Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Fe/N-doped Carbon Nanofibers with Fe_3O_4/Fe_2C Nanocrystals Enchased as Electrocatalyst for Efficient Oxygen Reduction reaction

Mengfei Li, †[a] Zhenyu Xiao, †[b] Lili Fan,[a] Fengmei Wang, [b] Xinxin Du, [a] Zixi Kang, [a] Weidong Fan,[a] Ziyang Guo, [b] and Daofeng Sun [a]*

[a] State Key Laboratory of Heavy Oil Processing, Institute of New Energy, School of Materials Science and Engineering, China University of Petroleum (East China), Qingdao 266580, P. R. China.

[b] Key Laboratory of Eco-chemical Engineering, Taishan scholar advantage and characteristic discipline team of Eco chemical process and technology, College of Chemistry and Molecular Engineering, Qingdao University of Science and Technology, Qingdao 266042, P. R. China.

† These authors contributed equally to this work.

E-mail addresses: lilifan@upc.edu.cn

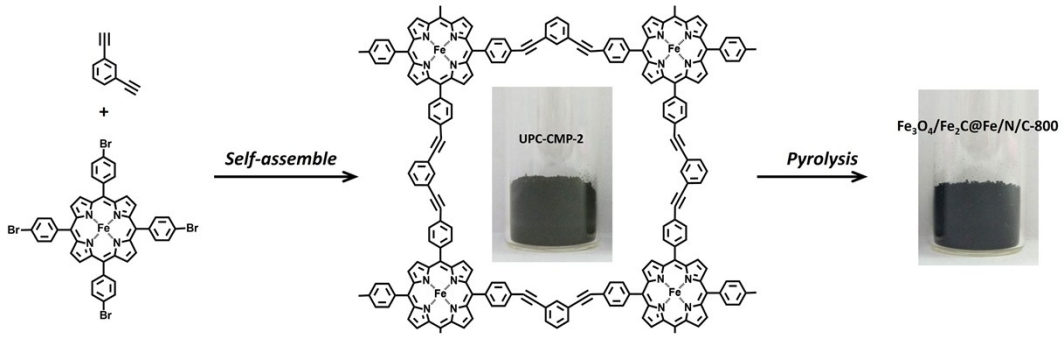

Fig. S1 Assembly process of UPC-CMP-2 structure and photographs of UPC-CMP-2 and Fe_3O_4/Fe_2C@Fe/N/C-800 powders.

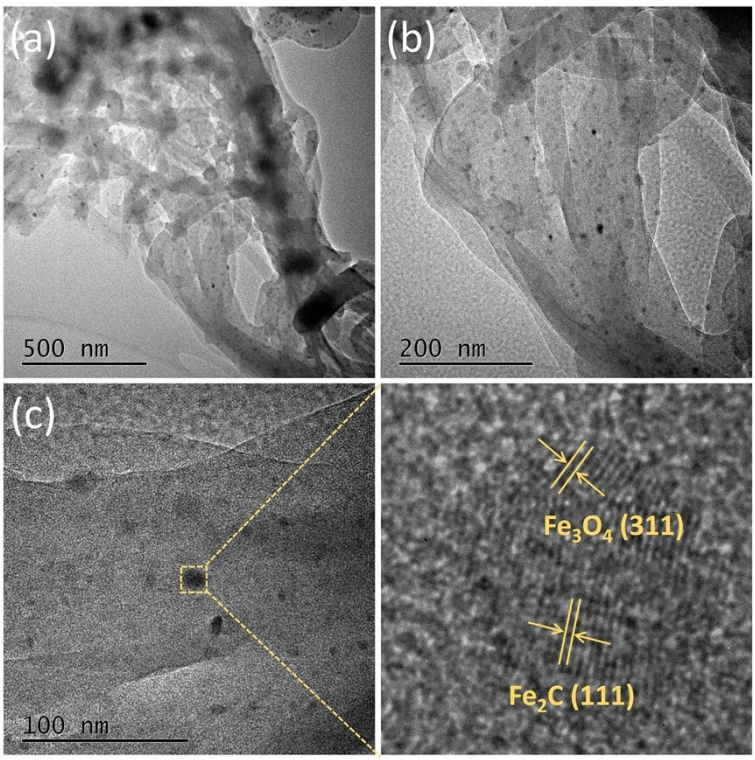

Fig. S2 Low magnification and high resolution TEM images of Fe_3O_4/Fe_2C@Fe/N/C-600.

