

Electronic Supporting Information (ESI)

Optimizing electromagnetic wave absorption bandwidth of SiC/C aerogels using continuous multi-band absorption

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The calculation of attenuation constant

$$\alpha = \frac{\sqrt{2}\pi f}{c} \sqrt{(\mu''\varepsilon'' - \mu'\varepsilon') + \sqrt{(\mu''\varepsilon'' - \mu'\varepsilon')^2 + (\mu'\varepsilon'' - \mu''\varepsilon')^2}} \quad (1)$$

where f is the frequency and c is the speed of light in vacuum.

The calculation of reflection loss

Based on the transmission line theory, RL is calculated according to the following equation:

$$Z_{in} = Z_0(\mu_r/\varepsilon_r)^{1/2} \tan h[j(2\pi f d/c)((\mu_r\varepsilon_r)^{1/2})] \quad (2)$$

$$RL = 20 \log_{10} \left| \frac{Z_{in} - Z_0}{Z_{in} + Z_0} \right| \quad (3)$$

where Z_{in} and Z_0 are denoted as the impedance of free space and input impedance. f , d and c are the frequency of the EM waves, the thickness of the absorber and the speed of light in free space, respectively.

The calculation of impedance matching

$$M_Z = \frac{2Z'_{in}}{|Z_{in}|^2 + 1} \quad (4)$$

where Z'_{in} means the real normalized input impedance. The value of M_Z equal or close to 1.0 means the EMW can easily enter the material rather than reflection on the air or absorber interfaces.

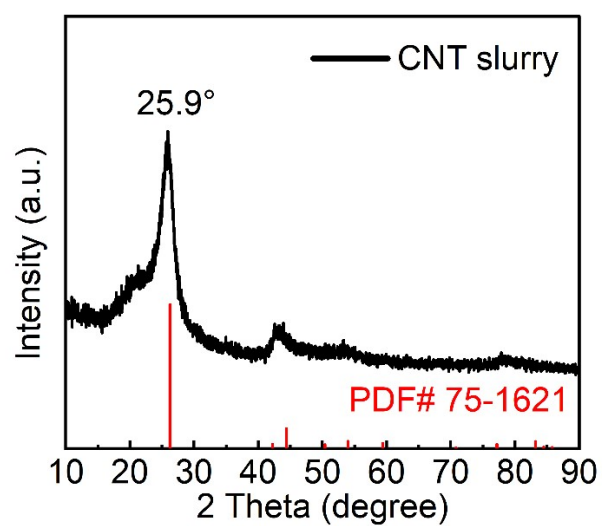


Fig. S1 XRD of CNT slurry after drying.

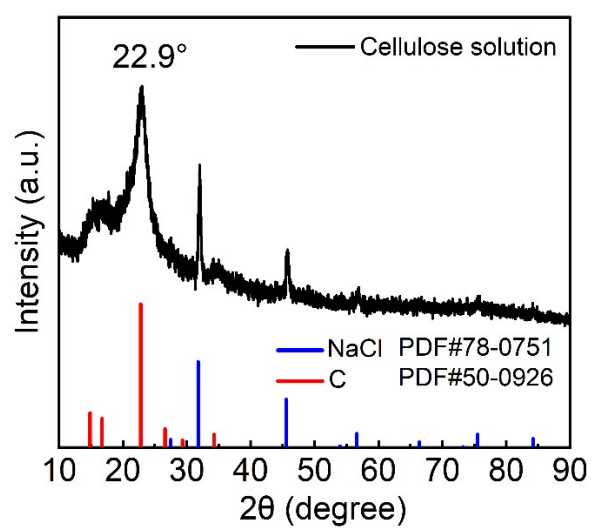


Fig. S2 XRD of cellulose solution after drying.

