Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information for

Ru-Fe alloy mediated α-Fe_2O_3 particles on mesoporous carbon nanofibers as electrode materials with superior capacitive performance

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Table S1 Metal content of RuFe@Fe_2O_3/mCNF composites

Materials	Ru/Fe feed ratio	Ru content[a] (mmol g^{-1})	Fe content[a] (mmol g^{-1})	Ru/Fe molar ratio	Total metal content (mmol g^{-1})	Ru/(Ru+Fe) molar ratio
RuFe@Fe_2O_3/mCNF-11%	0.43	1.78	14.80	0.12	16.58	0.11
RuFe@Fe_2O_3/mCNF-25%	1.00	2.10	6.25	0.34	8.35	0.25
RuFe@Fe_2O_3/mCNF-40%	9.00	2.87	4.28	0.67	7.15	0.40

[a] Estimated by ICP-AES.

The electrochemical gravimetric specific capacitance of the electrode material based on GCD curves was determined as follows:

$$C_n = \frac{C}{m} = \frac{I \times \Delta t}{m \times \Delta V}$$

in which C_n is the gravimetric specific capacitance (F g^{-1}), C is the capacitance (F), m is the mass of electrode material (g), I is the charge-discharge current (A), Δt is the discharge time (s), and ΔV is the potential window of charge-discharge (V).

Table S2 List of specific capacitance of RuFe@Fe_2O_3/mCNF-25% at various current densities

Current density (A g^{-1})	Specific capacitance (F g^{-1})
0.25	343
0.50	296
1.00	276
2.00	265