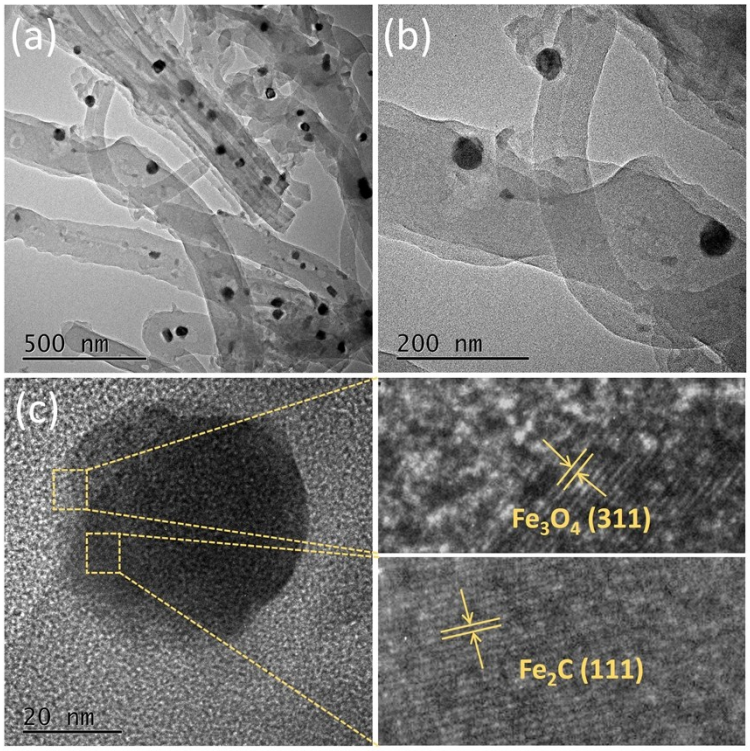

Fig. S3 Low magnification and high resolution TEM images of Fe_3O_4/Fe_2C@Fe/N/C-700.

