Supporting Information for

# Lotus Leaf-Derived Gradient Hierarchical Porous C/$MoS_2$ Morphology Genetic Composites with Wideband and Tunable Electromagnetic Absorption Performance

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## Supplementary Tables and Figures

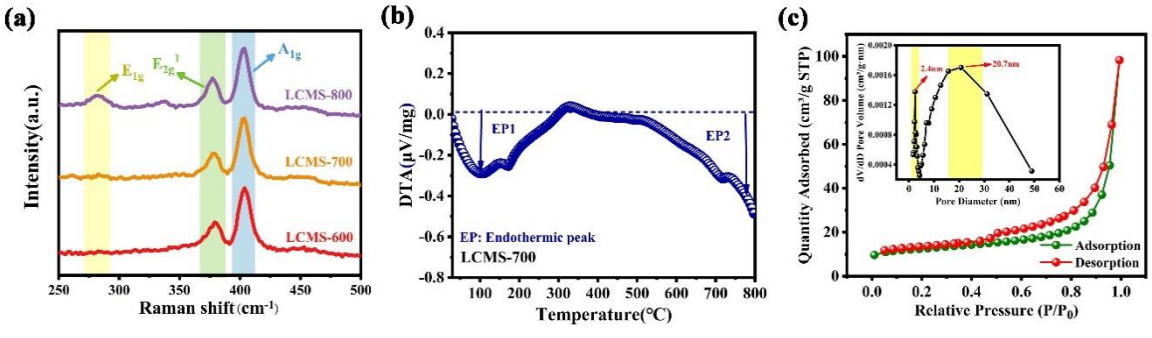


**Fig. S1 a** Raman spectroscopy of samples. **b** DTA curves of LCMS-700. **c** $N_2$ adsorption-desorption isotherms and pore size distribution of LCMS-700

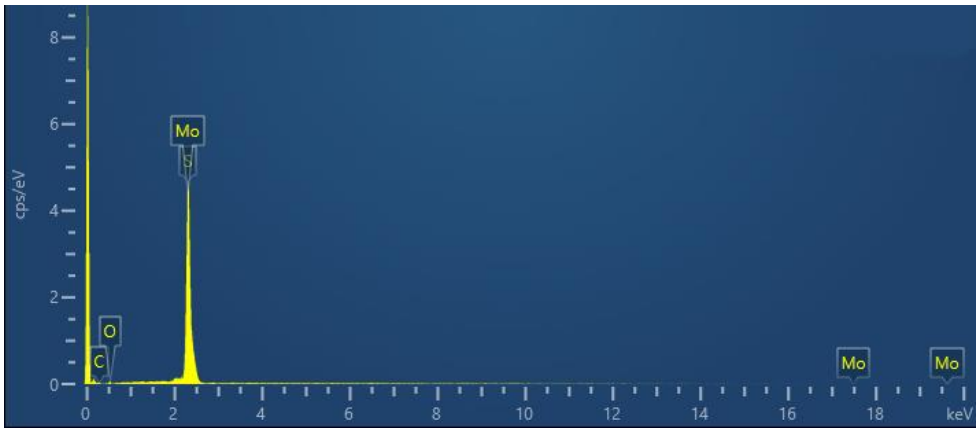


**Fig. S2** Elemental mappings of S, Mo, and C elements of LCMS-700

**Table S1** Elemental Mappings of LCMS-700

| element | line type | wt% weight | wt% sigma | wt% atom |
|---|---|---|---|---|
| S | K | 32.24 | 1.40 | 36.02 |
| Mo | L | 51.49 | 1.99 | 19.23 |
| O | K | 5.10 | 0.95 | 11.43 |
| C | K | 11.17 | 2.41 | 33.32 |
| Amounts | | 100 | | 100 |

