Supporting Information

Low-Cost Carbothermal Reduction Preparation of Monodisperse Fe_3O_4/C Core-Shell Nanosheets for Improved Microwave Absorption

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The α-Fe_2O_3 precursors were obtained by a modified mixed solvothermal method.[1] Typically, 8 mmol $FeCl_3 \cdot 6H_2O$ were added into the mixed solution of H_2O (3.0 mL), and C_2H_5OH (37.0 mL), forming a transparent solution. Then, 80 mmol of NaAc were added into the above solution. After vigorous stirring for 30 min, the resultant solution was loaded into a 100 mL Teflon-lined stainless steel autoclave and reacted at 180 °C for 12 h. Finally, the brick red products were obtained by centrifugation and wash with water and ethanol. Changing H_2O volume (V_{H2O} = 3.0, 4.0, 8.0 mL) while keeping the total solvent volume of 40 mL and Ac^- concentration (1.0, 2.0 M) can control the particle size and morphology.

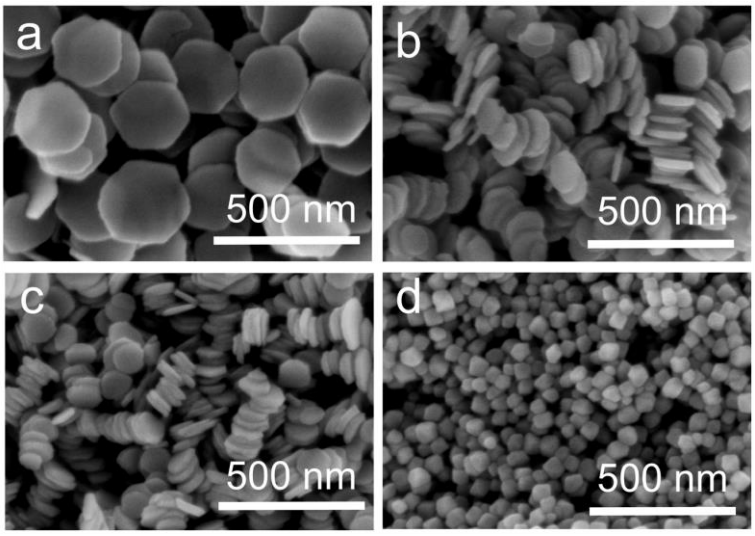

Figure S1 SEM images of the precursors obtained at different Ac^- concentration and H_2O volume: (a) [Ac^-]=2.0 M, V_{H2O}=3.0 mL; (b) [Ac^-]=1.0 M, V_{H2O}=3.0 mL; (c) [Ac^-]=1.0 M, V_{H2O}=4.0 mL; (d) [Ac^-]=1.0 M, V_{H2O}=4.0 mL.

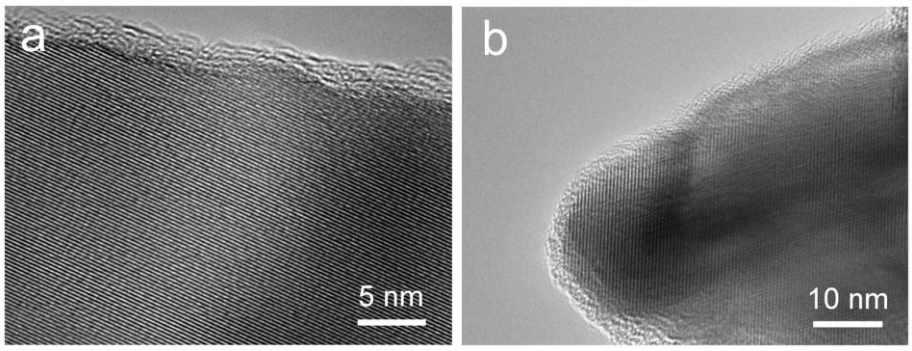

Figure S2 (a-b) HR-TEM images of the typical Fe_3O_4/C core-shell NSs.

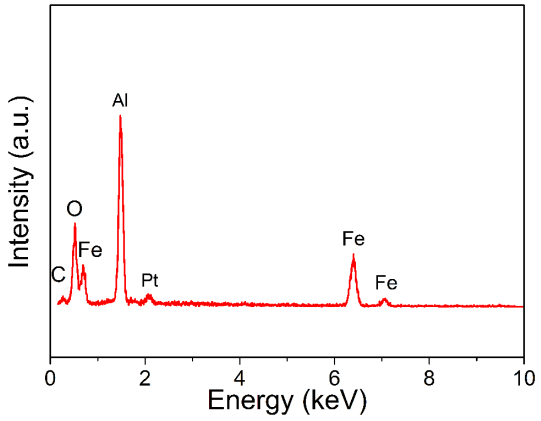

Figure S3 EDX spectrum of the typical Fe_3O_4/C core-shell NSs.