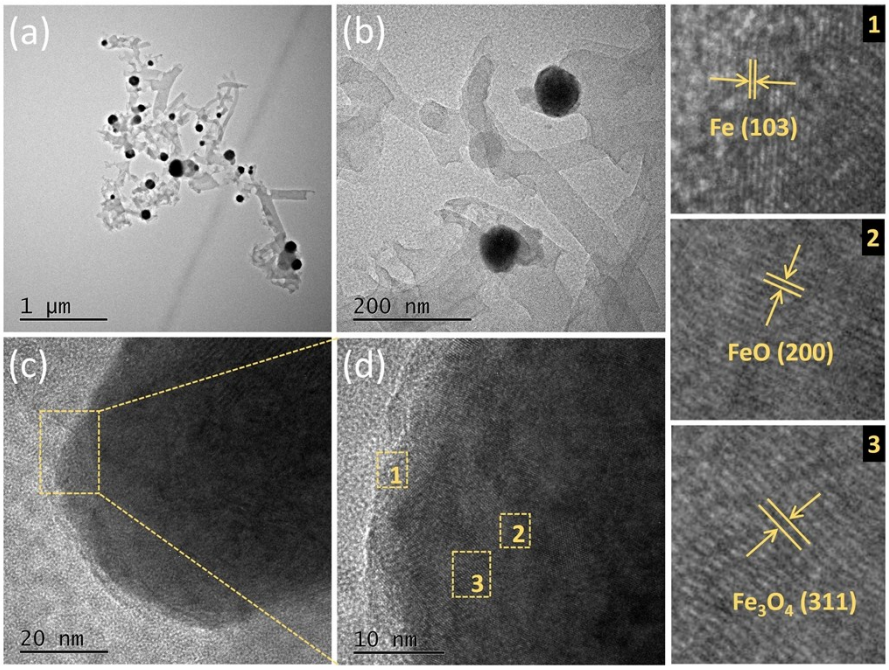

Fig. S4 Low magnification and high resolution TEM images of Fe_3O_4/Fe_2C@Fe/N/C-900.

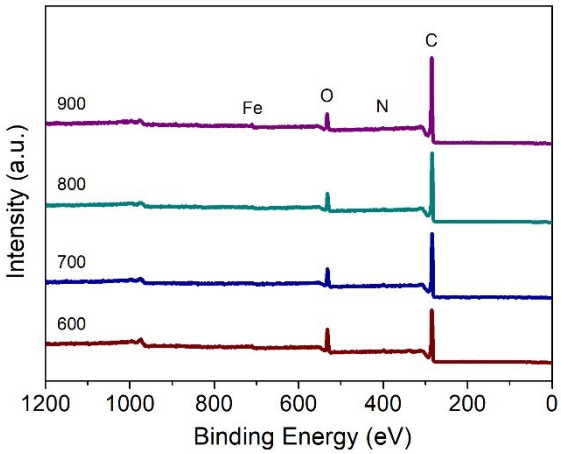

Fig. S5 Survey XPS spectra of Fe_3O_4/Fe_2C@Fe/N/C-600, 700, 800 and 900.

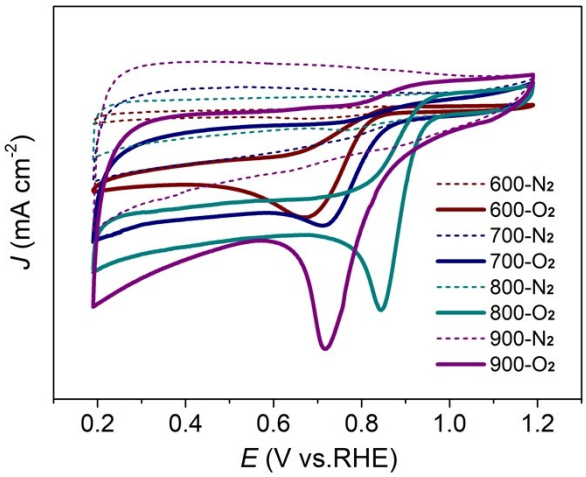

Fig. S6 CV curves of Fe_3O_4/Fe_2C@Fe/N/C-600, 700, 800 and 900 in N_2 and O_2-saturated 0.1 M KOH–H2O electrolyte.

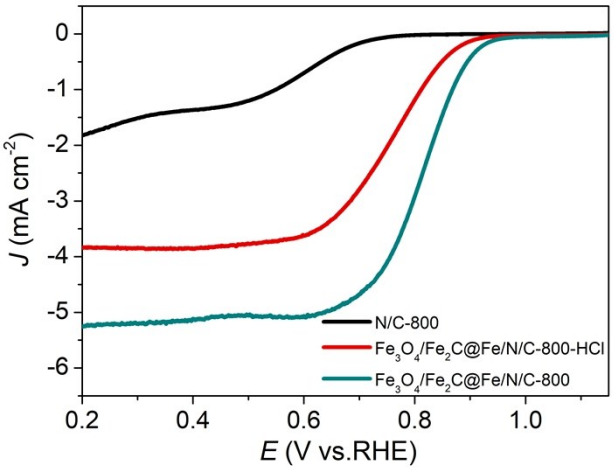

Fig. S7 LSV curves of (a) N/C-800, Fe_3O_4/Fe_2C@Fe/N/C-800 before (b) and after (c) HCl treatment.

