Supporting Information

Constructing hierarchical porous nanospheres for versatile microwave response approaches: the effect of architectural design

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1. Experimental Section

Preparation of rGO

Briefly, 10 mL GO solution was added to a mixture of ethanol (15 mL) and distilled water (45 mL) for ultrasonic treatment of 2 h. The obtained solution was transferred into a Teflon-lined autoclave at 150 °C for 10 h and cooled to room temperature. Finally, the product was separated by centrifugation, washed alternately for three times with distilled water and ethyl alcohol, and dried at 60 °C for 24 h under vacuum. The basic characterization of XRD and TEM are presented in Figure S1.

Preparation of porous Fe_3O_4 nanospheres

Porous Fe_3O_4 nanospheres were also prepared according to the synthesis procedures of Fe_3O_4-C nanospheres without the addition of acrylic acid. The porous Fe_3O_4 nanospheres were denoted as Is.

Preparation of carbon nanospheres

Carbon nanospheres were prepared via a typical method. Briefly, 7.92 g glucose was dissolved in 80 mL of deionized water under 5 min of ultrasonic treatment. Then, the obtained solution was transferred into a 100 mL Teflon-lined stainless steel autoclave at 180 °C for 5 h. In order to get graphitized carbon spheres, the precursor was treated in argon atmosphere at 550 °C for 5 h with a heating rate of 1 °C /min. The carbon nanospheres were denoted as Cs.

2. Results and discussion

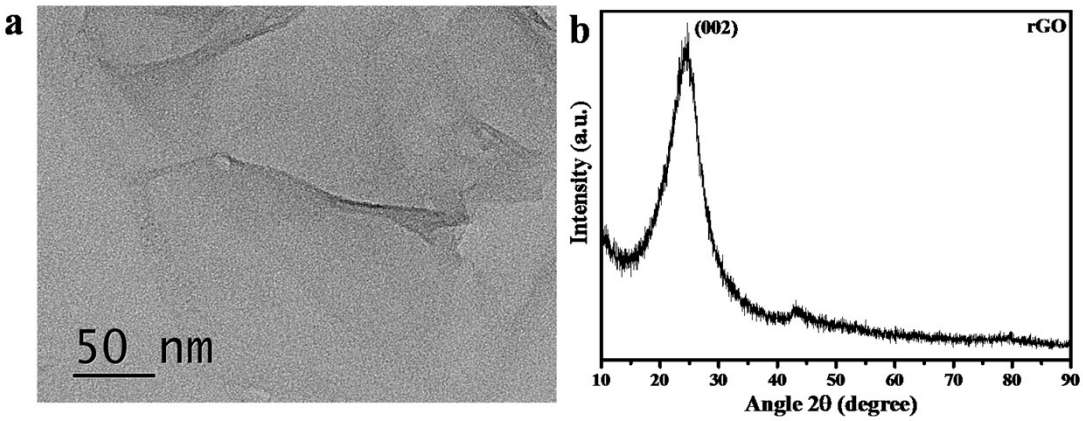

Figure S1. The TEM image (a) and XRD pattern (b) of prepared rGO.

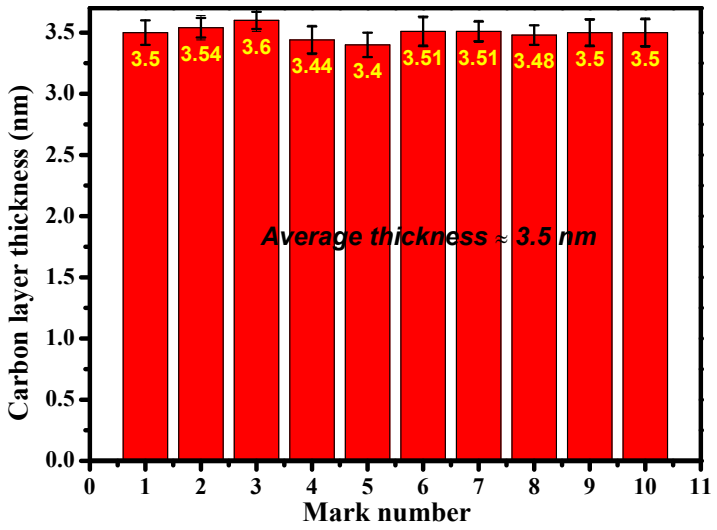

Figure S2. Carbon layer thickness statistics result. (Ten of the randomized nanospheres, each sphere with five measurement pots)

