Electronic Supplementary Information for

Realizing Significant Dielectric Dispersion of Composites Based on Highly Conducting Silver-Coated Glass Microsphere for Wide-Band Non-Magnetic Microwave Absorber

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Contents

Experimental Section of Electronic Supplementary Information

Materials, surface modification of GM, preparation of silver salt solution (denoted as solution A) and glucose solution (denoted as solution B) are described in our recent work. [1]

For the fabrication of GM@AgCPs with d of about 27.7 μm and various d_{Ag} or GM-Ag, other experimental steps were same as those of GM@AgCPs synthesized by in the typical experiment except for the volume of solution A ($V_{Solution\ A}$). GM@AgCPs with d_{Ag} of about 160 and 210 nm and GM-Ag were synthesized at $V_{solution\ A}$ = 30.0, 40.0 and 15.0 mL, respectively.

For the fabrication of GM@AgCPs with almost same d_{Ag} and various d, other experimental steps were same as those of GM@AgCPs synthesized by in the typical experiment except for the mass of GM-SS ($m_{GM\text{-}SS}$). For example, GM@AgCPs with d of about 41.1, 13.4, 8.2 and 3.0 μm were synthesized at $m_{GM\text{-}SS}$ = 19.00, 0.40, 0.30 and 0.22 g, respectively.

Supplementary Table

Table S1. The related material parameters of GM@AgCPs with various *d*, including d_{Ag} and S_{BET}; and V_c of these conducting fillers.

d (μm)	d_{Ag} (nm)	S_{BET} (m^2/g)	V_c (%)
~ 41.1	~ 70	0.05	52
~ 27.7	~ 70	0.23	49
~ 13.4	~ 70	2.33	45
~ 8.2	~ 75	3.15	31
~ 3.0	~ 70	4.20	29