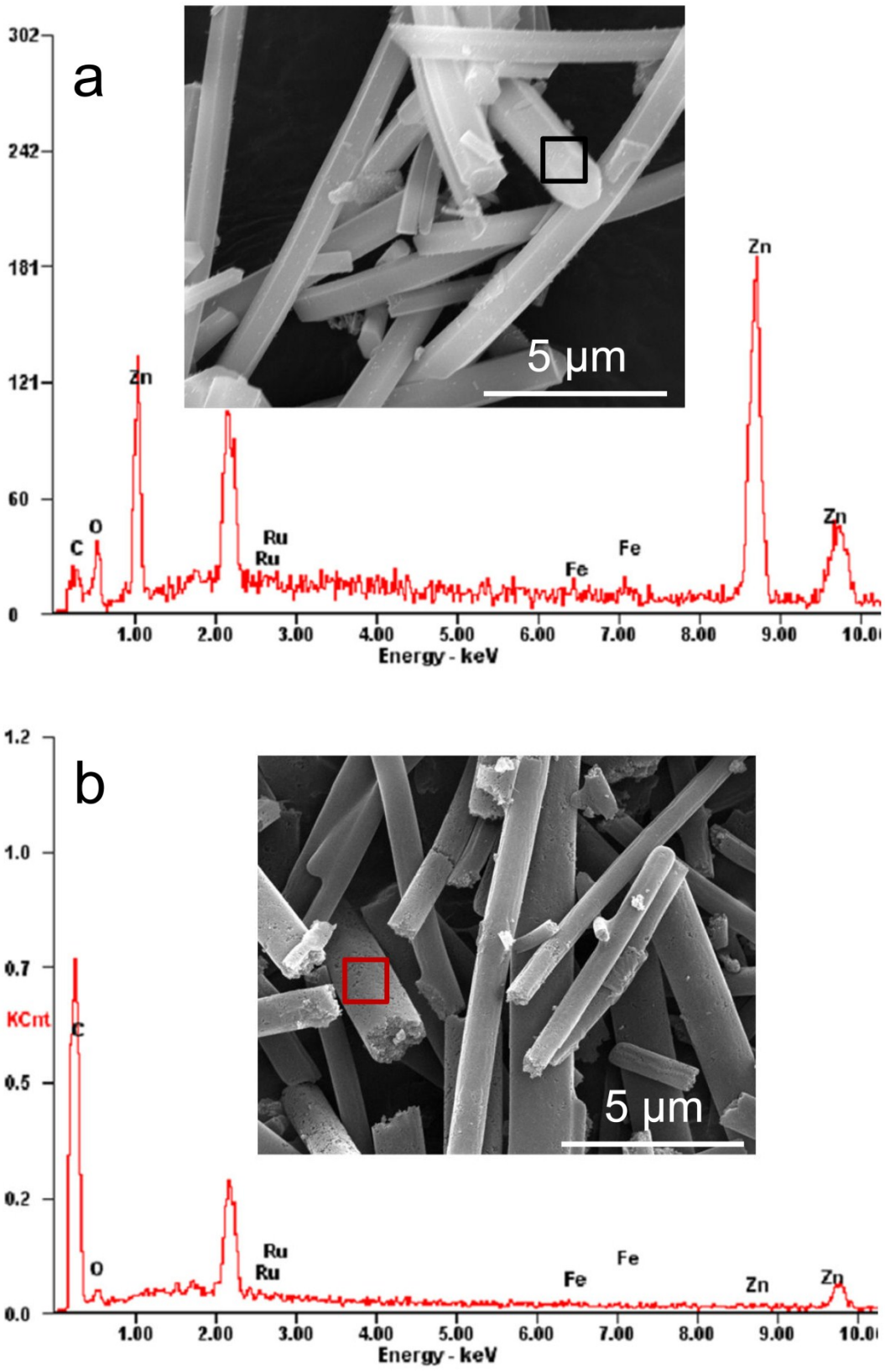

Fig. S1. EDS analysis of (a) Ru_5Fe_5-ZnBTC and (b) RuFe@Fe_2O_3/mCNF-25%.

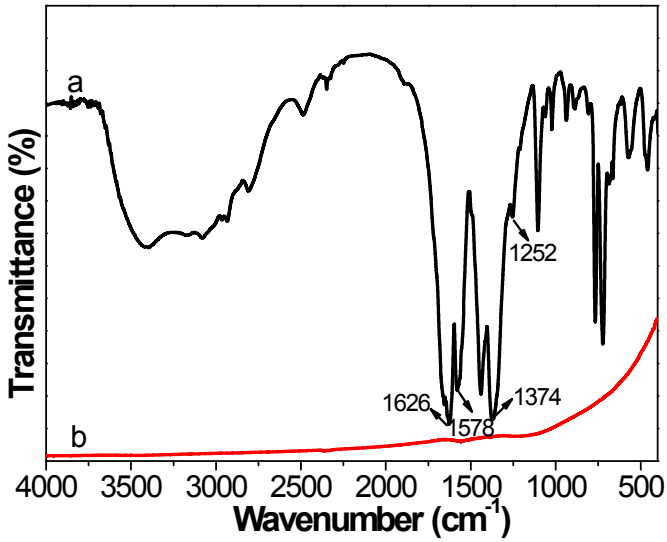

Fig. S2. FT-IR spectra of (a) Ru_5Fe_5-ZnBTC and (b) RuFe@Fe_2O_3/mCNF-25%.

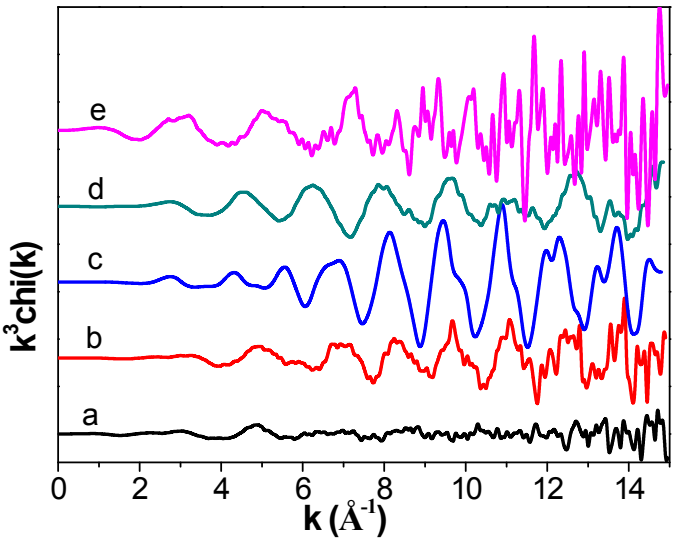

Fig. S3. Normalized EXAFS Ru K-edge scan plotted as k^3chi(k) *vs* k for (a) Ru_5Fe_5-ZnBTC, (b) RuFe@Fe_2O_3/mCNF-25%, (c) Ru foil, (d) $RuCl_3$ and (e) RuO_2.