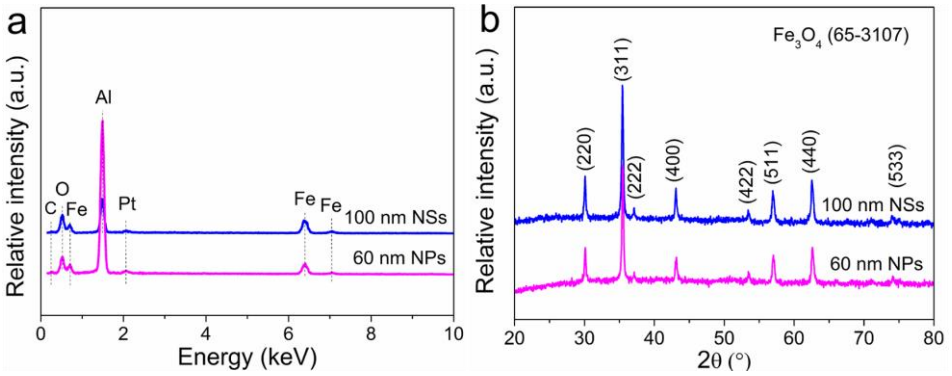

Figure S4 (a) EDX spectra and (b) XRD patterns of Fe_3O_4/C core-shell NSs and NPs with different sizes.

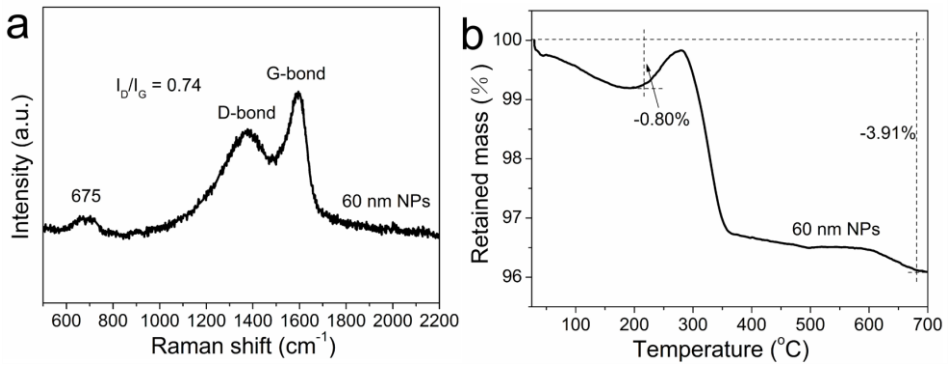

Figure S5 (a) Raman spectrum and (b) TG curve of the Fe_3O_4/C core-shell NPs with a = 60 nm.

Table S1 Data of physical parameters and magnetic properties of the obtained Fe_3O_4/C core-shell NSs and NPs.

a [a] /nm	t[a] /nm	Aspect ratio[b]	ε[c] /%	D [c] /nm	Magnetic property		
					M_s /emu·g^{-1}	M_r /emu·g^{-1}	H_c /Oe
250	10	25	0.42	22.5	82.61	28.06	283.98
150	10	15	0.41	23.3	82.51	26.00	256.56
100	15	6.0	0.35	26.1	84.47	20.53	198.35
60	53	1.13	0.34	26.9	82.08	18.05	132.63

[a] The size (a) and thickness (t) measured from SEM images.
[b] The aspect ratio is defined as diameter/thickness.
[c] Internal strain (ε) and average crystalline size (D) are calculated using the Hall-Williamson equation based on the XRD data.

