Supporting Information

Enhanced Ultra-Broadband Electromagnetic Wave Absorption Using Liquid Metal-Coated Carbonyl Fe/Ni Particles with Dual Dielectric Polarization

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Supplementary Fig.s and Tables

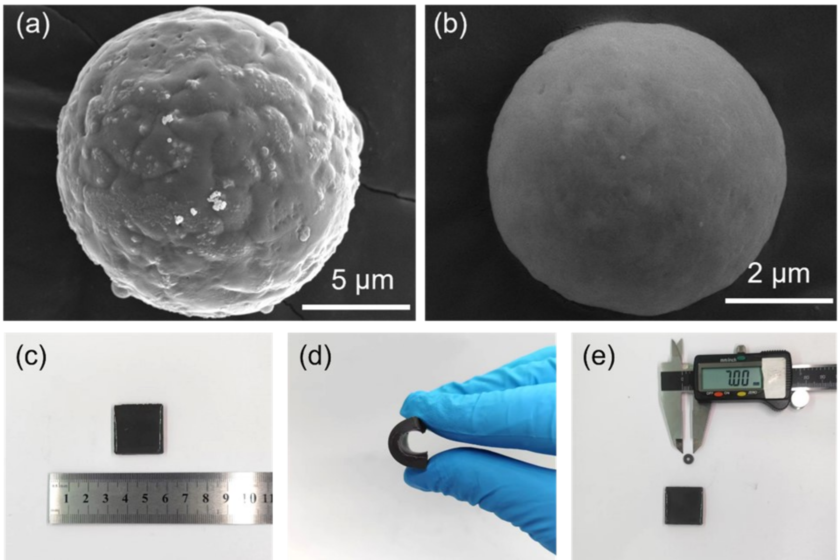

Fig. S1 Scanning electron microscopy (SEM) image of (a) Ni, and (b) Fe. (c) Schematic of Fe/Ni @LM-PDMS. (d) Demonstration of the flexibility of Fe/Ni@LM-PDMS. (e) Sample for testing the electromagnetic parameters of Fe/Ni @LM-PDMS.

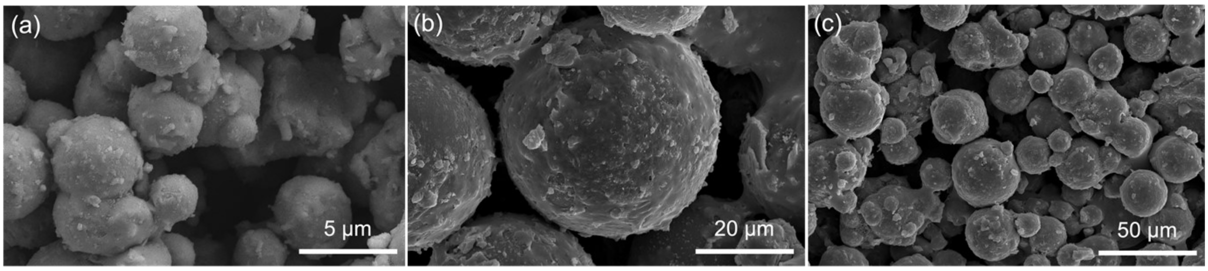

Fig. S2 Scanning electron microscopy (SEM) image of (a) Fe@LM, and (b) Ni@LM, and (c) Fe/Ni@LM.

