**Supporting Information**

Ultra-broadband microwave absorber and high-performance pressure sensor based on aramid nanofiber, polypyrrole and nickel porous aerogel

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Fig. S1. Preparation of ANF dispersion.



Fig. S2. (a) Real permittivity (*ε'*), (b) imaginary permittivity (*ε"*), (c) real permeability(*µ'*), and (d) imaginary permittivity (*µ"*) of AP15 and APN.

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Fig. S3. Impedance matching at optimum thickness of (a) AP31; (b) AP11; (c) AP13; (d) AP15; (e) APN aerogel in the frequency range of 1~18 GHz.



Fig. S4. Cole-Cole curve: (a) AP11; (b) AP13; (c) AP15; (d) APN.

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Fig. S5. Temperature-time curves and optical photographs taken with an infrared camera from the top of the aerogel on a heating stage at 100°C.

Table S1. Table of elemental content of C and Ni

|  |  |
| --- | --- |
| Element | at% |
| C | 97.99 |
| Ni | 2.01 |

Table S2. Comparison of the EMA properties in this work with those of other composites in previous studies

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| sample | Filling Content (wt%) | Thickness (mm) | Bandwidth (GHz) | RLmin(dB) | Ref. |
| AP13 aerogel | 10 | 2.95 | 5.823.49 | -20.6-47.9 | This Work |
| AP15 aerogel | 10 | 2.92.6 | 7.186.55 | -35.1-52 |
| APN aerogel | 10 | 2.82.4 | 8.46.24 | -20.7-48.7 |
| Fe3O4/Fe3S4 | 70 | 1.71 | 5.18 | 16.23 | 1 |
| rGO/Nb2CTx/Fe3O4 | 50 | 2.5 | 6.8 | 59.17 | 2 |
| Brconical prisms Ni@C | 40 | 2.4 | 4.4 | -52.9 | 3 |
| Co@CoO | 25 | 1.65 | 3.6 | 62.76 | 4 |
| Fe4N@C | 40 | 2.5 | 6.7 | -42 | 5 |
| Ni/Ni3ZnC0.7/C | 20 | 2 | 5.4 | -40.2 | 6 |
| BCN/C/Co | 48 | 2.3 | 6.6 | -19.6 | 7 |
| 3D Co/N-GCT | 25 | 2 | 3.2 | -- | 8 |
| BN/Ni | 48 | 1.7 | 3 | -- | 9 |
| FMCM | 40 | 2 | 6.5 | -41.9 | 10 |
| Cu3(HHTP)2 | 40 | 2.1 | 5.76 | -43.5 | 11 |
| B4C@GN NSs | 50 | 1.19 | 3.9 | -24.6 | 12 |
| SnO/SnO2 | 25 | 1.4 | 4.3 | -37.6 | 13 |
| Co@C/CG aerogel | 30 | 1.5 | 4.02 | 45.02 | 14 |
| Fe3O4/CA aerogel | 10 | 1.8 | 5.2 | -57 | 15 |
| CNTs@ZIS/CNF aerogel | 2 | 2.7 | 5.8 | -- | 16 |
| C@NiCo2O4 aerogel | 50 | 1.854.09 | 5.7-- | ---54.6 | 17 |
| TiO2/Ti3C2Tx/RGO aerogel | 10 | 22.5 | 4.31 | ---65.3 | 18 |
| CNTs/Fe3O4 aerogel | 50 | 1.4 | 4 | -33.7 | 19 |
| CeO2/porous carbon aerogel | 20 | 2.1 | 5.28 | -- | 20 |
| Shaddock peel-based carbon aerogel  | 20 | 1.7 | 5.8 | -29.5 | 21 |

**Referance**

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