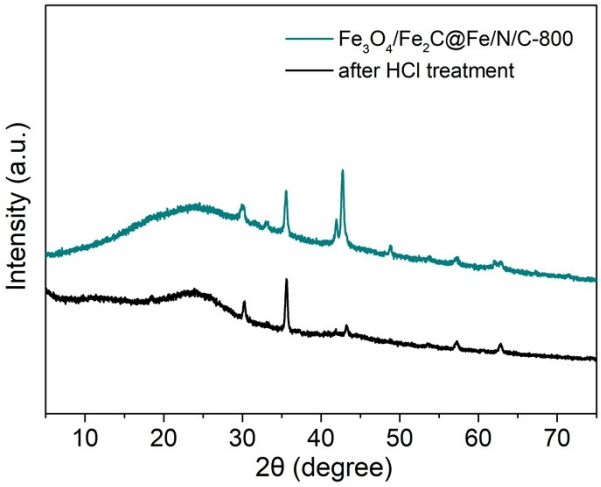

Fig. S8 XRD patterns of Fe_3O_4/Fe_2C@Fe/N/C-800 before and after HCl treatment.

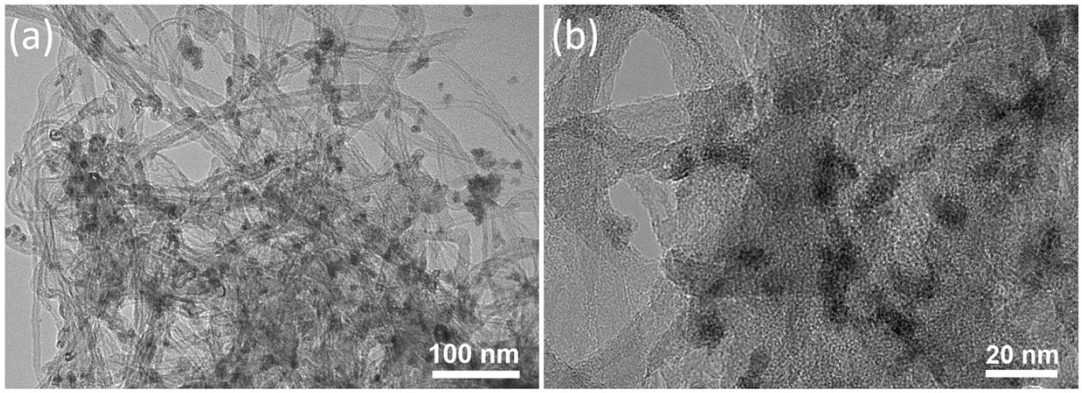

Fig. S9 TEM images of Fe_3O_4/Fe_2C@Fe/N/C-800 after HCl treatment.

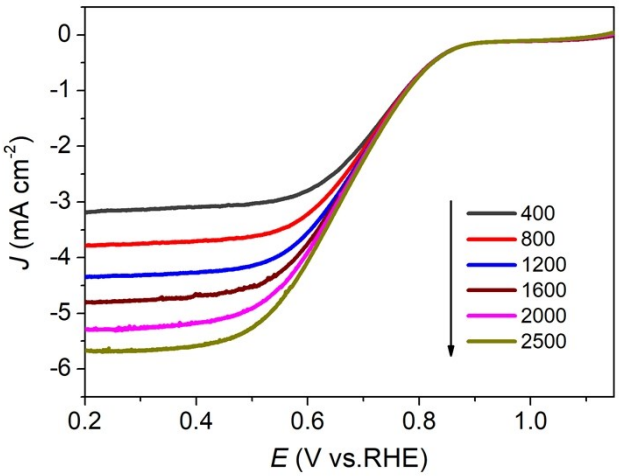

Fig. S10 LSV curves of Fe_3O_4/Fe_2C@Fe/N/C-600 at different rotation rates.