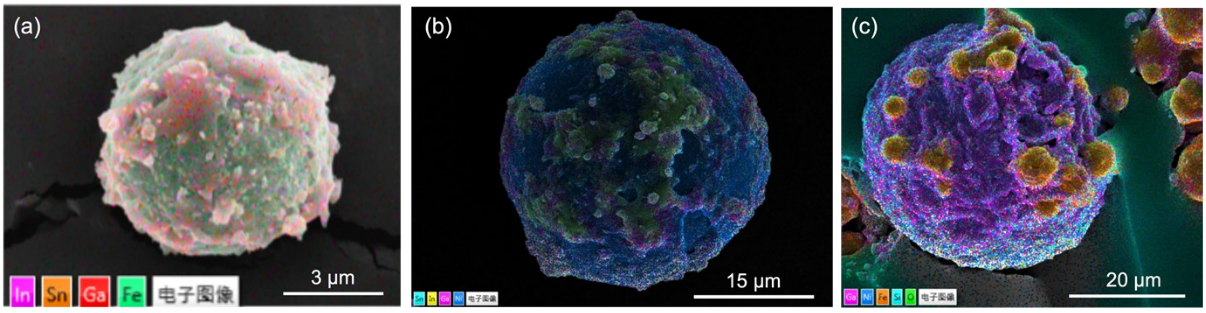

Fig. S3 (a–c) SEM images of the microstructures and elemental distribution of Fe@LM, Ni@LM, and Fe/Ni@LM

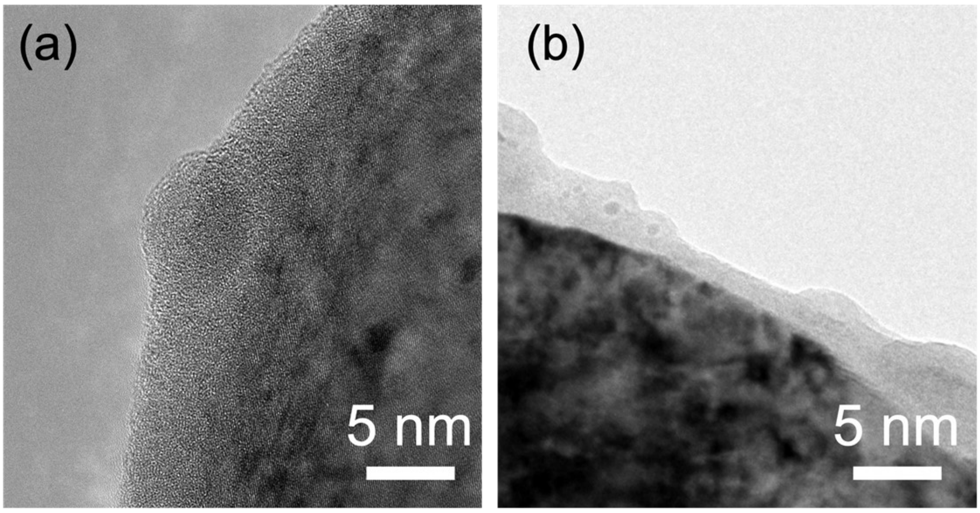

Fig. S4 (a, b) HRTEM images of Fe/LM and Ni/LM, respectively.

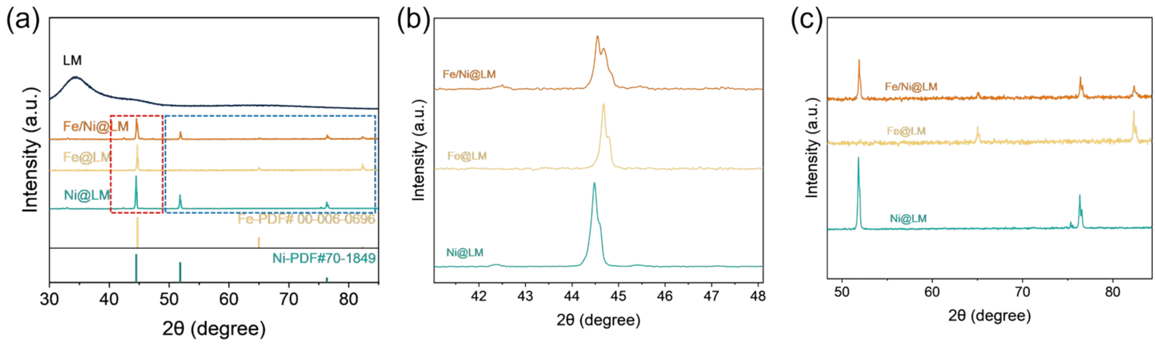

Fig. S5 (a-c) XRD spectra of Fe@LM, Ni@LM, Fe/Ni@LM.

