Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Electronic Supplemnetary Information

Pyrolysis-controlled FeCoNi@hard carbon composites with facilitated impedance matching for strong electromagnetic wave response

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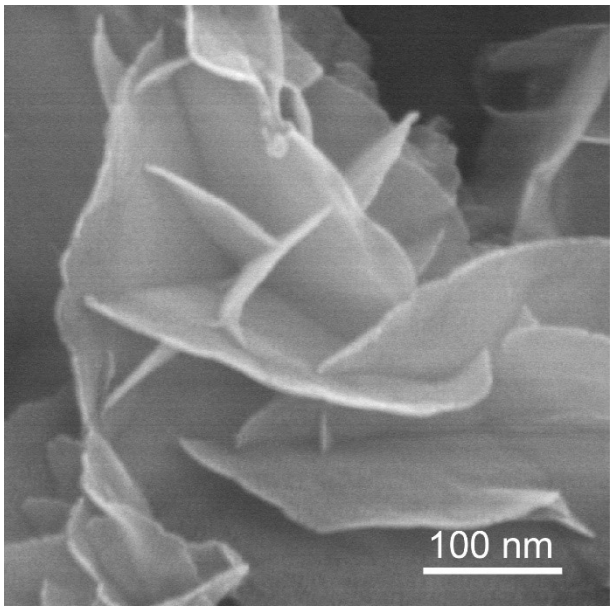