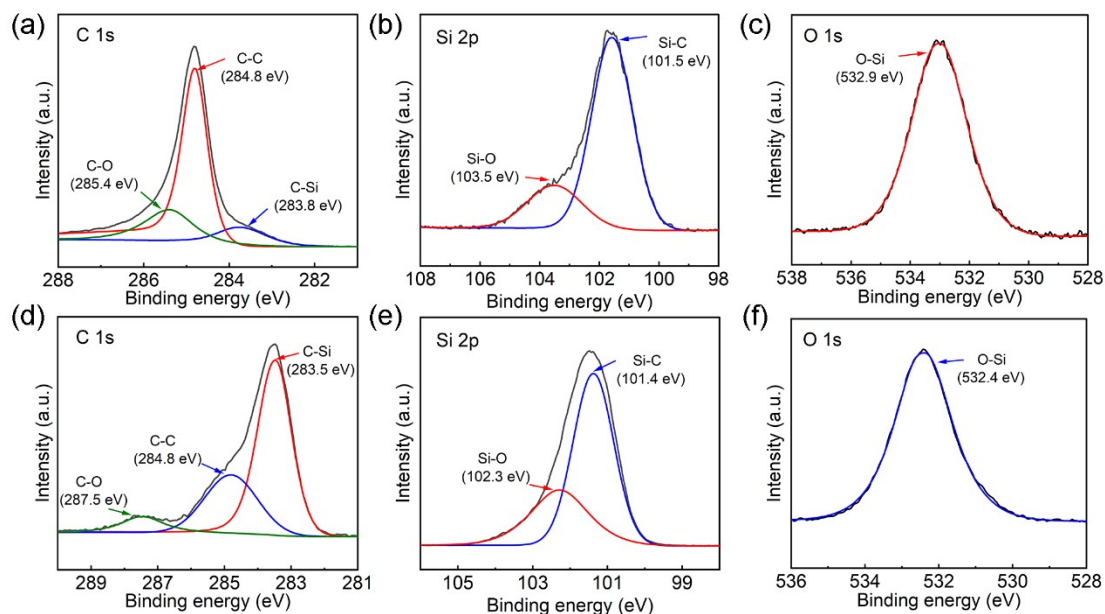


Fig. S3 XPS survey spectra of (a) C 1s, (b) Si 2p, and (c) O 1s regions of SN-1350.

XPS survey spectra of (d) C 1s, (e) Si 2p, and (f) O 1s regions of SN-1550.

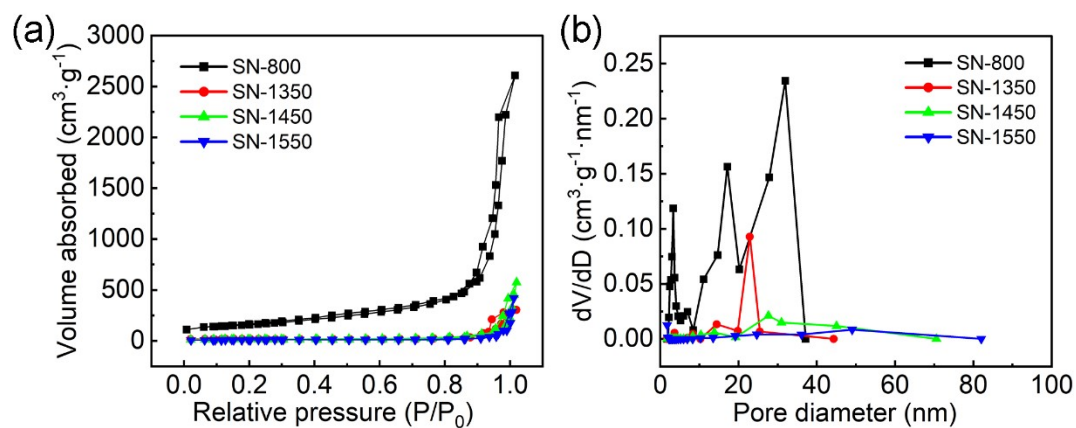


Fig. S4 (a) N₂ adsorption–desorption isotherms at 77 K and (b) pore size distributions of the samples.

