2	25	12.5	278	1390	14
	Carbon NWs/G/PDMS	97.1	0.16	36	22.5	371	2318.75	15
	G/PDMS	64.1	0.16	21	13.12	328	2050	
	Ag@C	3.82	0.2	51.2	25.6	13403	67015	16
		3.82	0.3	70.1	23.4	18350.7	61169	
	C-CNT/CNF	14	0.5	21	4.2	1690	3370	17
	Carbon foam	6	0.1	23	23	3800	38000	18
Template (freeze-drying & dip-coating)	MWCNT/WPU	126	0.23	50	21.7	397	1726	19
	Carbon/Graphene	61	0.5	43	8.6	705	1410	20
		61	0.3	27	9	443	1476.7	
		61	0.2	21	10.5	344	1720	
	CNT-interface/cellulose	77	0.25	40	16	519	2076	21
	CNT-matrix/cellulose	47	0.25	20	8	425	1700	
		51	0.25	27	10.8	529	2116	
		43	0.25	30	12	698	2792	
		36	0.25	35	14	972	3888	
	Melamine sponge/G	19	1.2	24	2	1263	1052	22
	PU/G	27	2	12.4	0.6	459	210	23
		27	6	34.7	0.6	1285	210	
		30	2	19.9	1	663	320	
		30	6	57.7	1	1923	320	
	Melamine sponge/G	11	4	37.2	0.93	3410	852.5	24
	BMF/AgNW	43	0.2	40	20	930	4650	This work
		41	0.2	32.8	16.4	800	4000	
		31	0.2	28	14	903	4515	
		19	0.2	21	10.5	1105	5525	
	BMF/AgNW/MXene	49.5	0.2	52.6	26.3	1062	5313	

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