Supplementary Figures

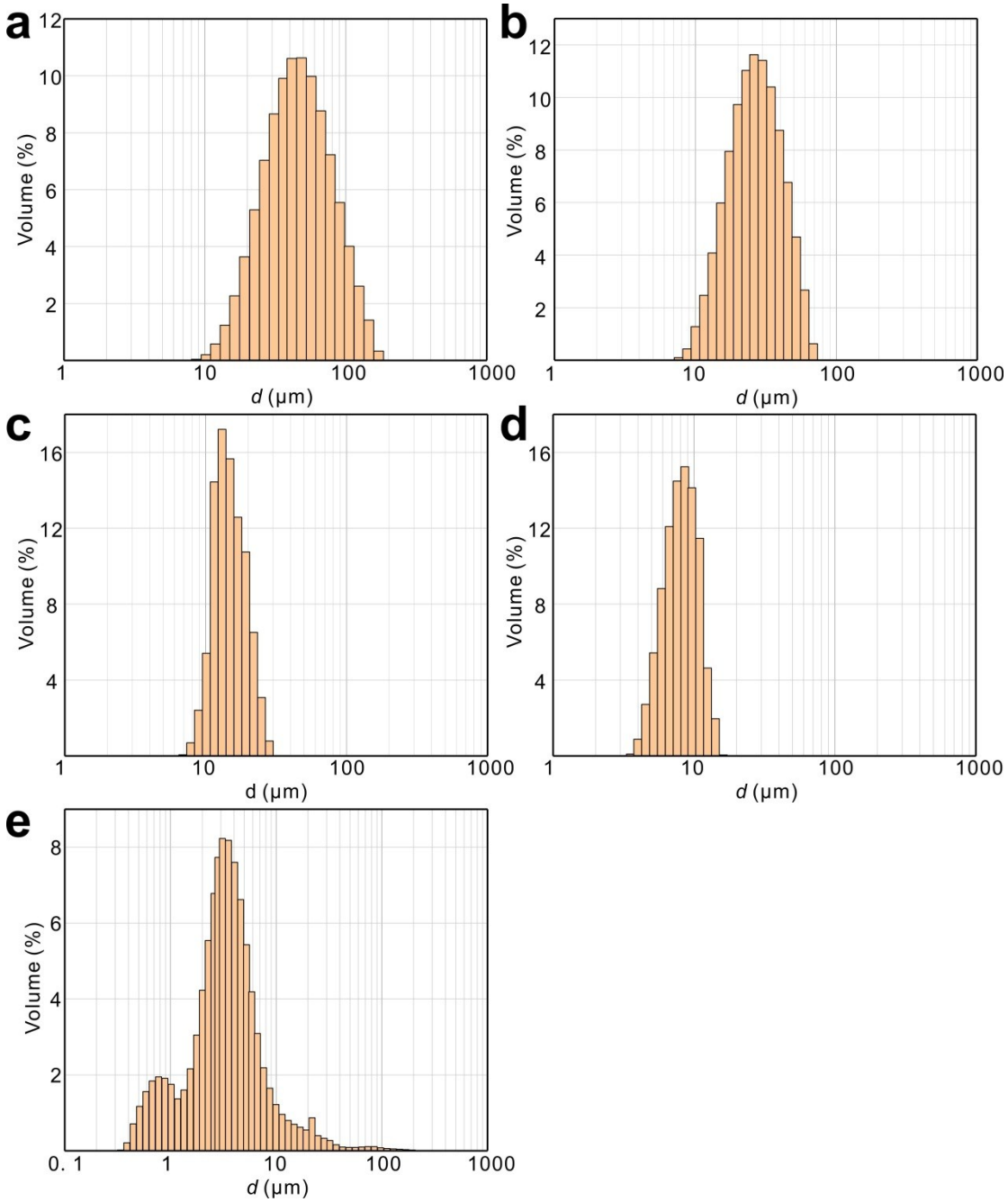

Fig. S1 The average diameter of various GM: (a)41.0, (b) 27.6, (c) 13.3, (d) 8.1 and (e) 2.9 μm

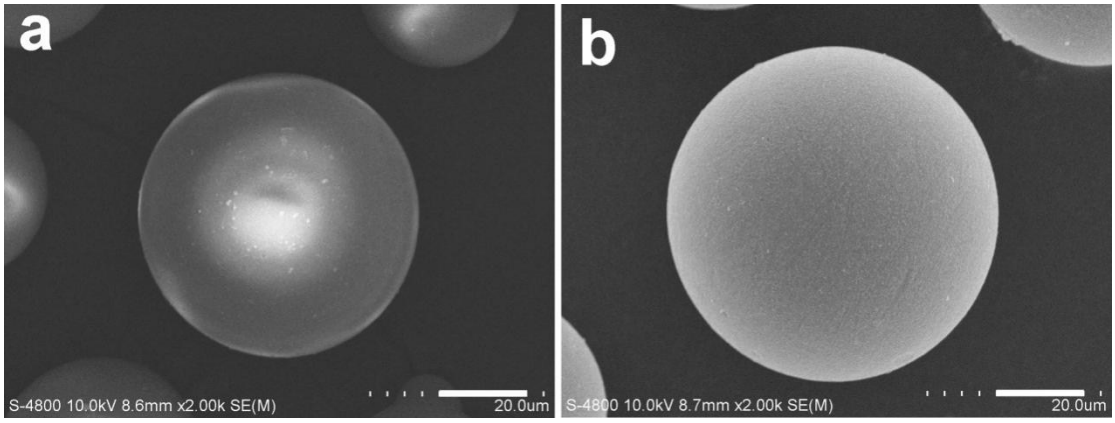

Fig. S2 SEM images of (a) GM and (b) GM-Ag, *d* as Fig. 4. All the scale bars of the insets are 10 μm.