Table. S1 Pore size and specific surface area of the samples.

Sample	Pore size	Specific surface area
	(nm)	(m ² /g)
SN-800	28.2	559.3
SN-1350	25.3	73.3
SN-1450	45.4	62.6
SN-1550	63.9	40.5

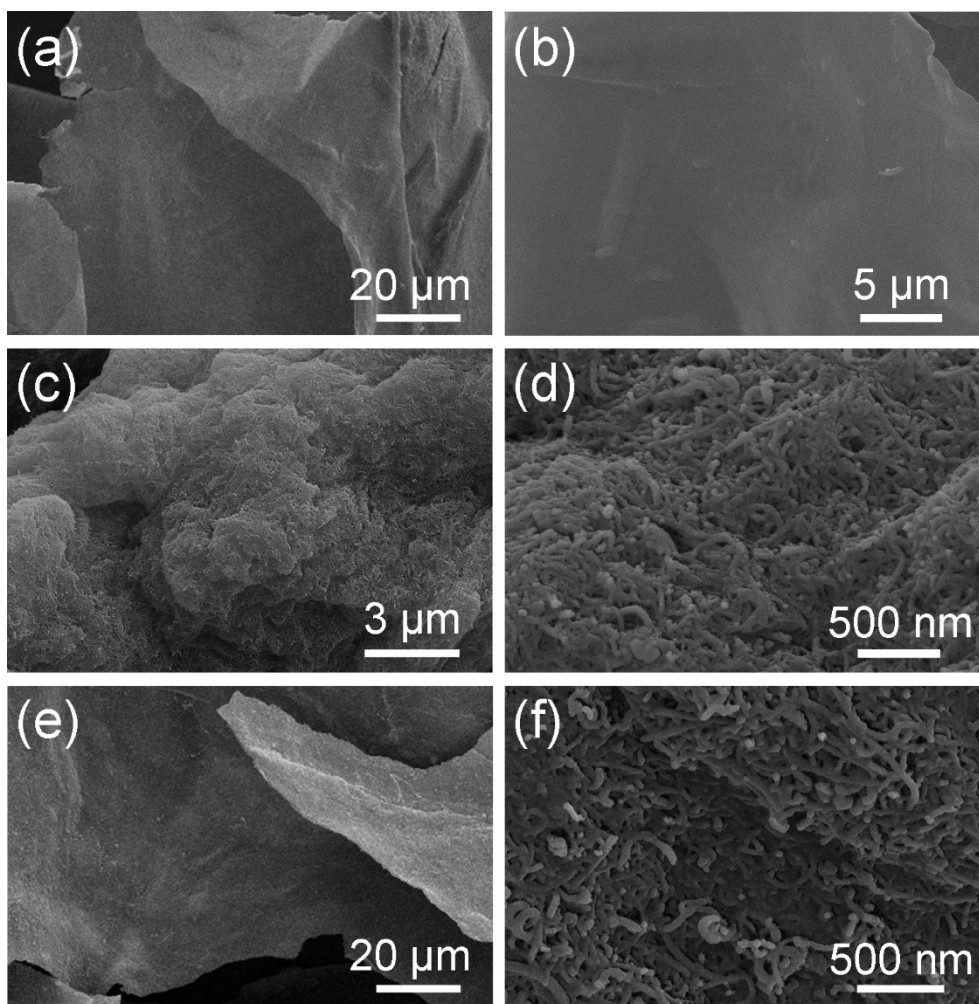


Fig. S5 SEM images of (a,b) cellulose microsheets, (c,d) CNTs slurry after drying, (e,f) SN-800.