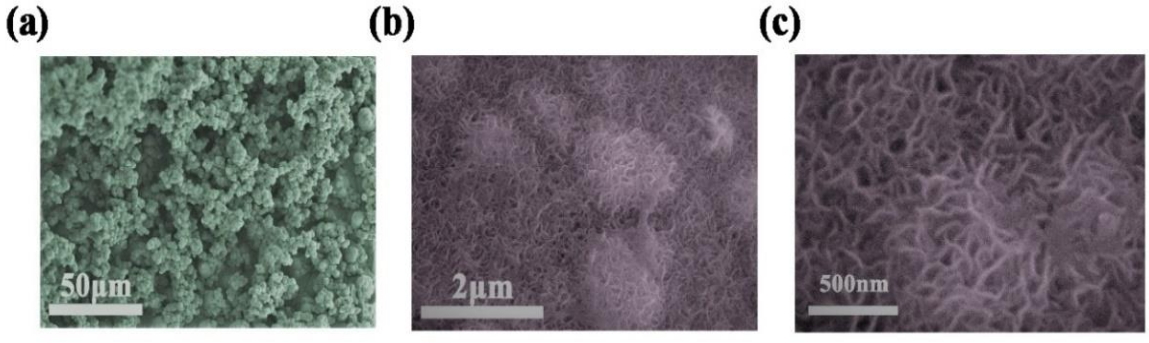


**Fig. S3 a** SEM images of front side of LCMS-700, **b-c** SEM images of back side of LCMS-700

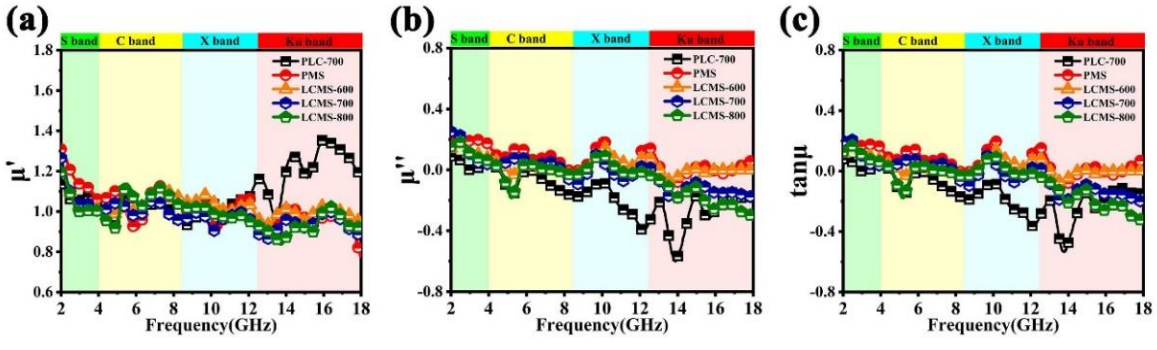


**Fig. S4** EMW parameters of samples. **a** real and **b** imaginary parts of permeability. **c** magnetic loss tangents

