Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Title: Fe_3C-based Oxygen Reduction Catalysts: Synthesis, Hollow Spherical Structures and Applications in Fuel Cells

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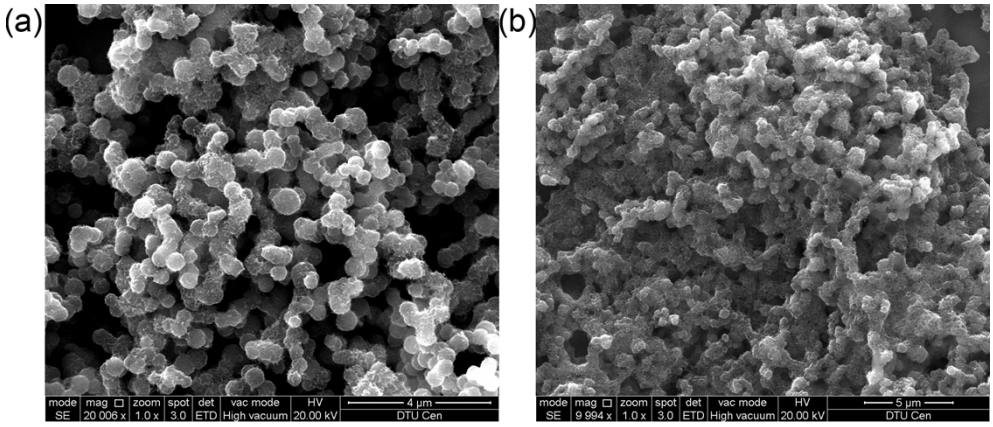

Fig. S1 SEM images of (a) Fe/C-630 and (b) Fe_3C/C-660.

Sample	Mean diameter
Fe/C-500	412 nm
Fe/C-600	408 nm
Fe/C-630	448 nm
Fe/C-660	436 nm
Fe/C-700	445 nm
Fe/C-800	530 nm

Table S1 Mean diameters of the spheres of prepared catalysts.

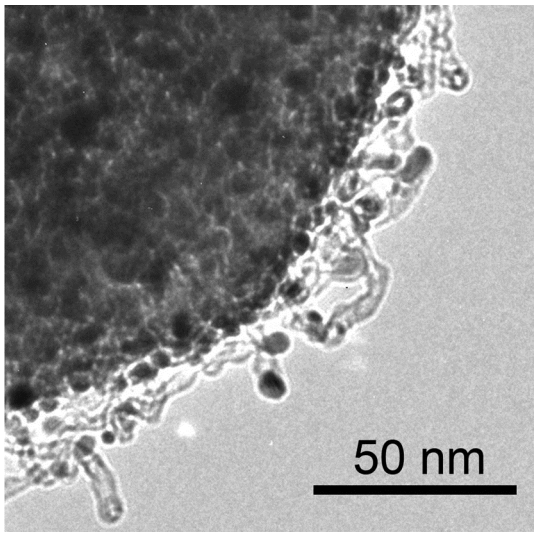

Fig. S2a CNT structures on the surface of a Fe/C-700 catalyst sphere.