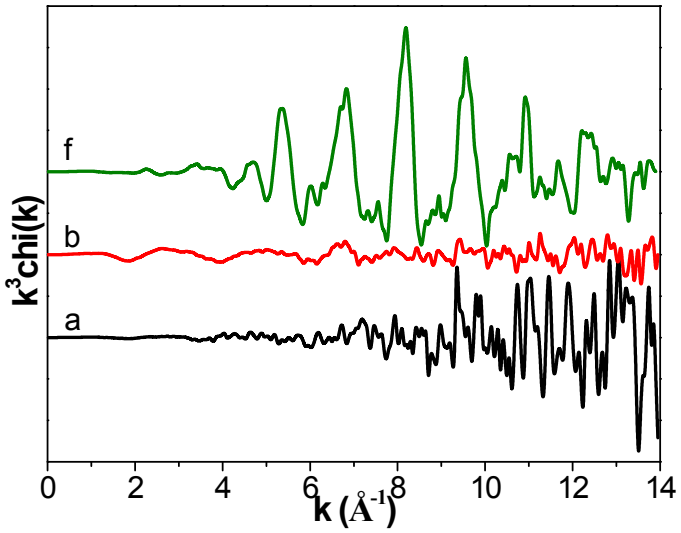

Fig. S4. Normalized EXAFS Fe K-edge scan plotted as k^3chi(k) *vs* k for (a) Ru_5Fe_5-ZnBTC, (b) RuFe@Fe_2O_3/mCNF-25% and (c) Fe foil.

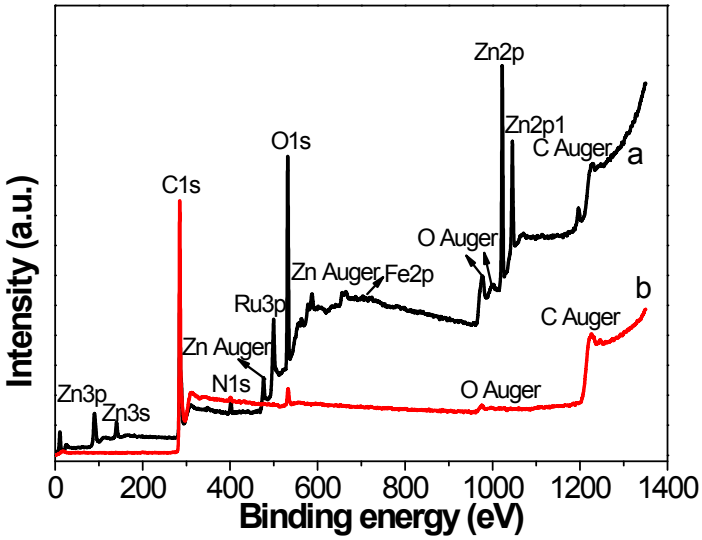

Fig. S5. XPS spectra of survey spectrum for (a) Ru_5Fe_5-ZnBTC and (b) RuFe@Fe_2O_3/mCNF-25%.