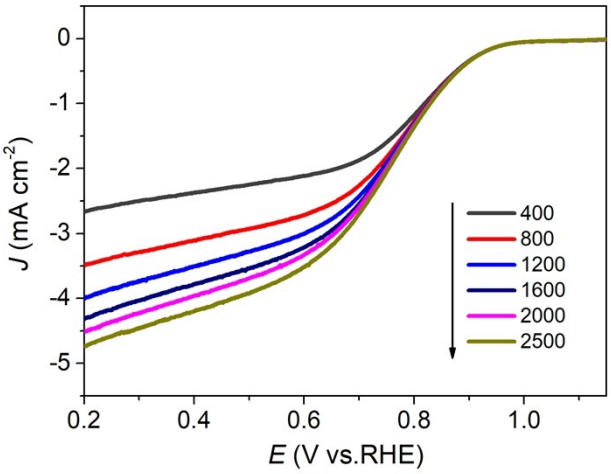

Fig. S11 LSV curves of Fe_3O_4/Fe_2C@Fe/N/C-700 at different rotation rates.

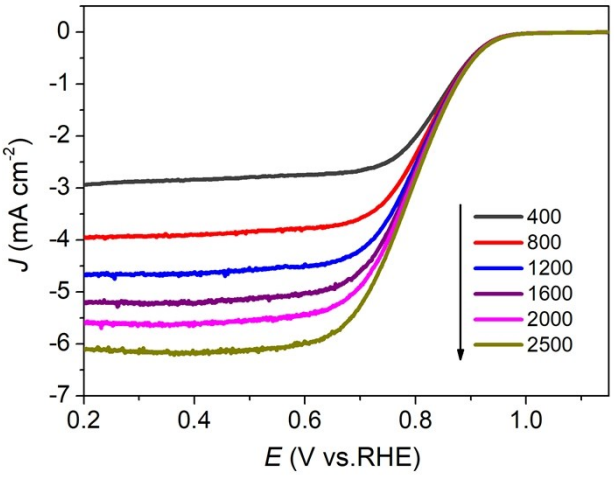

Fig. S12 LSV curves of Fe_3O_4/Fe_2C@Fe/N/C-900 at different rotation rates.

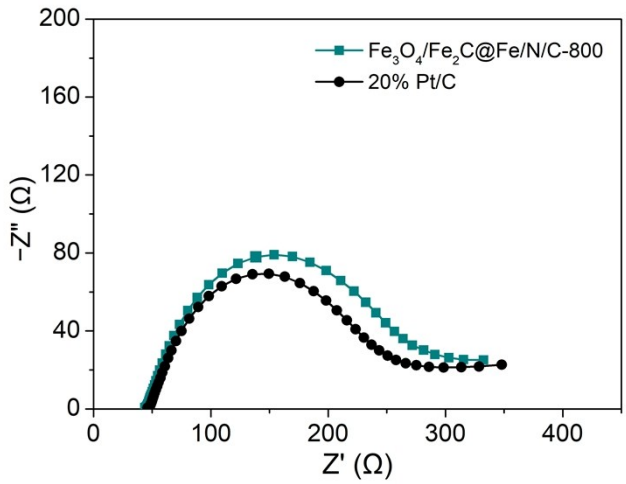

Fig. S13 Nyquist plots of Fe_3O_4/Fe_2C@Fe/N/C-800 and 20 % Pt/C recorded at 1.79 V vs. RHE.