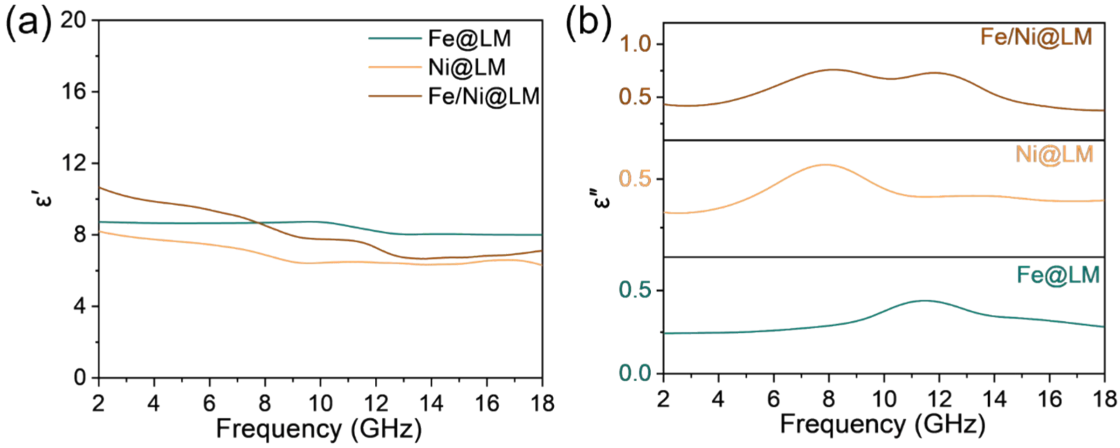

Fig. S6 The (a) ε′, (b) ε'' for Fe@LM, Ni@LM and Fe/Ni@LM.