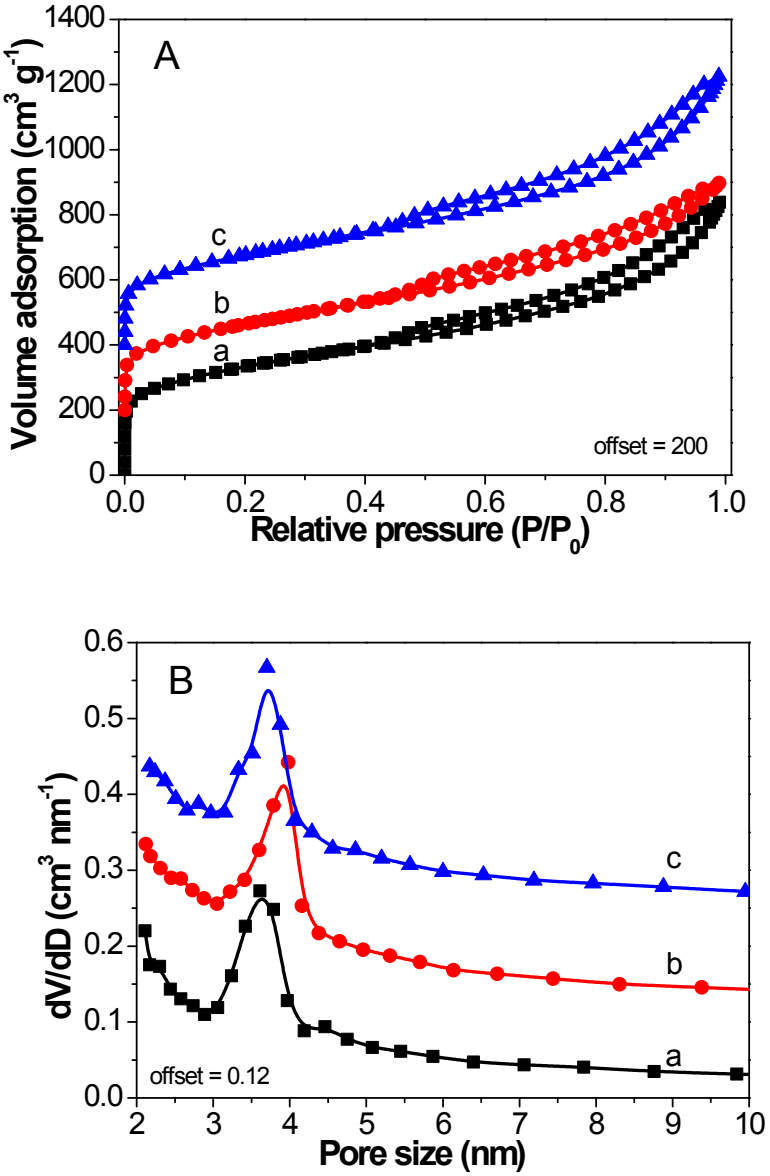

Fig. S6. N_2 adsorption/desorption isotherms (A) and the corresponding pore size distribution curves (B) of (a) RuFe@Fe_2O_3/mCNF-11%, (b) RuFe@Fe_2O_3/mCNF-25% and (c) RuFe@Fe_2O_3/mCNF-40%.

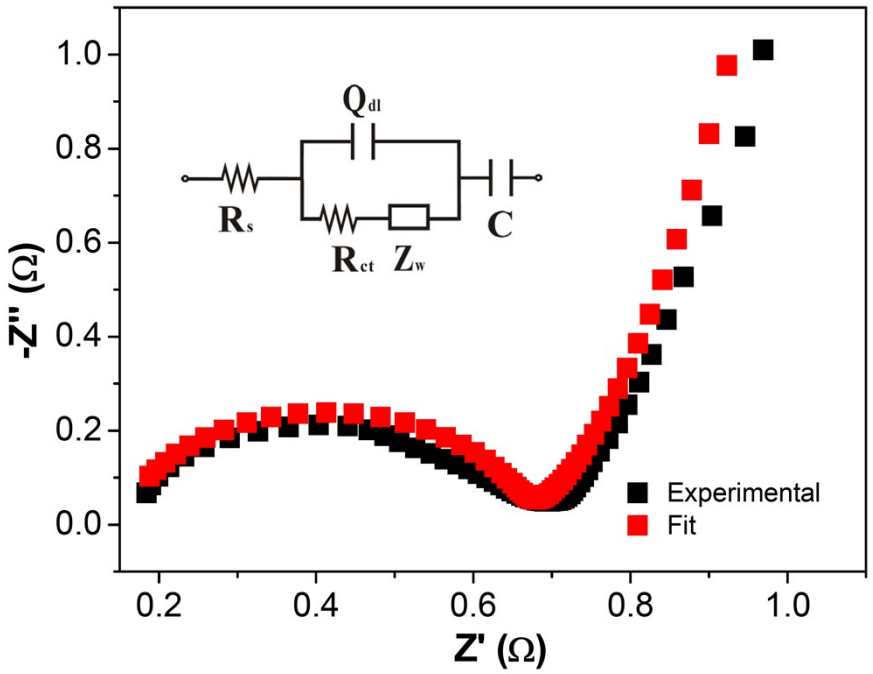

Fig. S7. Measured and simulated EIS impedance for RuFe@Fe_2O_3/mCNF-25% and the equivalent electrical circuit (inset).