**Supplementary Information**

**Promoting the microwave absorption performance of** **hierarchical CF@NiO/Ni composites** **via phase and morphology evolution**

Shipeng Wang1), Ziyan Liu1), Qiangchun Liu4), Baojun Wang1), Wei Wei1), Hao Wu1), Zijie Xu1), Shikuo Li1,2),🖂, Fangzhi Huang2,3),🖂, and Hui Zhang1,2),🖂

1) School of Materials Science and Engineering, Anhui University, Hefei 230601, China

2)Key Laboratory of Structure and Functional Regulation of Hybrid Materials, Ministry of Education, Anhui University, Hefei 230601, China

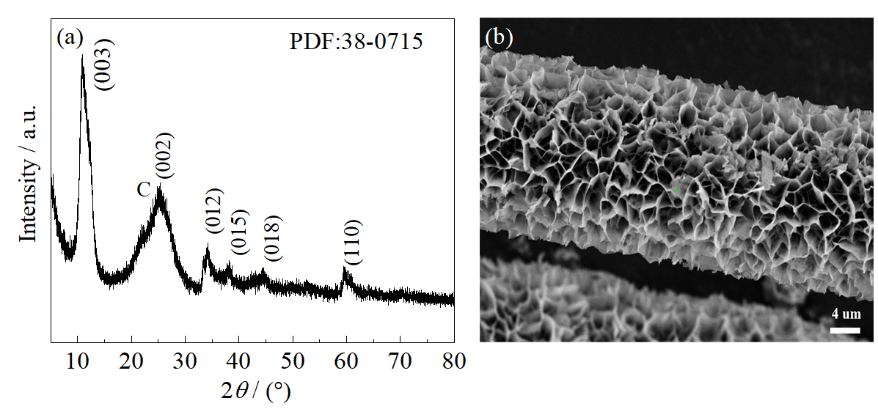
3) School of Chemistry and Chemical Engineering, Anhui University, Hefei 230601, China

4) School of Physics and Electronic Information, Huaibei Normal University, Huaibei 235000, China

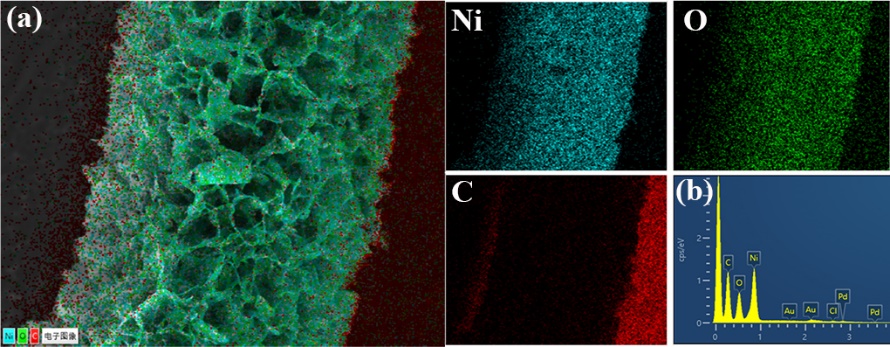
🖂 Corresponding authors:Shikuo Li E-mail: lishikuo@ahu.edu.cn;

Fangzhi Huang E-mail: huangfangzhi@163.com;

Hui Zhang E-mail: zhhui@ahu.edu.cn



**Fig. S1. (a) XRD pattern and (b) SEM image of CF@Ni(OH)2 precursors.**



**Fig. S2. (a) Elemental mapping and (b) EDX spectrum of CF@NiO/Ni-500 composite.**



**Fig. S3. Frequency-dependent relative complex permittivity of CF.**



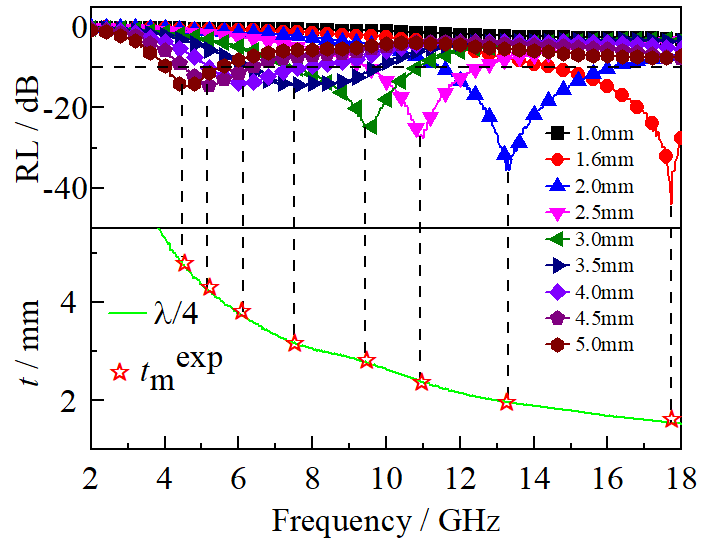
**Fig. S4. Typical Cole−Cole semicircles for the as-prepared composites.**



