## **Supporting Information**

## Construction of Heterogeneous Wave-Absorbing Structures Inspired by Cucumbers

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Fig. S1 TGA curves.



Fig. S2 Diameter distribution of (a) MC-CNFs-700; (b) MC-CNFs-900; (c) MC-CNFs-1100; (d) MC-CNFs-1300.



Fig. S3 TEM images of (a) MC-CNFs-700; (b) MC-CNFs-900; (c) MC-CNFs-1100; (d) MC-CNFs-1300.



Fig. S4 TEM images of MC-CNFs-1100.

$$L_d(\text{nm}) = \sqrt{(1.8 \pm 0.5) \times 10^{-9} \lambda_L^4 (\frac{I_D}{I_G})^{-1}}$$
(S1)

$$n_d(\mathrm{cm}^{-2}) = \frac{(1.8 \pm 0.5) \times 10^{22}}{\lambda_L^4} (\frac{I_D}{I_G})$$
(S2)



Fig. S5 Comparison of dielectric and magnetic loss of (a) MC-CNFs-700; (b) MC-CNFs-900; (c) MC-CNFs-1100; (d) MC-CNFs-1300.



Fig. S6 2D maps of RL values of: (a) MC-CNFs-700; (b) MC-CNFs-900; (c) MC-CNFs-1100; (d) MC-CNFs-1300.

$$t_{m} = \frac{nc}{4f_{m}\sqrt{|\varepsilon_{r}\mu_{r}|}} (n = 1, 3, 5...)$$
(S3)

where  $t_{m}\xspace$  is the matching thickness and  $f_{m}\xspace$  is the matching frequency.



Fig. S7 The Z of MC-CNFs-X at the same thickness.



Fig. S8 Dependence of the matching thickness on matching frequency at the quarter wavelength of: (a) MC-CNFs-700; (b) MC-CNFs-900; (c) MC-CNFs-1300.



Fig. S9 Cole-Cole curves of (a) MC-CNFs-700; (b) MC-CNFs-900; (c) MC-CNFs-1300.



Fig. S10 The  $\epsilon_c{}^{"}$  and  $\epsilon_p{}^{"}$  of MC-CNFs-1100.



Fig. S11 3D RCS plot of (a) PEC; (b) MC-CNFs-700; (c) MC-CNFs-900 and (d) MC-CNFs-1300.