Electronic Supplementary Information

CoFe₂O₄ and/or Co₃Fe₇ loaded Porous Activated Carbon Balls as a Lightweight Microwave Absorbent

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Fig. S1 Pore size distribution of the pristine PACB (a) from the adsorption branches of the isotherms using BJH method, (b) from mercury porosimetry.

Figure S1a shows the pore size distribution curve of the pristine PACB, calculated from the adsorption branches of the isotherms using BJH method according to density functional theory. The pore size focuses on the range of 0.75-1.65 nm, exhibiting the characteristic of microporosity. Figure S1b gives the pore size distribution measured through mercury porosimeter, indicating that the pore is micron size, around 1-4 μ m.



Fig. S2 The HRTEM image (a) and its SAED pattern (b) of CBM450.

Fig S2a shows a HRTEM image of the flake, in which three classes of lattice fringe present and their corresponding inter-plane distances are 0.49, 0.30 and 0.25 nm. This result matches well with the inter-plane distances of the (1 1 1), (2 2 0) and (3 1 1) planes. The SAED pattern (see Fig S2b) indicates that the diffraction spots belong to the (1 1 1), (2 2 0) and (3 1 1) planes with an incident electron beam along the [-1 1 2] direction, showing the selected flake is $CoFe_2O_4$ with the spinel structure.



Fig. S3 Normal Raman spectra of PACB composite treated at different temperature.

Figure S3 gives the typical Raman spectra of CBM400, CBM450, CBM500, CBM600, CBM700, CBM800, and CBM900. The Raman spectra exhibits two main broad peaks at around 1350 cm⁻¹ marked as D peak for disordered graphite structure and 1600 cm⁻¹ marked as G peak for graphite carbon. Degree of graphitization can be represented by the relative intensity $R=I_D/I_G$, the corresponding R values of above samples is 1.08, 1.09, 1.06, 1.08, 1.08, 1.07, and 1.14, respectively. Compared with 1.11 of the pristine PACB, no obvious change of graphitization was observed after heat treatment.



Fig. S4 Magnetic hysteresis loop of the samples measured at room temperature.

Fig S4 gives the magnetic hysteresis loops of the samples, the magnetization curves show a similar magnetic behavior, and the curves almost overlap when the temperature exceeds 600 °C.





Fig. S5 dependence of $\lambda/4$ thickness (calculated and experimental) on frequency for the PACB

composites: (a) CBM450, (b) CBM600, and (c) CBM800.

Fig S5 displays the dependence of $\lambda/4$ thickness on frequency for the PACB composites. After comparing the matching thickness t_m^{cal} calculated by Eq. (9) ($f=f_m$) with the experimental matching thickness t_m^{exp} , it's obvious that the calculated result t_m^{cal} agree well with the experimental value t_m^{exp} .



Fig. S6 Values of $\mu''(\mu')^{-2}f^{1}$ of CBM450, CBM600 and CBM800 versus frequency.