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Fig. s1 (a, b) FESEM, (c) TEM images and (d)XRD pattern of rose-like iron alkoxide precursor.



Fig. S2 TGA of rose-like iron alkoxide precursor.



Fig. S3 (a) Raman, (b) TGA, (c) BET and (d) VSM of hierarchical rose-like Fe@C composites.







alkoxide and (b) pure iron heat treatment at Ar and H_2 on iron oxide

Fig. S5 (a) TGA and (b) VSM of pure iron with rose-like structure



Fig. S6 Reflection losses (RL) of hierarchical rose-like Fe@C and rose-like pure iron with thicknesses of



2.00mm and match thickness, respectively.

Fig. S7 XRD pattern of (a) (b) Fe@C particles without rose-like morphology and Raman spectra of

(c) $Fe_3O_4@C$ particles and (d) Fe@C particles without rose-like morphology



Fig. S8 SEM images of (a, b)Fe $_3O_4@C$ obtained by pyrolysis of iron oxide precursor under atmosphere of nitrogen (c, d) Fe@C particles without rose-like morphology obtained by reduction of Fe₃O₄@C



Fig. S9 RL of Fe@C particles without rose-like morphology.



Fig. S10 The complex permittivity (a) and permeability (b) of Fe@C particles without rose-like



Fig. S11 (a) Cole-Cole plots of rose-like pure iron and (b) Cole-Cole plots (c) attenuation factor α , (d) impedance matching degree Δ with thickness of 1.48 mm of Fe@C particles without rose-like morphology