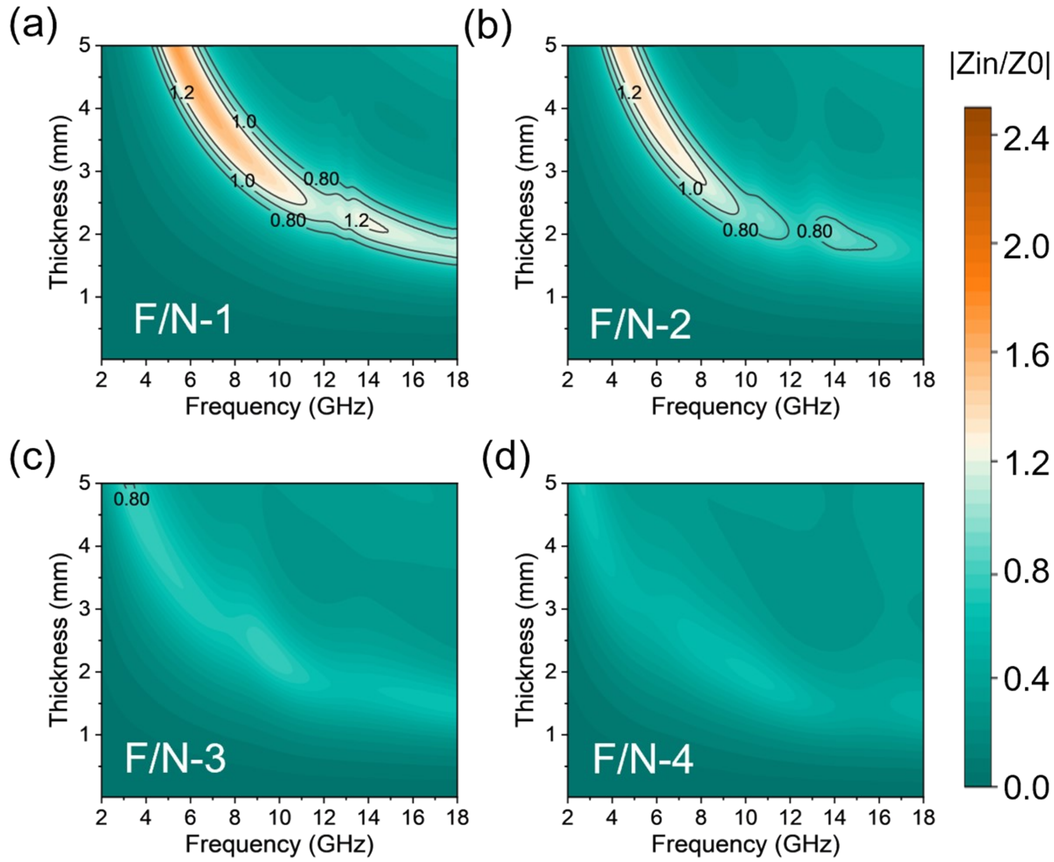

Fig. S7 (a-d) Impedance matching degree maps $|Z_{in}/Z_0|$.

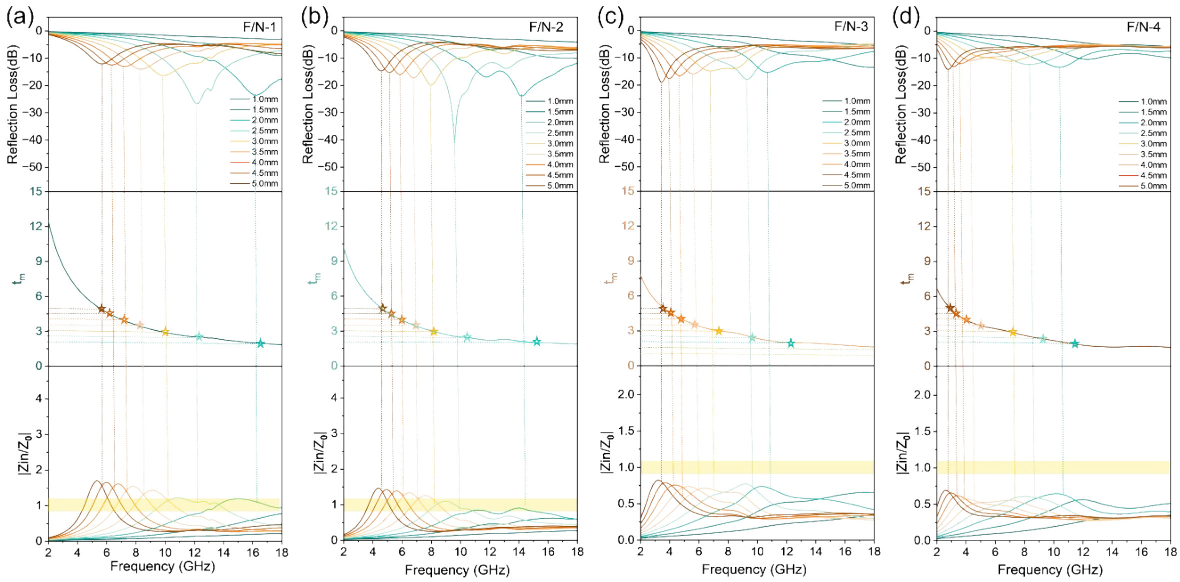

Fig. S8 *RL* as a function of matched thickness and frequency at a quarter-wavelength ($\lambda/4$) and impedance matching characteristics for (a) F/N-1, (b) F/N-2, (c) F/N-3 and (d) F/N-4.