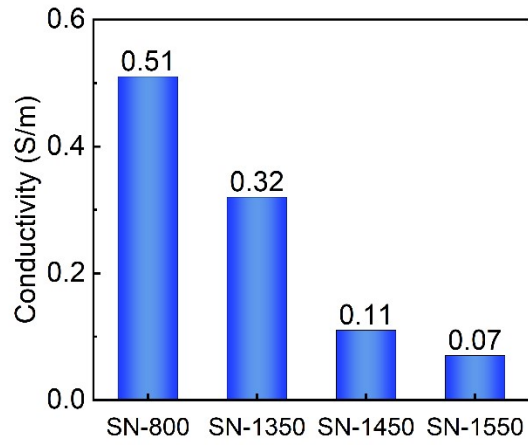


Fig. S6 The conductivity of the samples.

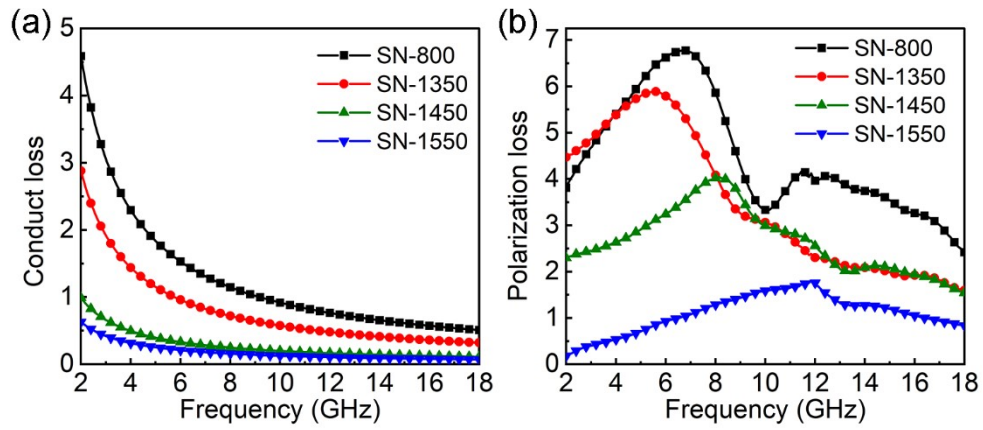


Fig. S7 Frequency dependence of the (a) conductance loss (ϵ_c''), and (b) polarization loss (ϵ_p'') of the samples.