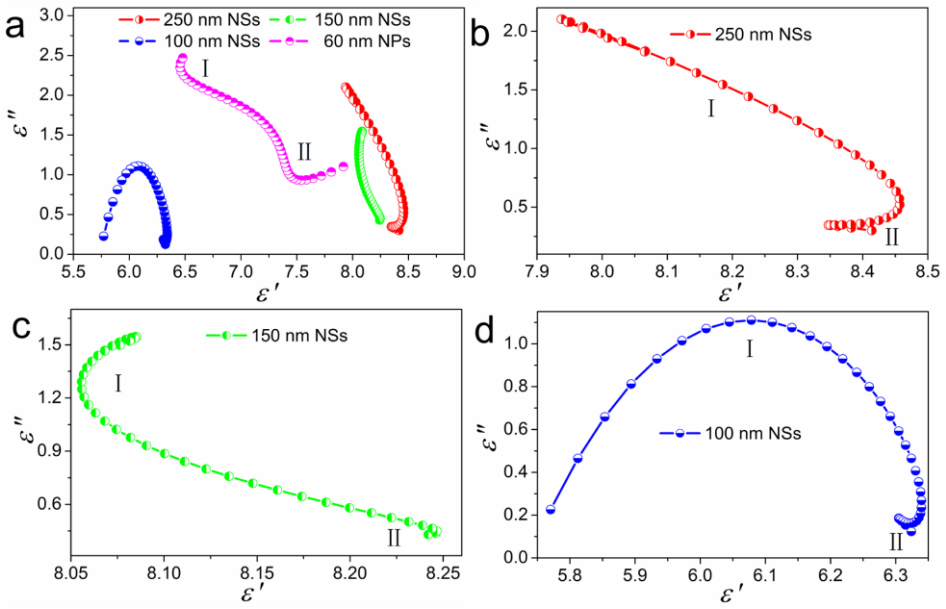

Figure S6 (a) Cole-Cole curves of Fe_3O_4/C core shell NSs and NPs with different sizes, (b-d) the corresponding individual magnified curves in (a).

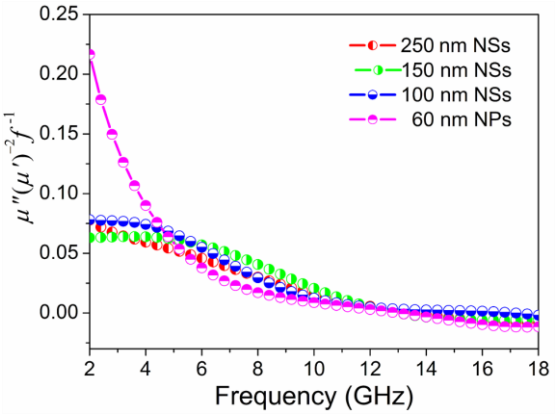

Figure S7 $\mu''(\mu')^{-2} f^{-1}$ versus frequency for paraffin composites containing 50 wt.% Fe_3O_4/C core-shell products with different sizes, indicating that the eddy current loss occurs at high frequencies.

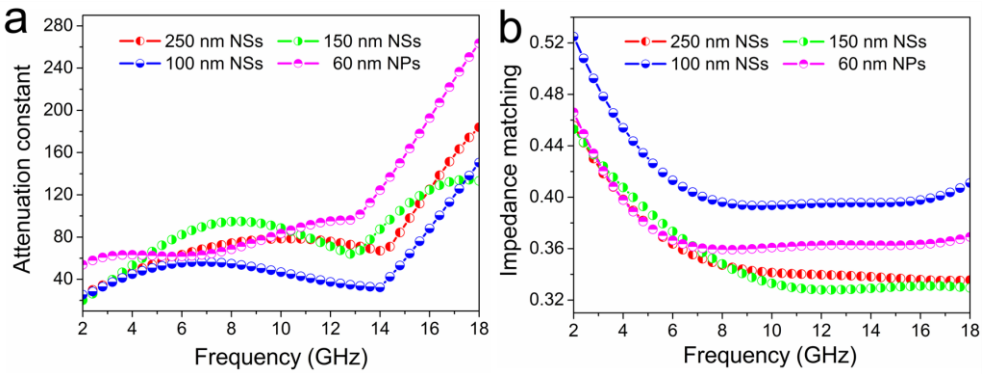

Figure S8 (a) Attenuation constant versus frequency and (b) impedance matching versus frequency for paraffin composites containing 50 wt.% Fe_3O_4/C core-shell NSs and NPs with different sizes.

Reference

(1) Chen, L. Q.; Yang, X. F.; Chen, J.; Liu, J.; Wu, H.; Zhan, H. Q.; Liang, C. L.; Wu, M. M. Continuous Shape- and Spectroscopy-Tuning of Hematite Nanocrystals. *Inorg. Chem.* **2010**, *49*, 8411–8420.