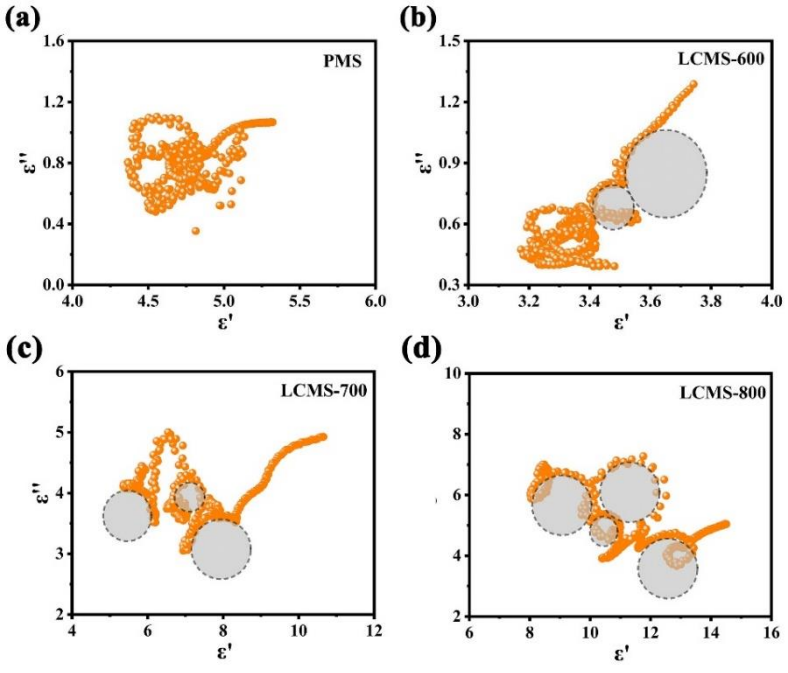


**Fig. S5** Cole–Cole curves of samples: **a** PMS, **b** LCMS-600, **c** LCMS-700, **d** LCMS-800

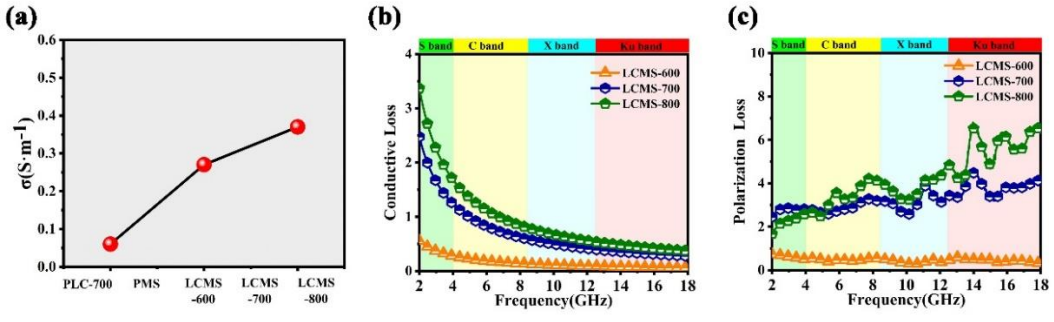


**Fig. S6 a** Conductivity (σ) of samples. **b-c** conduction loss ($\varepsilon_c''$) and polarization loss ($\varepsilon_p''$) of LCMS-600, LCMS-700, and LCMS-800