Fig. S1 SEM image of FeCoNi NSs

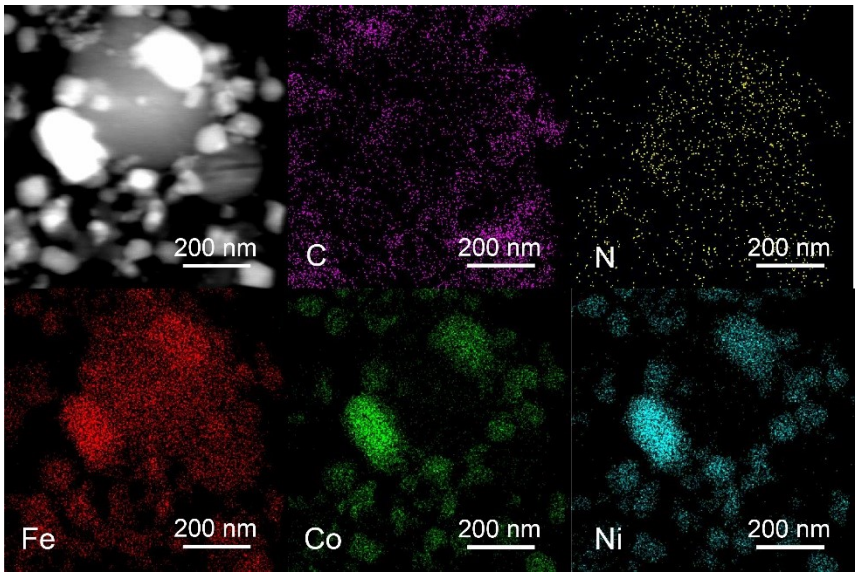

Fig. S2 HAADF-STEM and elemental mapping of FeCoNi@HC composites at 900 °C

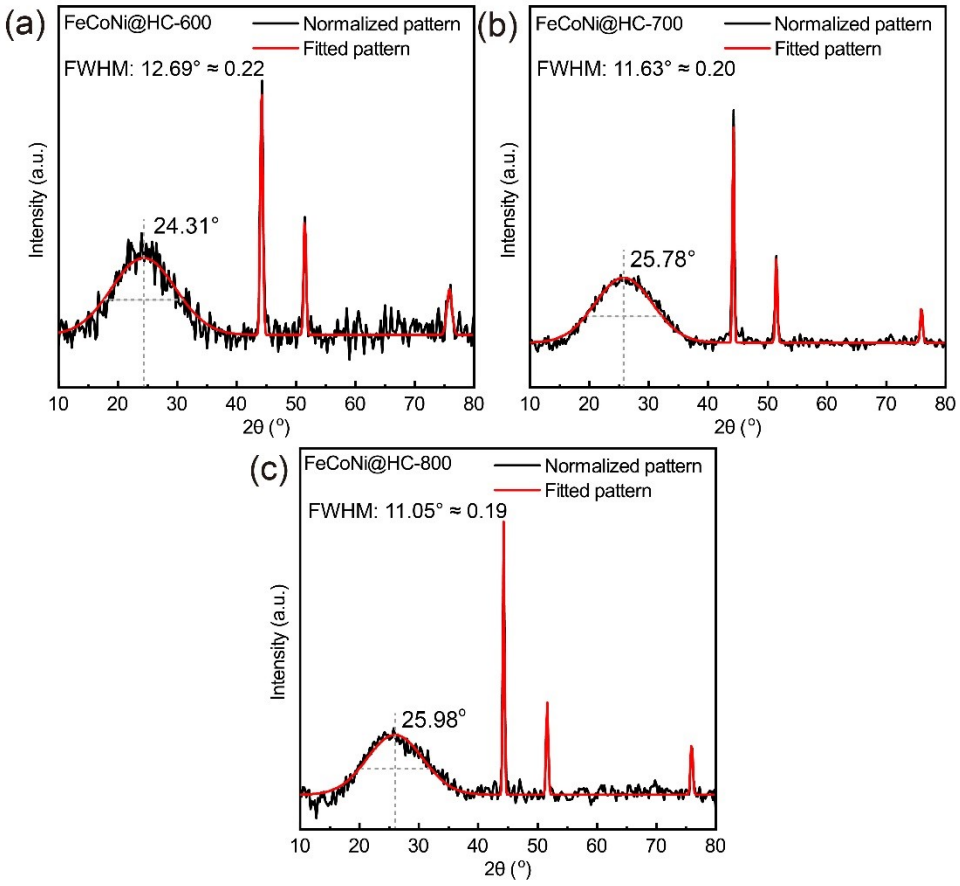

Fig. S3 Normalized XRD patterns for confirming θ and β values based on the (002) peaks

For exact measuring the (002) peak of HC, the normalized XRD patterns are fitted through the corresponding four peaks of the raw XRD results, and therefore the θ and β values can be

extracted for the XRD patterns. It should be noted that since the β value for Scherrer equation is supported by radian format while the FWHM outputs of (002) peak is degree format, the radian format of β value for calculation then were transferred from degree to radian format based on the equation: $\beta = \beta^{\circ} \times \pi/180^{\circ}$. Here, the β values are 0.22 for FeCoNi@HC-600, 0.20 for FeCoNi@HC-700, and 0.19 for FeCoNi@HC-800, respectively.