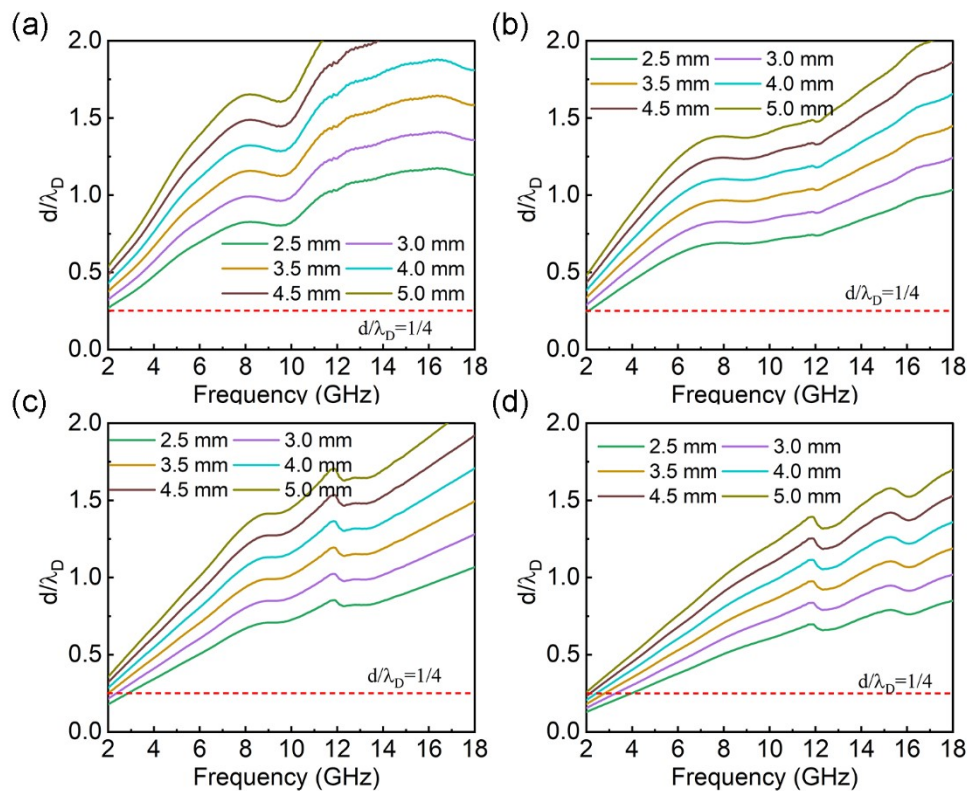


Fig. S8 Frequency dependence of d/λ_D (a) SN-800, (b) SN-1350, (c) SN-1450, and (d) SN-1550.

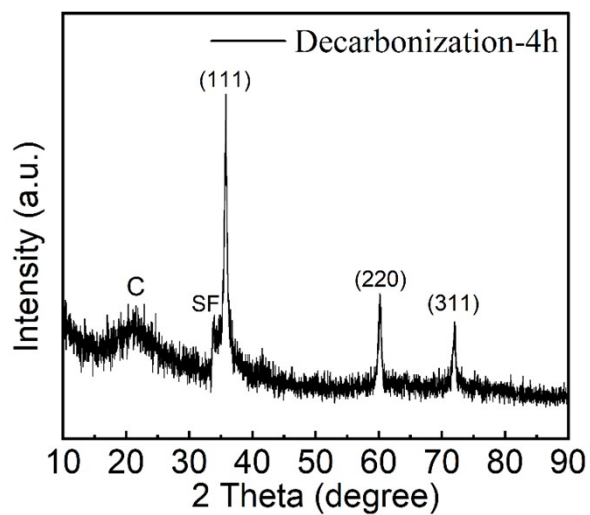


Fig. S9 XRD of Decarbonization-4h.