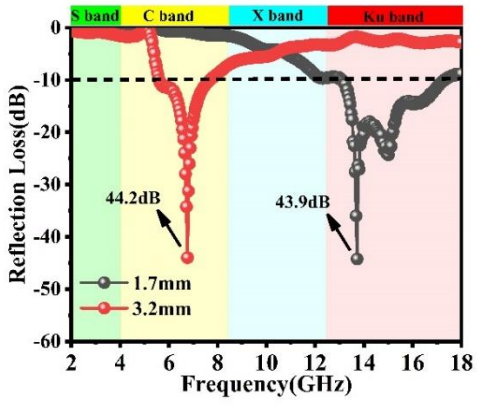


**Fig. S7** Reflection loss of LCMS-800 from 2.0 to 18.0 GHz at 1.7 mm and 3.2 mm

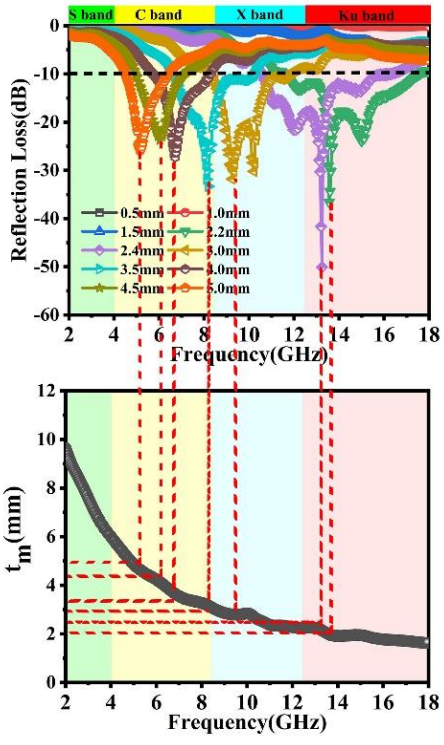


**Fig. S8** Reflection loss and quarter wavelength thickness of LCMS-700 from 2.0 to 18.0 GHz

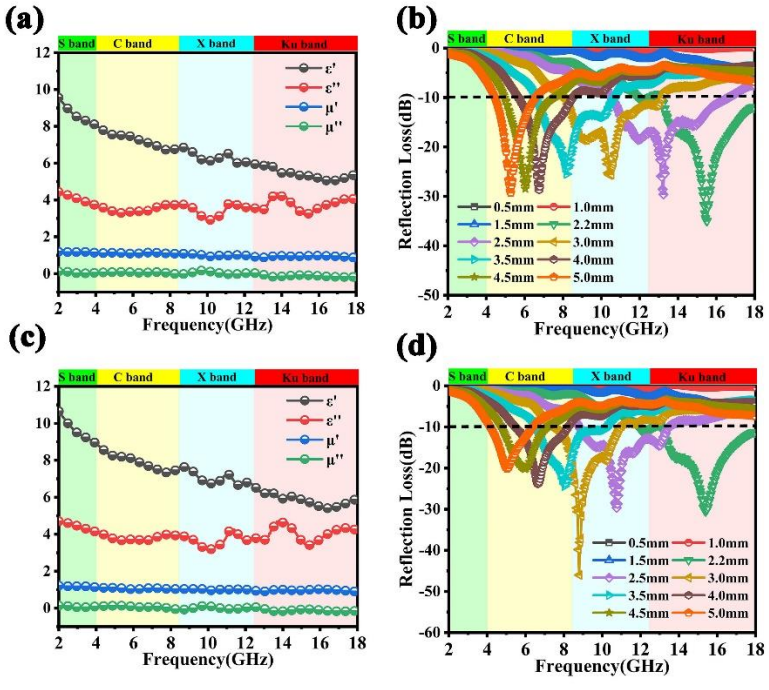


**Fig. S9** EMW parameters and reflection loss at different carbonation heating rates of LCMS-700 from 2.0 to 18.0 GHz: **a-b** 3 °C $min^{-1}$; **c-d** 5 °C $min^{-1}$

**Table S2** Dielectric sum-quotient model ($\varepsilon_{total}$=5)

| $\varepsilon_{total}$=5 | 1.0 mm | 1.2 mm | 1.4 mm | 1.6 mm | 1.8 mm | 2.0 mm |
|---|---|---|---|---|---|---|
| cotε=5.0 | None | None | None | None | None | None |
| cotε=4.0 | None | None | None | None | None | None |
| cotε=3.0 | None | None | None | None | None | None |
| cotε=2.5 | None | None | None | None | None | None |
| cotε=2.0 | None | None | None | None | None | None |
| cotε=1.5 | None | None | None | None | None | None |
| cotε=1.0 | None | None | None | None | None | None |
| $\varepsilon_{total}$=5 | 2.2 mm | 2.4 mm | 2.6 mm | 2.8 mm | 3.0 mm | |
| cotε=5.0 | None | None | None | None | None | |
| cotε=4.0 | None | None | None | None | None | |
| cotε=3.0 | None | 16.4-18.0 | 15.1-17.9 | 14.0-16.6 | 13.1-15.5 | |
| cotε=2.5 | 17.2-18.0 | 15.8-18.0 | 14.6-18.0 | 13.6-18.0 | 12.6-17.8 | |
| cotε=2.0 | 17.0-18.0 | 15.6-18.0 | 14.4-18.0 | 13.3-18.0 | 12.4-18.0 | |
| cotε=1.5 | 17.0-18.0 | 15.6-18.0 | 14.4-18.0 | 13.3-18.0 | 12.4-18.0 | |
| cotε=1.0 | 17.6-18.0 | 16.1-18.0 | 14.8-18.0 | 13.8-18.0 | 12.8-18.0 | |