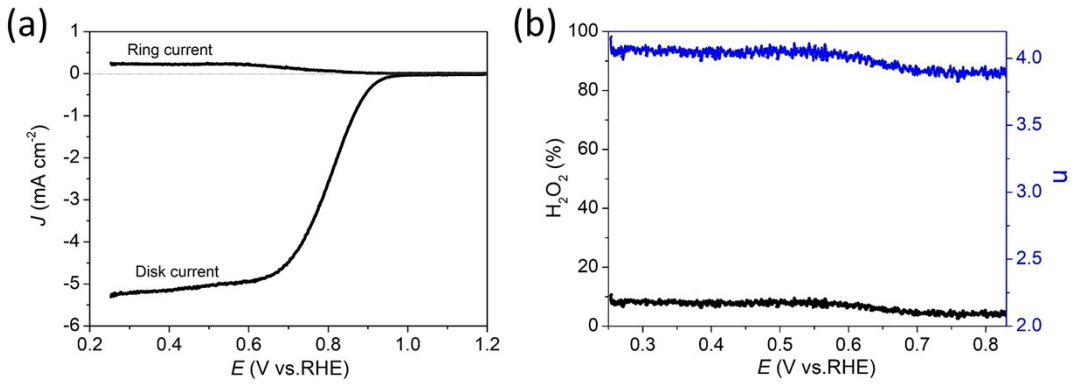

Fig. S14 (a) RRDE test of Fe_3O_4/Fe_2C@Fe/N/C-800 and (b) corresponding H_2O_2 production yields and the number of electrons transferred.

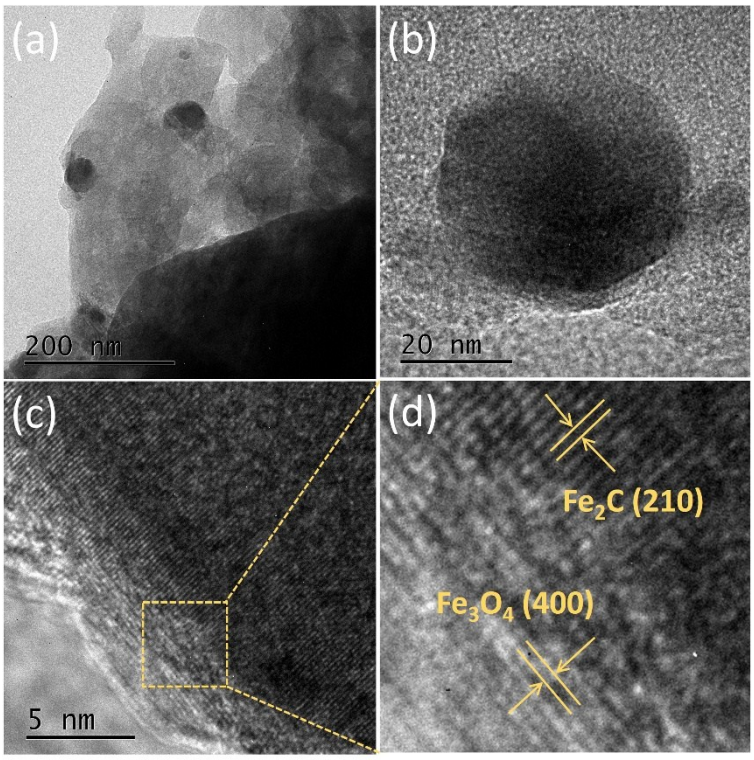

Fig. S15 TEM images of Fe_3O_4/Fe_2C@Fe/N/C-800 after 10 h chronoamperometric test.