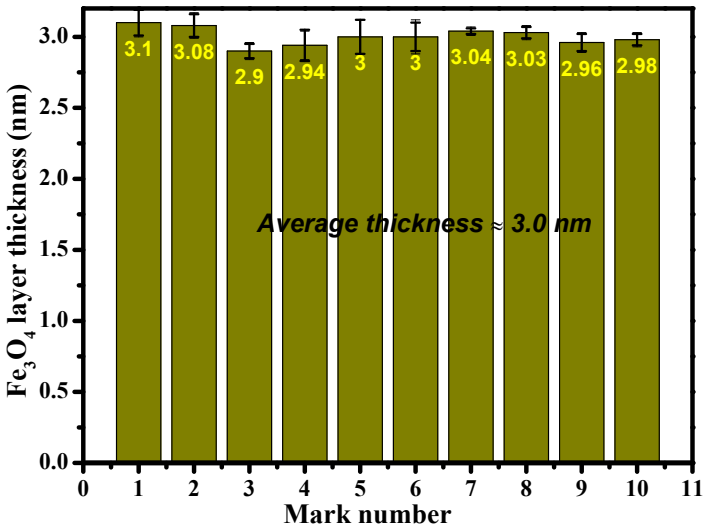

Figure S3. Fe_3O_4 layer thickness statistics result. (Ten of the randomized nanospheres,

each sphere with five measurement pots)

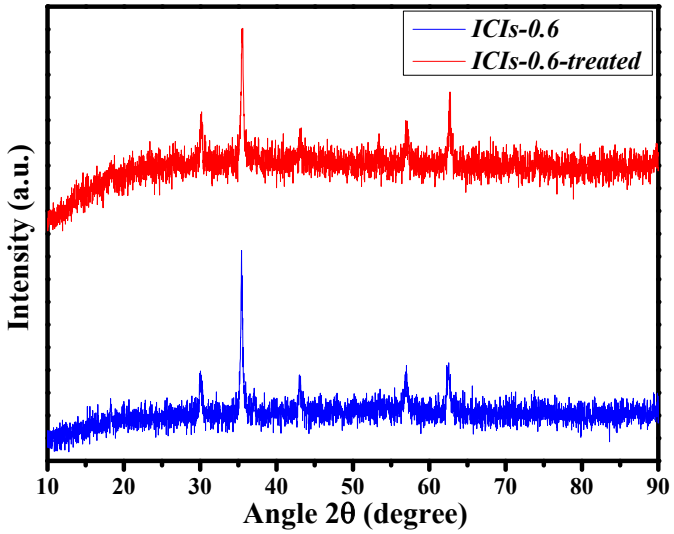

Figure S4. XRD patterns of ICIs-0.6 and ICIs-0.6 treated at 50 °C in air for 48 h.

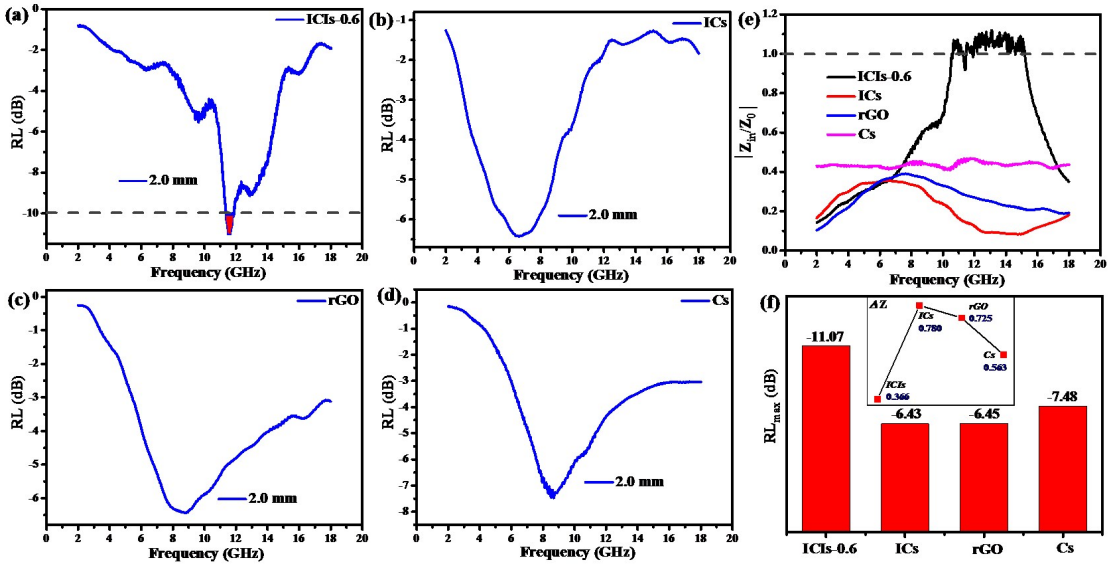

Figure S5. The calculated reflection loss of paraffin composites at 2.0 mm; (a) ICIs-0.6, (b) ICs, (c) rGO, (d) Cs. The modulus of normalized input impedance $|Z_{in}/Z_0|$ (e) and the maximum RL values (f) for ICIs-0.6, ICs, rGO and Cs at 2.0 mm. Inset shows the proposed ACIM value (ΔZ) of the four samples.