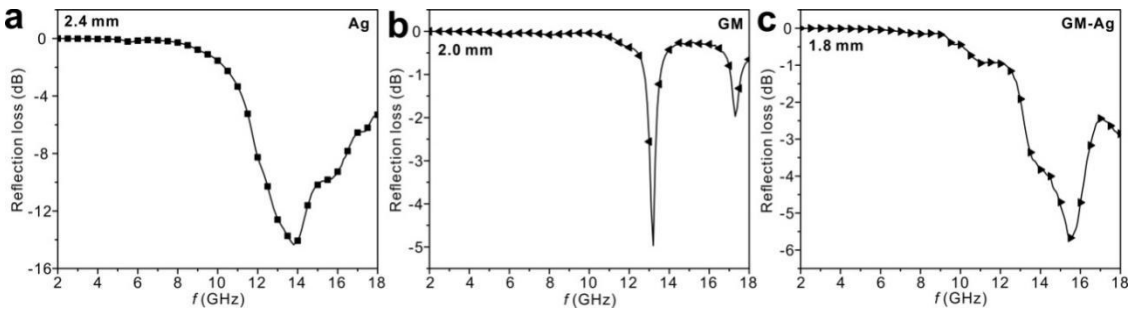

Fig. S3 *RL* of composites based on various fillers of (a) flaky Ag powders at V = 19 %, (b) GM at V = 45 % and (c) GM-Ag at V = 45 %, other conditions as Fig. 4. According to $\lambda/4$ matching model, thickness in (a), (b) and (c) for *RL* is 2.4, 2.0 and 1.8 mm, respectively.

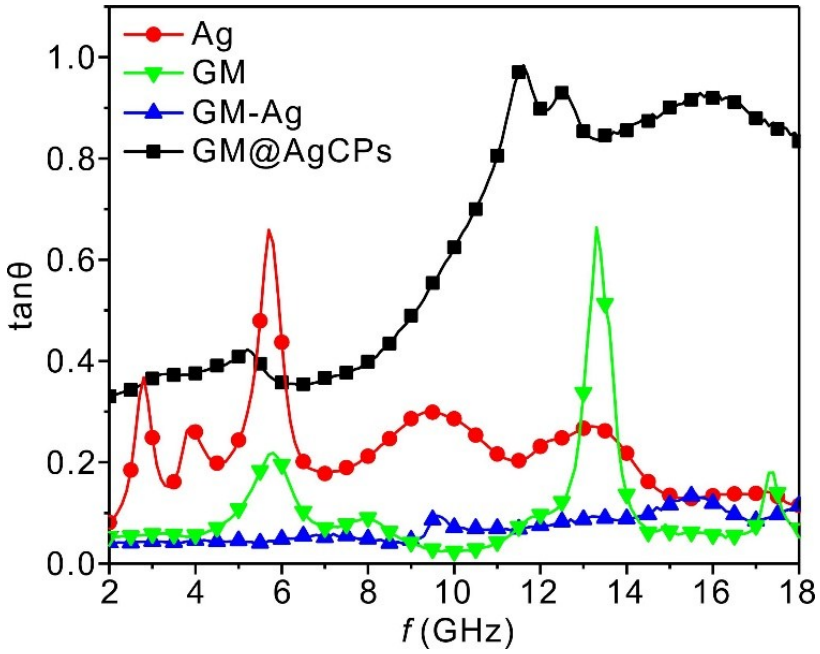

Fig. S4 The tangent values of dielectric loss of composites based on various fillers of Ag powders at V = 19 %, GM at V = 45 %, GM-Ag at V = 45 % and the typical GM@AgCPs at V = 45 %.