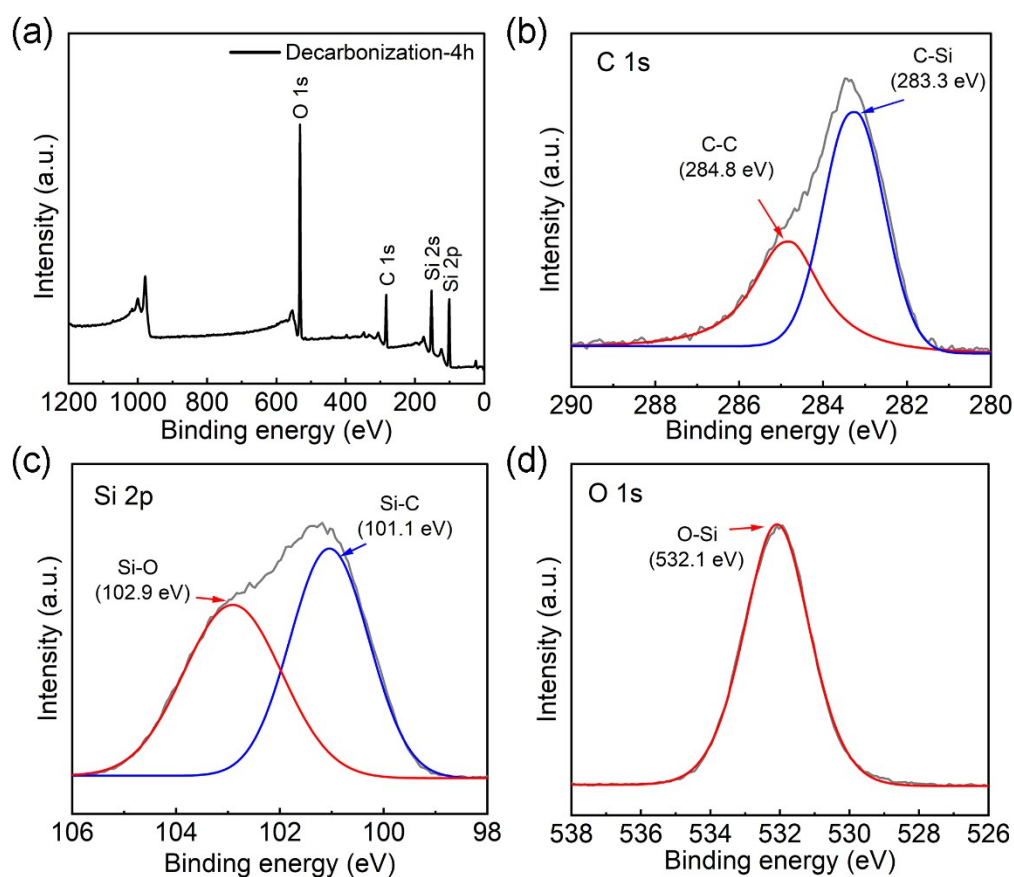


Fig. S10 (a) XPS survey spectra and (b) C 1s, (c) Si 2p, and (d) O 1s regions of Decarbonization-4h.

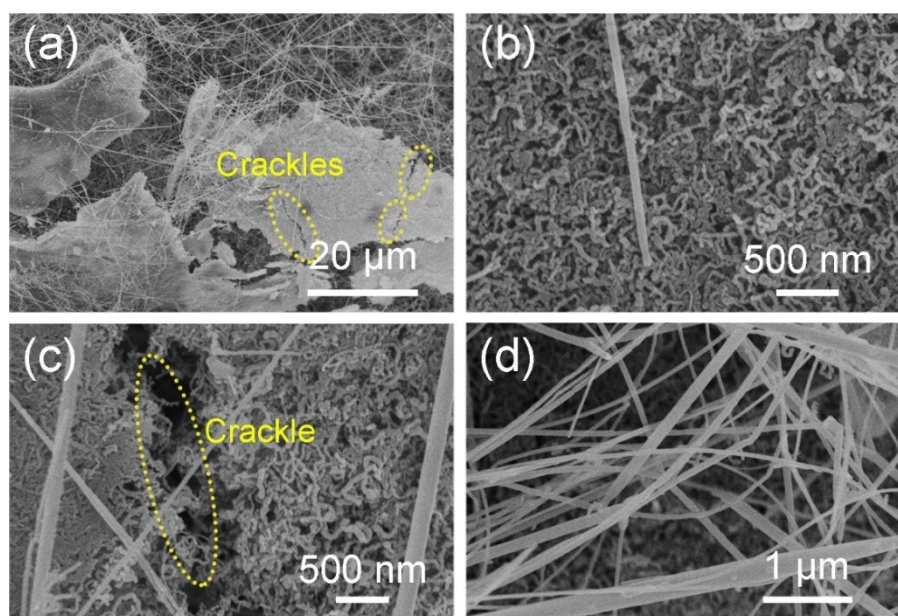


Fig. S11 SEM images of Decarbonization-4h.