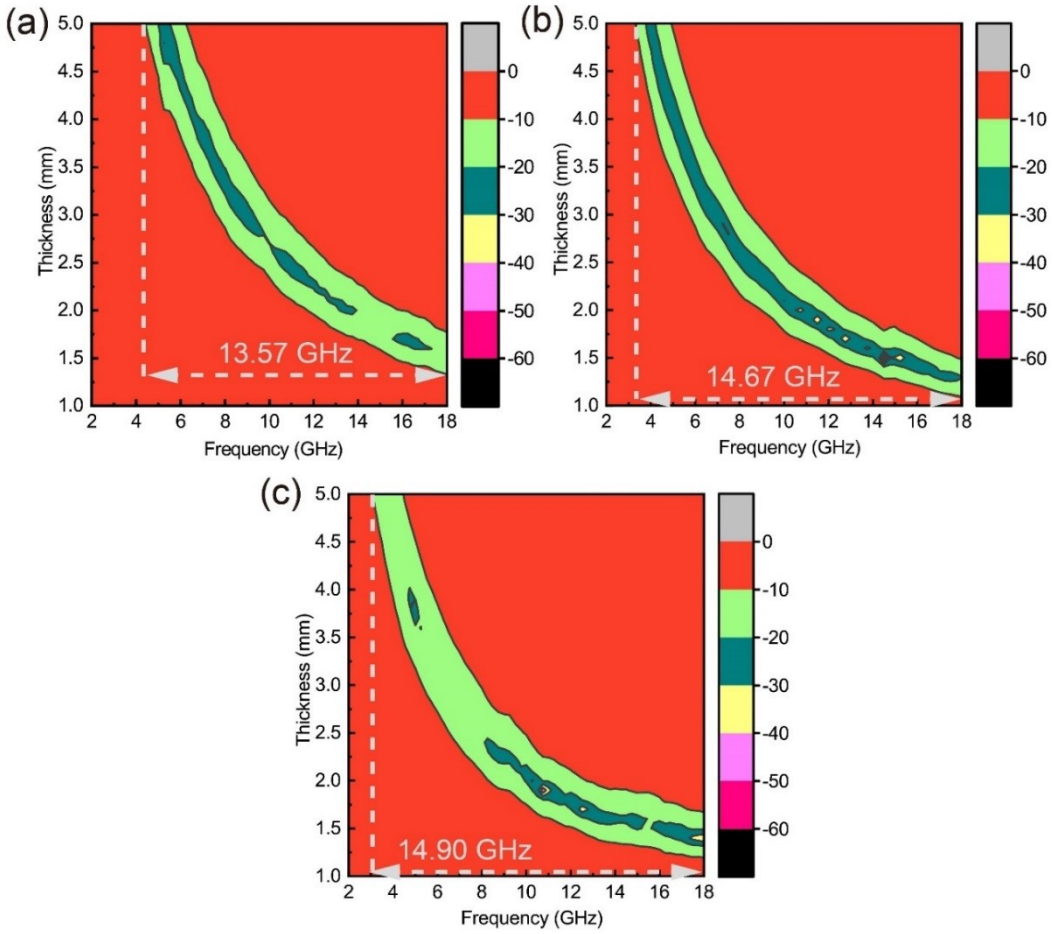

Fig. S4 2D RL contour maps of the FeCoNi@HC composites. (a) FeCoNi@HC-600; (b) FeCoNi@HC-700; (c) FeCoNi@HC-800.

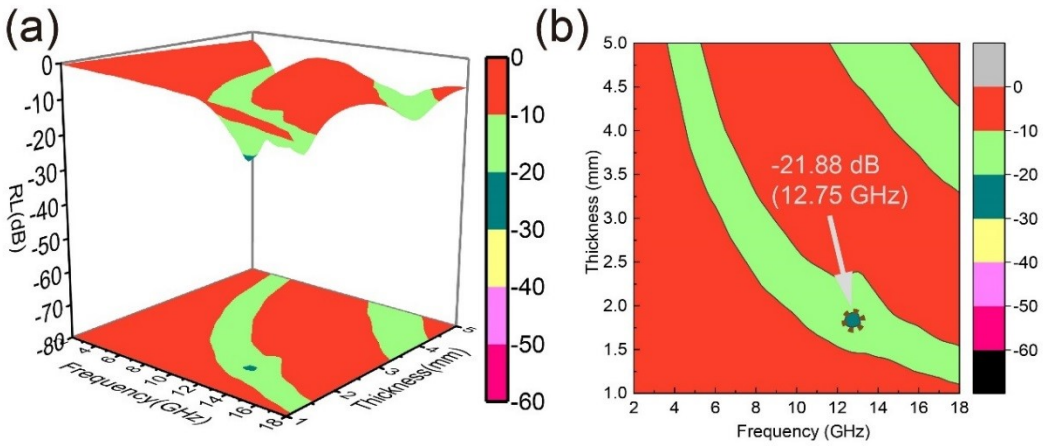

Fig. S5 3D/2D RL contour maps of FeCoNi NSs.