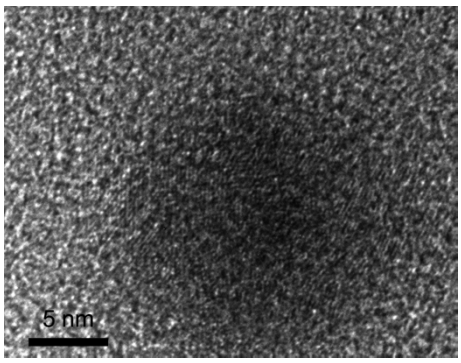

Fig. S2b HRTEM image of a Fe_3C nanoparticle in Fe/C-600

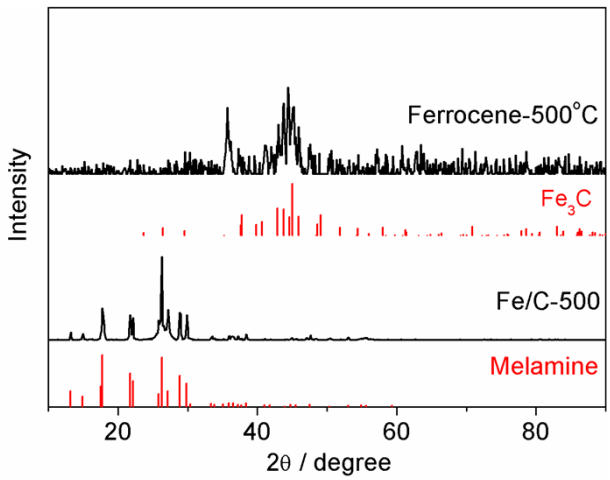

Fig. S3 XRD patterns of Fe/C-500 and the product obtained by using ferrocene as the precursor pyrolyzed at 500°C.

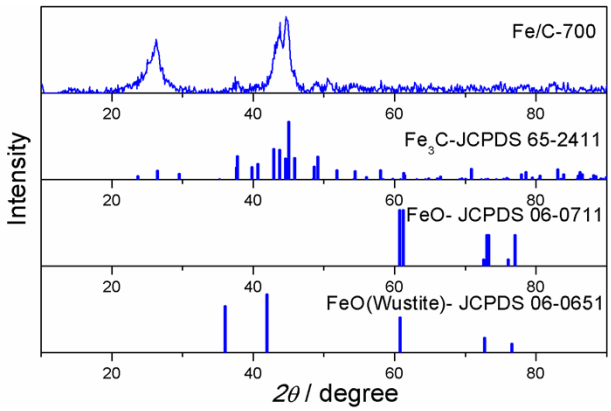

Fig. S4 XRD patterns of Fe/C-700 and the standard XRD patterns assigned for Fe_3C and two types of iron oxide.

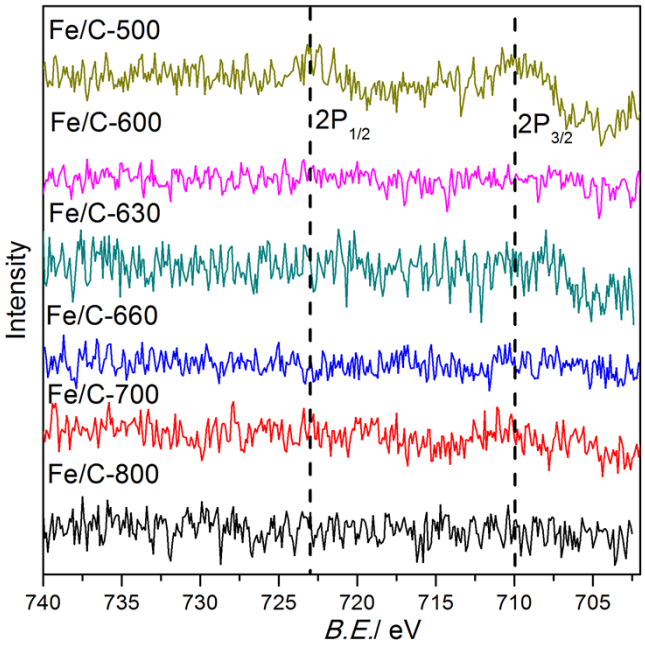

Fig. S5 High resolution XPS spectra of Fe-2p for Fe/C-500, Fe/C-600, Fe/C-630, Fe/C-660, Fe/C-700 and Fe/C-800.