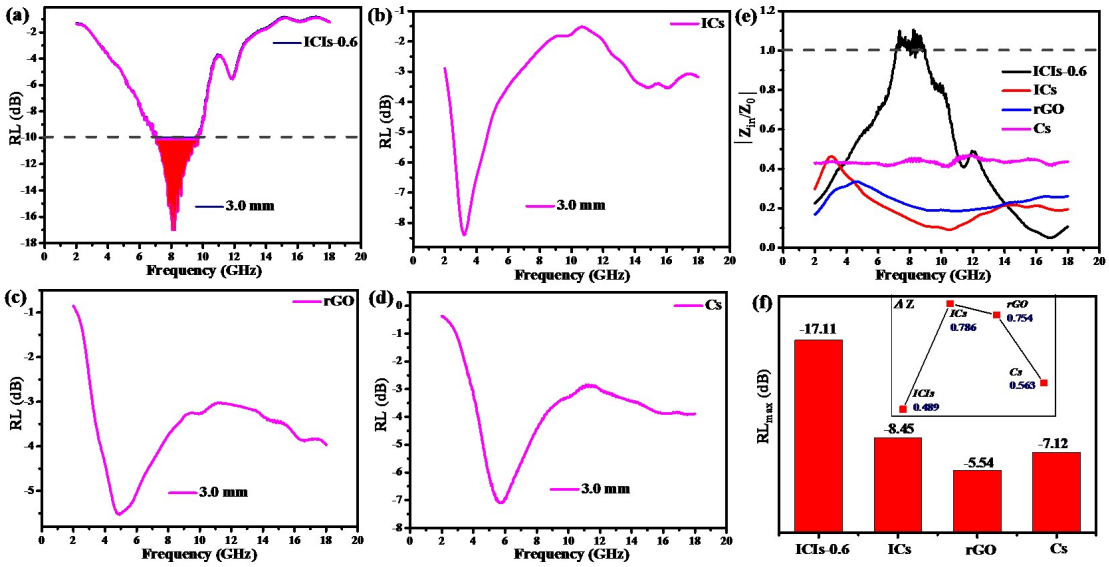

Figure S6. The calculated reflection loss of paraffin composites at 3.0 mm; (a) ICIs-0.6, (b) ICs, (c) rGO, (d) Cs. The modulus of normalized input impedance $|Z_{in}/Z_0|$ (e) and the maximum RL values (f) for ICIs-0.6, ICs, rGO and Cs at 3.0 mm. Inset shows the proposed ACIM value (ΔZ) of the four samples.