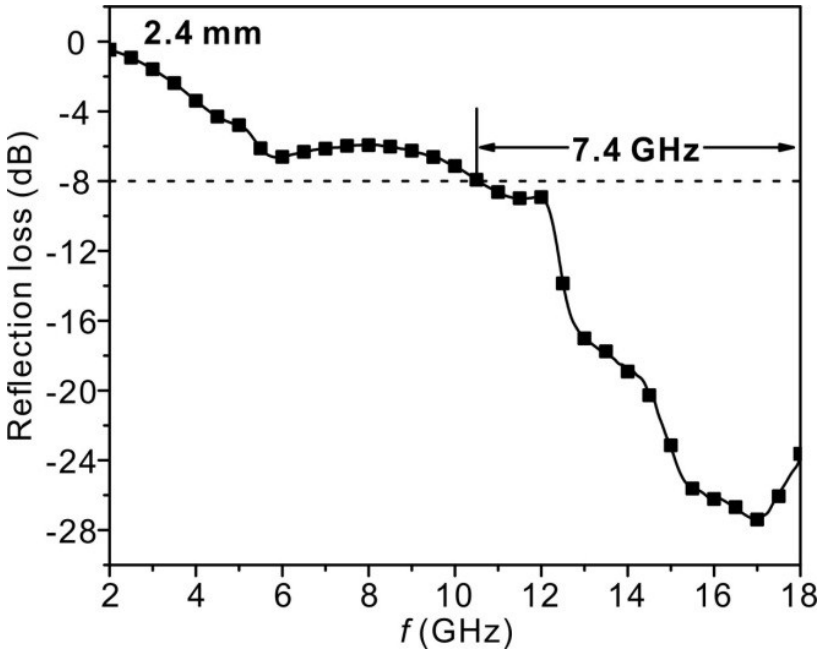

Fig. S5 *RL* of composites based on the typical GM@AgCPs at V = 46 %. According to the $\lambda/4$ thickness equation, thickness of composites is selected as 2.4 mm.