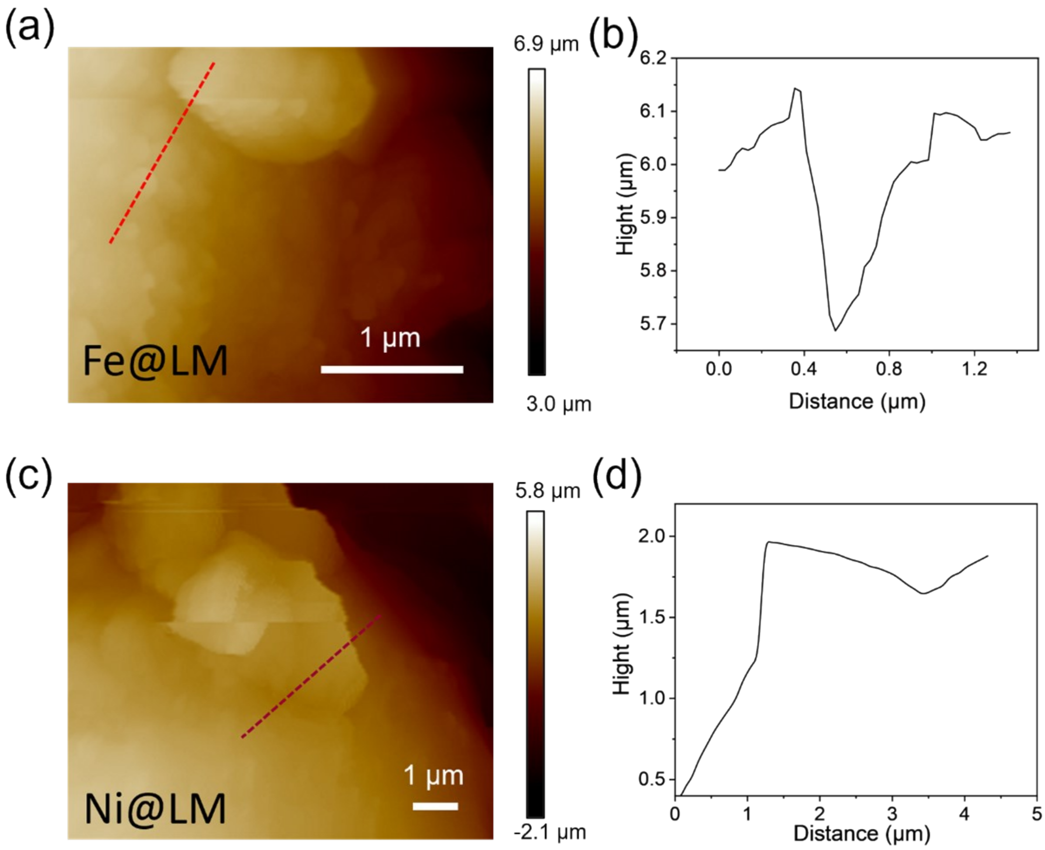

Fig. S9 Atomic force microscopy (AFM) and height profile images of (a, b) Fe@LM and (c, d) Ni@LM.