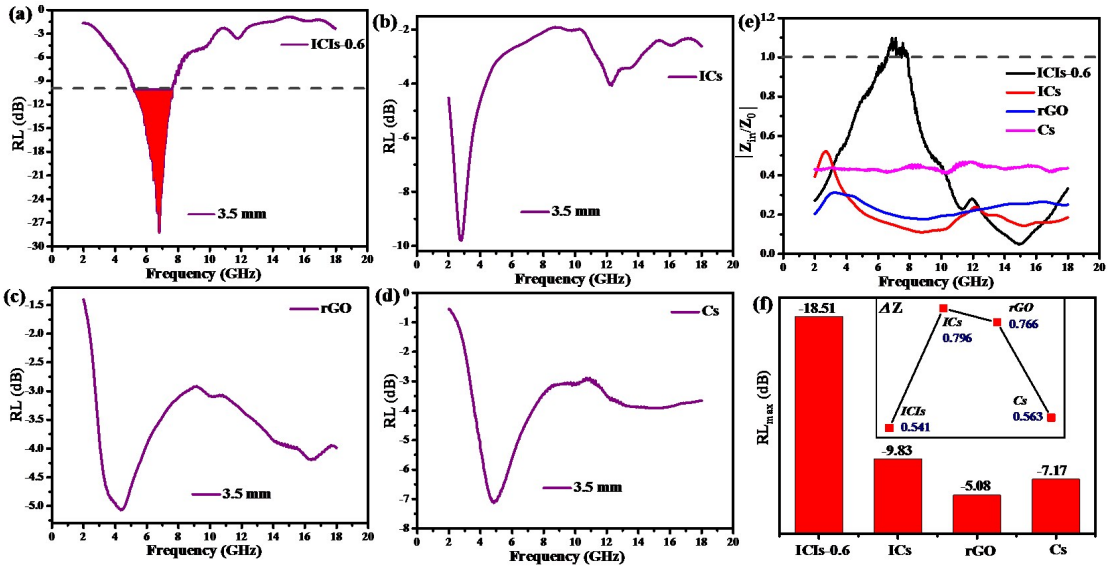

Figure S7. The calculated reflection loss of paraffin composites at 3.5 mm; (a) ICIs-0.6, (b) ICs, (c) rGO, (d) Cs. The modulus of normalized input impedance $|Z_{in}/Z_0|$ (e) and the maximum RL values (f) for ICIs-0.6, ICs, rGO and Cs at 3.5 mm. Inset shows the proposed ACIM value (ΔZ) of the four samples.

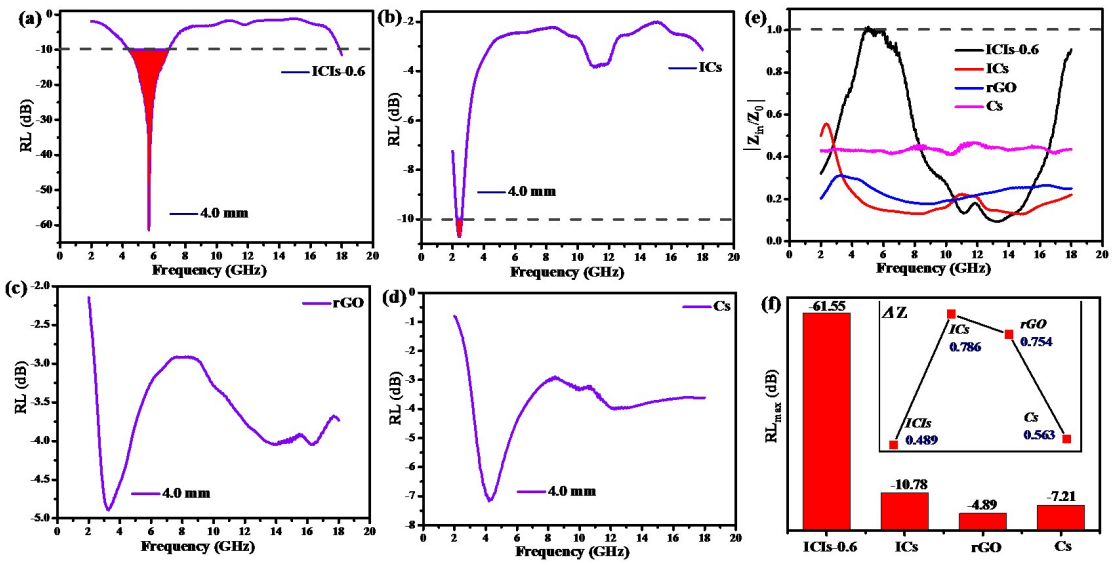

Figure S8. The calculated reflection loss of paraffin composites at 4.0 mm; (a) ICIs-0.6, (b) ICs, (c) rGO, (d) Cs. The modulus of normalized input impedance $|Z_{in}/Z_0|$ (e) and the maximum RL values (f) for ICIs-0.6, ICs, rGO and Cs at 4.0 mm. Inset shows the proposed ACIM value (ΔZ) of the four samples.

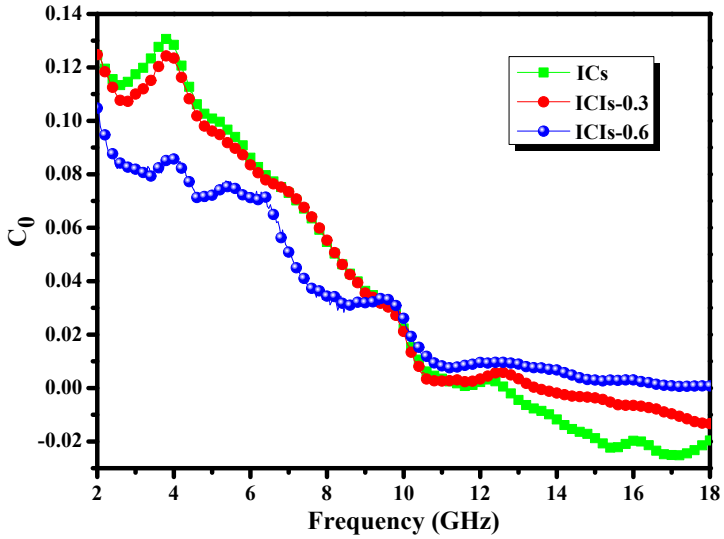

Figure S9. Eddy current loss of ICs, ICIs-0.3 and ICIs-0.6.