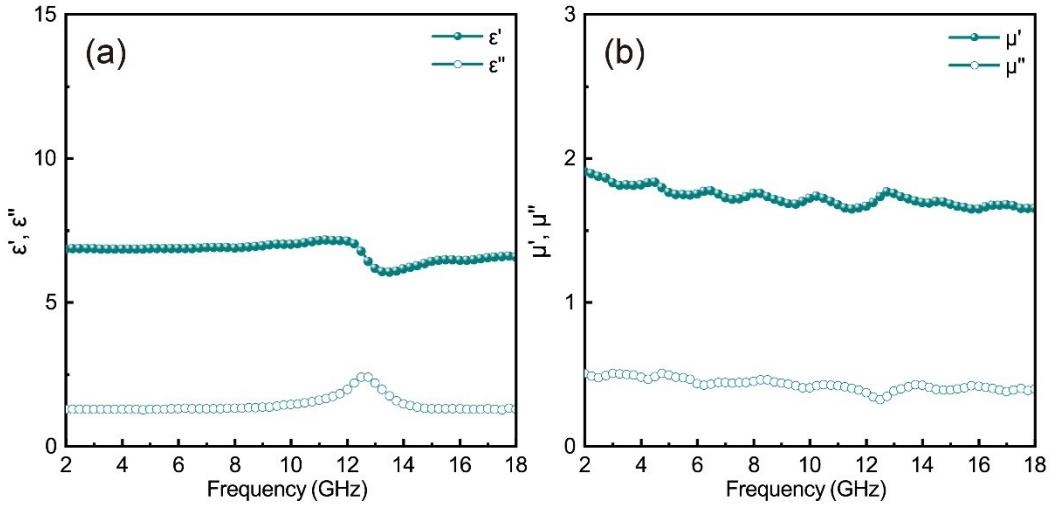

Fig. S6 Electromagnetic parameters of FeCoNi NSs. (a) the real/imaginary parts of complex permittivity; (b) the real/imaginary parts of complex permeability.

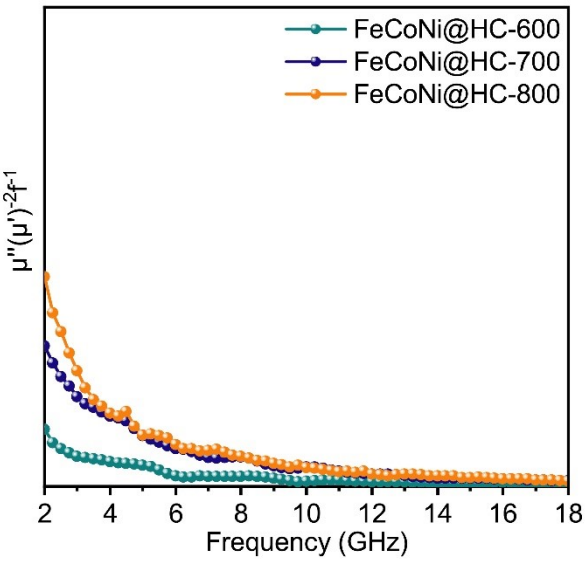

Fig. S7 C_0 curves of the FeCoNi@HC composites

Table S1 Fitting parameters of Raman spectra in the composites

Samples	Integral area (%)				S_D/S_G	S_{D3}/S_G	S_{D4}/S_G	Total
	D	G	D3	D4				
FeCoNi@HC-600	57.15	19.41	18.38	5.06	2.94	0.95	0.26	4.15
FeCoNi@HC-700	53.83	24.61	14.93	6.62	2.19	0.61	0.27	3.07
FeCoNi@HC-800	54.70	26.59	9.06	9.65	2.06	0.34	0.36	2.76