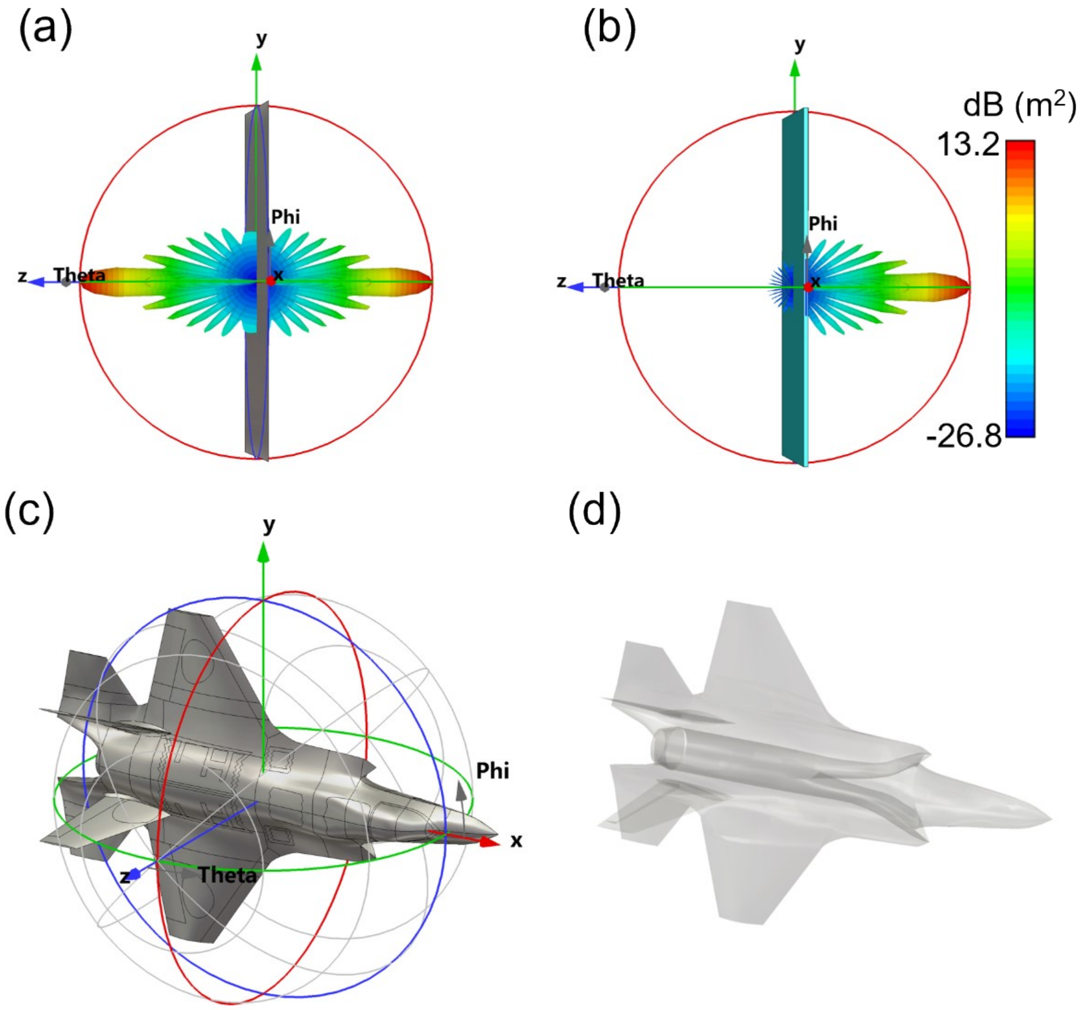

Fig. S10 (a, b) 3D diagrams of radar cross-section (RCS) simulations for a perfect electric conductor (PEC) with a thickness of 0.1 mm and Fe/Ni@LM with a thickness of 1.96 mm at 12.22 GHz. (c) Simulation of the F-35 aircraft in CST Studio Suite 2022. (d) Location of stealth coating on the fighter aircraft.

Table S1. Comparison of RL_{min} and EAB among reported absorbers for electromagnetic wave absorption

Absorbers	EAB (GHz)	Thickness (mm)	Reference
TiO_2@Fe_3O_4@PPy	6.00	3.20	[1]
$NiFe_2O_4$@PPy	6.80	2.62	[2]
PPy/Fe_3O_4	6.16	3.70	[3]
CIP@void@NC	6.90	1.70	[4]
CIP@SiO_2@Mn	7.12	2.00	[5]
Fe/RGO	7.52	2.62	[6]
Cu/CuO/C	6.28	2.40	[7]
2D-MOFs(Co/Ni/X)	7.60	2.60	[8]
Co/Ni/C	7.30	2.00	[9]
OMC/Si@Ni	8.00	2.50	[10]
2D-CoNi	6.24	2.60	[11]
$CoFe_2O_4$@rGO	5.90	2.20	[12]
$MnFe_2O_4$/RGO	4.80	3.50	[13]
Fe/Ni@LM	9.05	2.43	This work

Supporting references

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