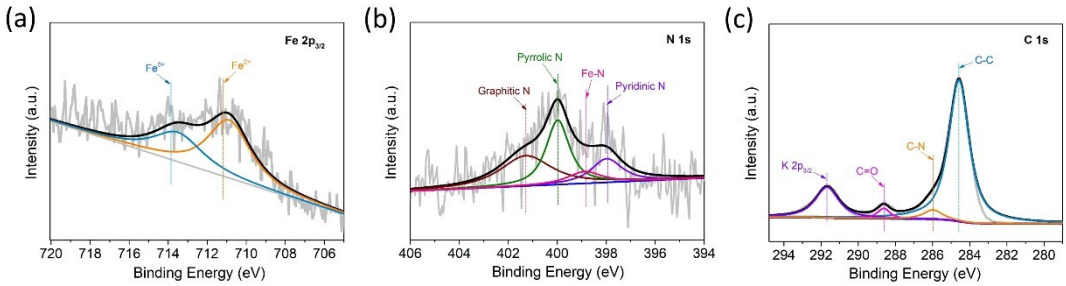

Fig. S16 XPS spectra of (a) Fe $2p_{3/2}$, (b) N 1s, and (c) C 1s of Fe_3O_4/Fe_2C@Fe/N/C-800 after 10 h chronoamperometric test.

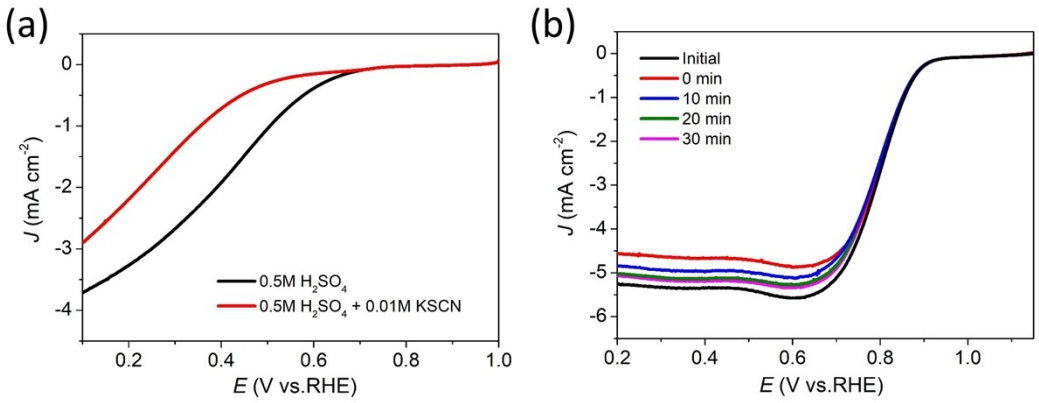

Fig. S17 LSVs of (a) Fe_3O_4/Fe_2C@Fe/N/C-800 before and after the addition of 0.01 M KSCN in 0.5 M H_2SO_4–H_2O electrolyte at 1600 rpm and (b) SCN^- poisoned Fe_3O_4/Fe_2C@Fe/N/C-800 in 0.1 M KOH–H_2O electrolyte.

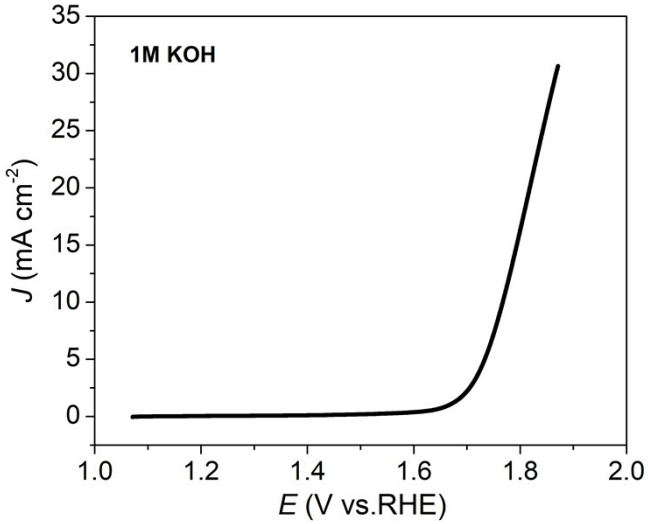

Fig. S18 The OER activity of Fe_3O_4/Fe_2C@Fe/N/C-800 in 1 M KOH solution.