**Table S3** Dielectric sum-quotient model ($\varepsilon_{total}$=10)

| $\varepsilon_{total}$=10 | 1.0 mm | 1.2 mm | 1.4 mm | 1.6 mm | 1.8 mm | 2.0 mm |
|---|---|---|---|---|---|---|
| cotε=5.0 | None | None | None | None | None | None |
| cotε=4.0 | None | None | None | 16.2-18.0 | 14.4-16.4 | 13.0-14.8 |
| cotε=3.0 | None | None | None | 15.8-18.0 | 14.1-18.0 | 12.7-16.2 |
| cotε=2.5 | None | None | None | 15.8-18.0 | 14.1-18.0 | 12.6-17.0 |
| cotε=2.0 | None | None | None | 16.0-18.0 | 14.2-18.0 | 12.8-17.8 |
| cotε=1.5 | None | None | None | 16.4-18.0 | 14.6-18.0 | 13.1-18.0 |
| cotε=1.0 | None | None | None | None | 16.1-18.0 | 14.4-18.0 |
| $\varepsilon_{total}$=10 | 2.2 mm | 2.4 mm | 2.6 mm | 2.8 mm | 3.0 mm | |
| cotε=5.0 | None | None | None | None | None | |
| cotε=4.0 | 11.8-13.4 | 10.8-12.3 | 10.0-11.4 | 9.2-10.5 | 8.6-9.8 | |
| cotε=3.0 | 11.5-14.7 | 10.0-13.5 | 9.7-12.4 | 9.0-11.5 | 8.4-10.8 | |
| cotε=2.5 | 11.5-15.4 | 10.6-14.1 | 9.7-13.0 | 9.0-12.1 | 8.4-11.3 | |
| cotε=2.0 | 11.6-16.2 | 10.6-14.8 | 9.8-13.7 | 9.1-12.7 | 8.5-11.9 | |
| cotε=1.5 | 12.0-16.9 | 11.0-15.5 | 10.1-14.3 | 9.4-13.3 | 8.8-12.4 | |
| cotε=1.0 | 13.2-16.6 | 12.0-15.2 | 11.1-14.0 | 10.3-13.0 | 9.6-12.1 | |

**Table S4** Dielectric sum-quotient model ($\varepsilon_{total}$=15)

| $\varepsilon_{total}$=15 | 1.0 mm | 1.2 mm | 1.4 mm | 1.6 mm | 1.8 mm | 2.0 mm |
|---|---|---|---|---|---|---|
| cotε=5.0 | None | 17.3-18.0 | 14.8-16.3 | 13.0-14.3 | 11.5-12.7 | 10.4-11.4 |
| cotε=4.0 | None | 17.0-18.0 | 14.6-17.3 | 12.8-15.2 | 11.3-13.4 | 10.2-12.1 |
| cotε=3.0 | None | 17.0-18.0 | 14.6-18.0 | 12.7-16.2 | 11.3-14.4 | 10.2-12.9 |
| cotε=2.5 | None | 17.1-18.0 | 14.7-18.0 | 12.8-16.7 | 11.4-14.8 | 10.3-13.4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| cotε=2.0 | None | 17.5-18.0 | 15.0-18.0 | 13.1-17.3 | 11.6-15.4 | 15.5-13.8 |
| cotε=1.5 | None | None | 15.7-18.0 | 13.8-17.5 | 12.2-15.6 | 11.0-14.0 |
| cotε=1.0 | None | None | None | None | None | None |
| $\varepsilon_{total}$=15 | 2.2 mm | 2.4 mm | 2.6 mm | 2.8 mm | 3.0 mm | |
| cotε=5.0 | 9.4-10.4 | 8.6-9.5 | 8.0-8.8 | 7.4-8.1 | 6.9-7.4 | |
| cotε=4.0 | 9.3-11.0 | 8.5-10.1 | 7.8-9.3 | 7.3-8.6 | 6.8-8.0 | |
| cotε=3.0 | 9.2-11.7 | 8.5-10.8 | 7.8-9.9 | 7.3-9.2 | 6.8-8.6 | |
| cotε=2.5 | 9.3-12.1 | 8.6-11.1 | 7.9-10.2 | 7.3-9.5 | 6.8-8.9 | |
| cotε=2.0 | 9.5-12.6 | 8.7-11.5 | 8.0-10.6 | 7.5-9.8 | 7.0-9.2 | |
| cotε=1.5 | 10.0-12.7 | 9.2-11.7 | 8.5-10.8 | 7.8-10.0 | 7.3-9.3 | |
| cotε=1.0 | None | None | None | None | None | |