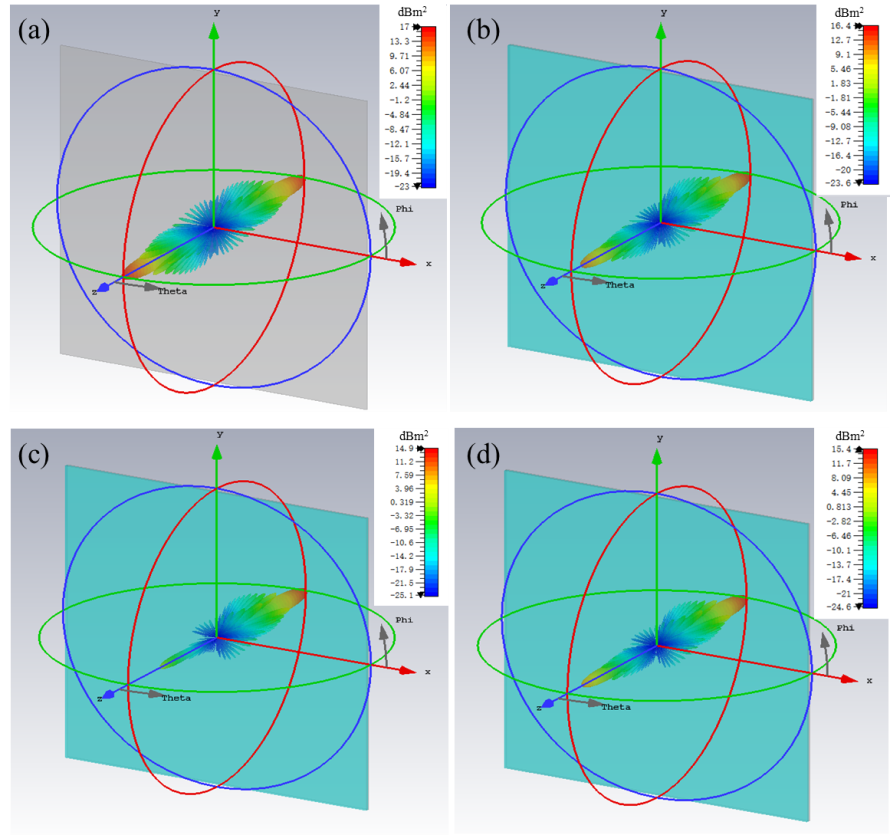
**Fig. S5. Frequency dependence of eddy current loss for the as-prepared composites.**



**Fig. S6. Frequency dependence of RL of CF.**



**Fig. S7. Frequency dependence of RL and simulations of the thickness of absorber (*t*m) versus peak frequency (*f*m) of CF@NiO/Ni-500 composites under the *nλ*/4 model (*n* = 1).**



**Fig. S8. 3D RCS simulation maps of (a) PEC, (b) CF, (c) CF@NiO/Ni-400, and (d) CF@NiO/Ni-500.**

Table S1. Comparison of the absorption properties for CF@NiO/Ni composites with other CF-based MAMs in previous studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample | RL / dB | Loading / wt% | EAB / GHz | Thickness / mm | |SRLt| | |SRLft| | |SRLBft| | Ref. |
| CF/SiC | ‒19.90 | 20 | 2.50 | 2 | 1.00 | 0.50 | 1.24 | [1] |
| CF/Fe3O4/FeO | ‒40.80 | 50 | 6.10 | 1.9 | 0.82 | 0.43 | 2.62 | [2] |
| CF/MoS2/Fe3O4 | ‒21.40 | 20 | 10.85 | 3.8 | 1.07 | 0.28 | 3.06 | [3] |
| CF/TiO2 | ‒58.63 | 50 | 3.40 | 1.1 | 1.17 | 1.07 | 3.62 | [4] |
| CF/Co3O4 | ‒29.00 | 20 | 5.44 | 2 | 1.45 | 0.73 | 3.94 | [5] |
| CF/NiF2O4 | ‒55.80 | 25 | 6.50 | 2.4 | 2.23 | 0.93 | 6.05 | [6] |
| CC/MnO2 | ‒53.20 | 25 | 5.84 | 2 | 2.13 | 1.06 | 6.21 | [7] |
| CC/CoS2 | ‒59.60 | 30 | 9.20 | 2.8 | 1.99 | 0.71 | 6.53 | [8] |
| CF/CO-LDH | ‒24.10 | 5 | 6.50 | 2.1 | 4.82 | 2.30 | 14.92 | [9] |
| CF/1T-2HMoS2 | ‒43.00 | 5 | 8.75 | 2.7 | 8.60 | 3.19 | 27.87 | [10] |
| CF@NiO/Ni-400 | ‒25.85 | 3 | 6.40 | 2.25 | 8.50 | 3.78 | 24.18 | This work |
| CF@NiO/Ni-500 | ‒43.92 | 3 | 5.64 | 1.80 | 14.64 | 8.13 | 45.87 | This work |

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