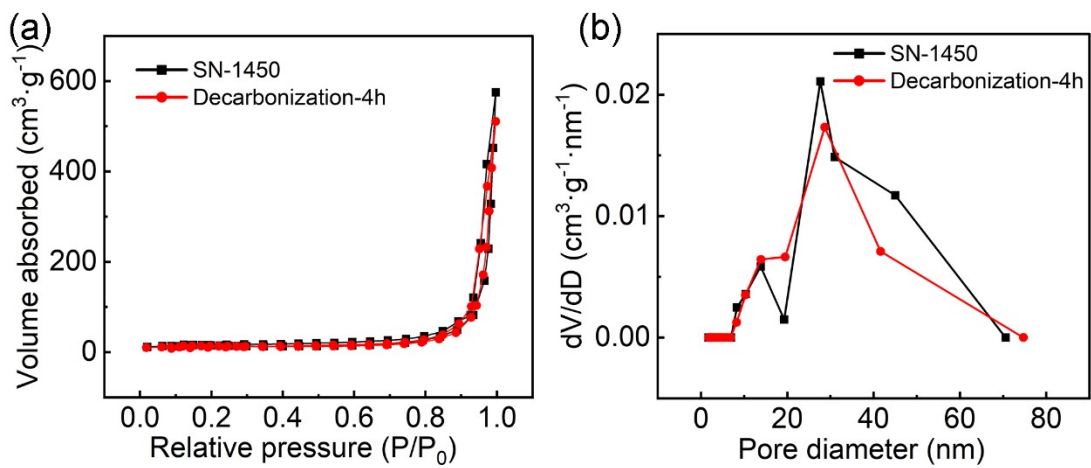


Fig. S12 (a) N₂ adsorption–desorption isotherms at 77 K and (b) pore size distributions of SN-1450 and Decarbonization-4h.

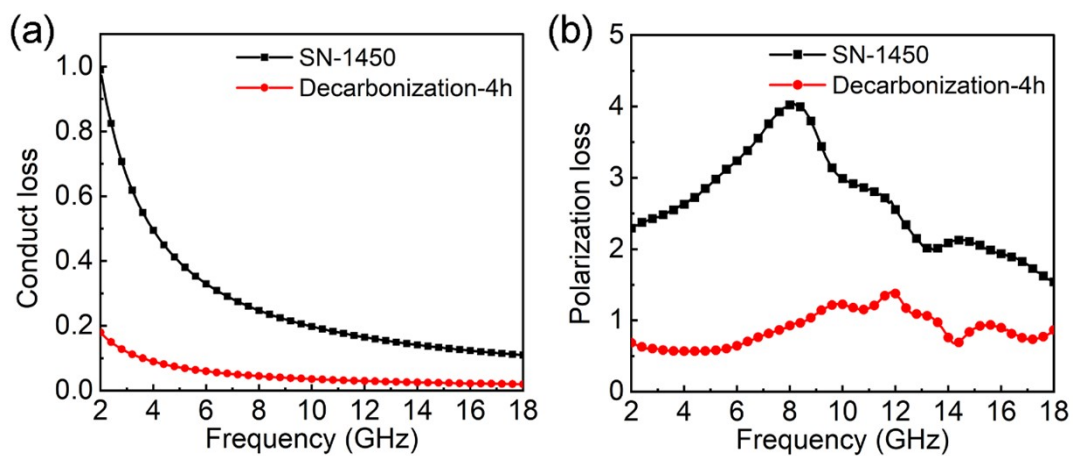


Fig. S13 Comparison of (a) conduction loss (ϵ_c''), and (b) polarization loss (ϵ_p'') for SN-1450 and Decarbonization-4h.

Table. S2 Summary of EMW absorption performance of other relevant studies.

Sample	EAB _{max} (GHz)	Thickness (mm)	The EAB _{max} at a normalized thickness of 4.3mm (GHz)	Reference
Polydopamine-MXene- polydopamine	3.1	1.5	8.88	1
CNT/Cement	12.8	25	2.20	2
Fe ₃ O ₄ @C@NiO	9.9	4.9	8.69	3
Carbon matrix composites	4.64	3.1	6.44	4
CF/CoNi@C/TPU	4.81	2.14	9.66	5
η-MoC/Co@NC-800	4.85	2.5	7.88	6
SiC/MWCNTs	3.34	1.5	9.57	7
Co@C and MXene	4.1	2.5	7.05	8
Co/MnO@NC	6.32	3.5	7.76	9
WS ₂	4.72	3.19	6.36	10
This work	11.04	4.3	11.04	

Reference

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