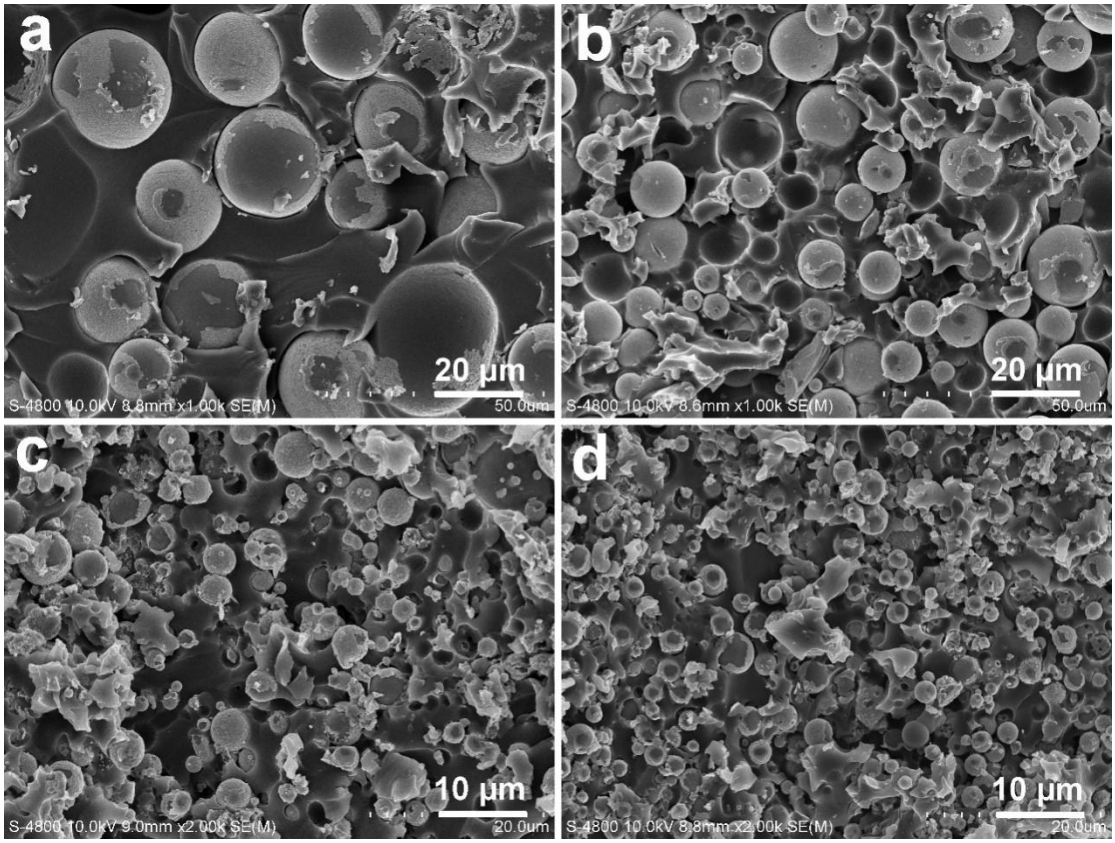

Fig. S6 SEM images of cross-section samples of composites based on GM@AgCPs with various d of (a) 27.7 μm at V = 45 %, (b) 13.4 μm at V = 43 %, (c) 8.2 μm at V = 30 % and (d) 3.0 μm at V = 27 %, d_{Ag} of GM@AgCPs as Fig. 2b, Fig. 6b, 6c, and 6d, respectively.

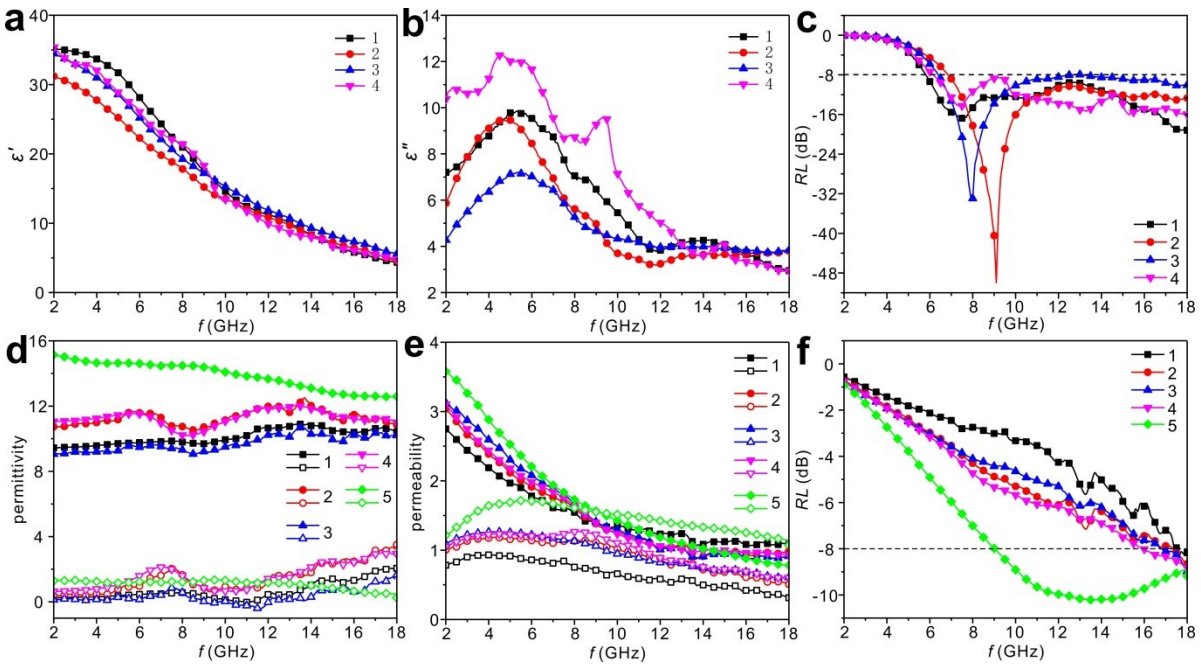

Fig. S7 (a) The real and (b) imaginary parts of complex permittivity, (c) *RL* of the typical composites with matching thickness of 2.2 mm (other conditions as Fig. 2) after various environmental adaptability experiments; (d, e) the electromagnetic parameters and (f) absorbing performance of MAMs containing carbonyl iron particles at V = 28 % before (5) and after various environmental adaptability experiments. The related experiments are (1) 24 h in air at 200 °C, (2) 24 h in 5.0 wt% of NaOH solution, (3) 24 h in 5.0 wt% of H_2SO_4 solution and (4) 24 h in 50 g/L of NaCl solution, respectively.

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