**Table S5** Dielectric sum-quotient model ($\varepsilon_{total}$=20)

| $\varepsilon_{total}$=20 | 1.0 mm | 1.2 mm | 1.4 mm | 1.6 mm | 1.8 mm | 2.0 mm |
|---|---|---|---|---|---|---|
| cotε=5.0 | 17.6-18.0 | 14.6-16.6 | 12.5-14.2 | 11.0-12.4 | 9.8-11.1 | 8.8-10.0 |
| cotε=4.0 | 17.5-18.0 | 14.6-17.4 | 12.5-14.9 | 10.9-13.0 | 9.7-11.6 | 8.7-10.4 |
| cotε=3.0 | 17.6-18.0 | 14.7-18.0 | 12.6-15.7 | 11.0-13.7 | 9.8-12.2 | 8.8-11.0 |
| cotε=2.5 | 17.9-18.0 | 14.9-18.0 | 12.8-16.1 | 11.2-14.1 | 9.9-12.5 | 8.9-11.2 |
| cotε=2.0 | None | 15.3-18.0 | 13.1-16.4 | 11.5-14.4 | 10.0-12.8 | 9.2-11.5 |
| cotε=1.5 | None | 16.6-18.0 | 14.2-16.2 | 12.4-14.2 | 11.0-12.6 | 9.9-11.3 |
| cotε=1.0 | None | None | None | None | None | None |
| $\varepsilon_{total}$=20 | 2.2 mm | 2.4 mm | 2.6 mm | 2.8 mm | 3.0 mm | |
| cotε=5.0 | 8.0-9.0 | 7.3-8.3 | 6.7-7.6 | 6.2-7.1 | 5.8-6.6 | |
| cotε=4.0 | 7.9-9.5 | 7.3-8.7 | 6.7-8.0 | 6.2-7.4 | 5.8-6.9 | |
| cotε=3.0 | 8.0-10.0 | 7.3-9.1 | 6.8-8.4 | 6.3-7.8 | 5.9-7.3 | |
| cotε=2.5 | 8.1-10.2 | 7.4-9.4 | 6.9-8.6 | 6.4-8.0 | 6.0-7.5 | |
| cotε=2.0 | 8.4-10.4 | 7.6-9.6 | 7.0-8.8 | 6.6-8.2 | 6.1-7.6 | |
| cotε=1.5 | 9.0-10.3 | 8.3-9.4 | 7.6-8.7 | 7.1-8.0 | 6.6-7.5 | |
| cotε=1.0 | None | None | None | None | None | |

**Table S6** EMW Absorption Performance of MGM Materials

| sample | RL (dB) | thickness (mm) | bandwidth (GHz) | Refs. |
|---|---|---|---|---|
| C/$Fe_3O_4$ | 22.1 | 2.0 | 4.4 | [49] |
| C/Ni | 42.2 | 2.0 | 2.3 | [50] |
| C foam | 43.6 | 4.7 | 3.3 | [51] |
| C/$CoFe_2O_4$ | 49.6 | 2.5 | 3.0 | [52] |
| SiC | 48.0 | 3.0 | 1.8 | [53] |
| C aerogels | 55.0 | 3.5 | 3.6 | [54] |
| Porous C | 43.8 | 3.0 | 3.2 | [55] |
| C/Fe | 57.6 | 3.9 | 5.2 | [56] |
| C/CNT/Co | 53.5 | 2.9 | 2.4 | [57] |
| C/ $Fe_3O_4$/PANI | 44.8 | 2.7 | 4.7 | [58] |
| C/$MoS_2$ | 50.1 | 2.4 | 5.8 | **this work** |