Table S2 EAB/EAB* values and related RL peaks with various thicknesses in the composites FeCoNi@HC-600:

Thickness (mm)	RL peak (dB)	Frequency of RL peak (GHz)	EAB (RL ≤ -10 dB) (GHz)	EAB* (RL ≤ -20 dB) (GHz)
1.5	-19.13	18.00	2.50 (15.50-18.00)	0.73 (13.16-13.89)
2.0	-21.72	13.75	4.30 (11.70-16.00)	0.81 (10.41-11.22)
2.5	-24.66	10.75	3.41 (9.27-12.68)	0.81 (8.52-9.33)
3.0	-26.38	9.00	2.94 (7.62-10.56)	0.59 (7.37-7.96)
3.5	-23.42	7.75	2.55 (6.55-9.10)	0.46 (6.48-6.94)
4.0	-21.08	6.75	2.19 (5.73-7.92)	0.59 (7.37-7.96)
4.5	-21.66	6.00	2.09 (4.96-7.05)	0.46 (6.48-6.94)
5.0	-21.01	5.25	1.82 (4.43-6.25)	0.51 (4.98-5.49)

FeCoNi@HC-700:

Thickness (mm)	RL peak (dB)	Frequency of RL peak (GHz)	EAB (RL ≤ -10 dB) (GHz)	EAB* (RL ≤ -20 dB) (GHz)
1.5	-61.14	14.50	5.53 (12.33-17.86)	1.96 (14.05-16.01)
2.0	-32.52	10.50	4.05 (8.98-13.03)	1.43 (10.07-11.50)
2.5	-27.59	8.50	3.22 (7.03-10.25)	1.07 (7.91-8.98)
3.0	-29.93	7.00	2.77 (5.75-8.52)	0.50 (6.88-7.38)
3.5	-26.49	5.75	2.50 (4.75-7.25)	0.64 (5.54-6.18)
4.0	-25.01	5.00	2.12 (4.13-6.25)	0.63 (4.78-5.41)
4.5	-25.46	4.50	1.83 (3.68-5.51)	0.56 (4.14-4.70)
5.0	-28.23	4.00	1.61 (3.31-4.92)	0.43 (3.76-4.19)

FeCoNi@HC-800:

Thickness (mm)	RL peak (dB)	Frequency of RL peak (GHz)	EAB (RL ≤ -10 dB) (GHz)	EAB* (RL ≤ -20 dB) (GHz)
1.5	-25.34	16.50	5.75 (12.25-18.00)	1.64 (15.62-17.26)
2.0	-30.79	10.25	4.55 (8.29-12.84)	0.79 (9.94-10.73)
2.5	-19.35	8.00	3.37 (6.53-9.90)	0
3.0	-19.68	6.50	2.59 (5.31-7.90)	0
3.5	-19.24	5.25	2.20 (4.42-6.62)	0
4.0	-20.35	4.75	1.84 (3.91-5.75)	0.06
4.5	-18.66	4.00	1.53 (3.50-5.03)	0
5.0	-19.51	3.75	1.38 (3.08-4.46)	0

Table S3 An EM absorbing comparison summary of FeCoNi-based MAs in the recent works.

Samples	RL_{min} (dB)	EAB (GHz)	RL_{min} peak (GHz)	Filling ratio (wt%)	Thickness (mm)	Ref.
U-channelled FeCoNi	-36.9	About 6.10	8.6	75	2.5	1
Flake-like FeCoNi	-51	4.44	8	30	2.0	2
FeCoNi/graphene/TPU	-68	About 2.2	8.4	45.4	2.33	3
FeCoNi@PMMA	-37.2	4.5	12.2	45	1.5	4
Graphene/FeCoNi	-18.4	9.2	2.44	60	2	5
FeCoNi@HC-700	-61.12	5.53	14.50	30	1.5	This work

References

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