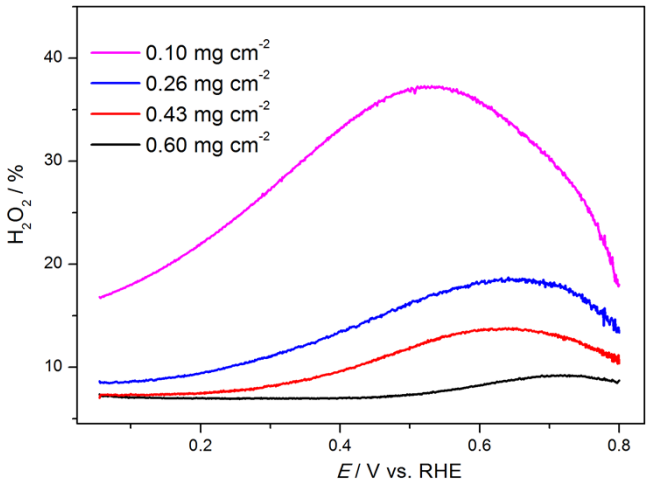

Fig. S6 Peroxide yields of Fe/C-700 (at different loadings) for ORR in 0.1M $HClO_4$.

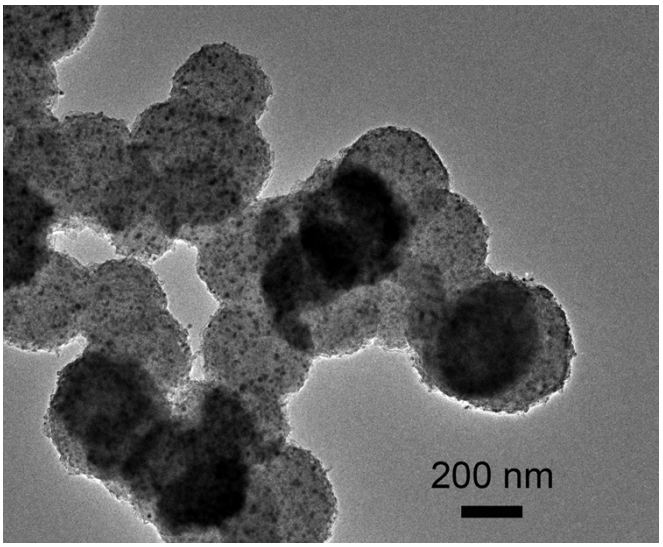

Fig. S7 Catalyst spheres of Fe/C-800 after the AST test in O_2.

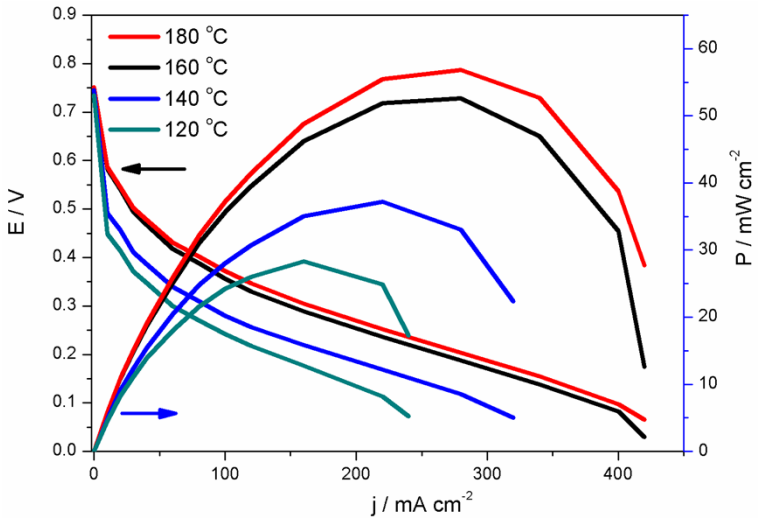

Fig. S8 Polarization and power density curves of the PBI-2 H_2-O_2 fuel cell different working temperatures under ambient pressure. The catalyst loading is 3.95 mg cm^{-2}. See Experimental Section for other operation conditions.

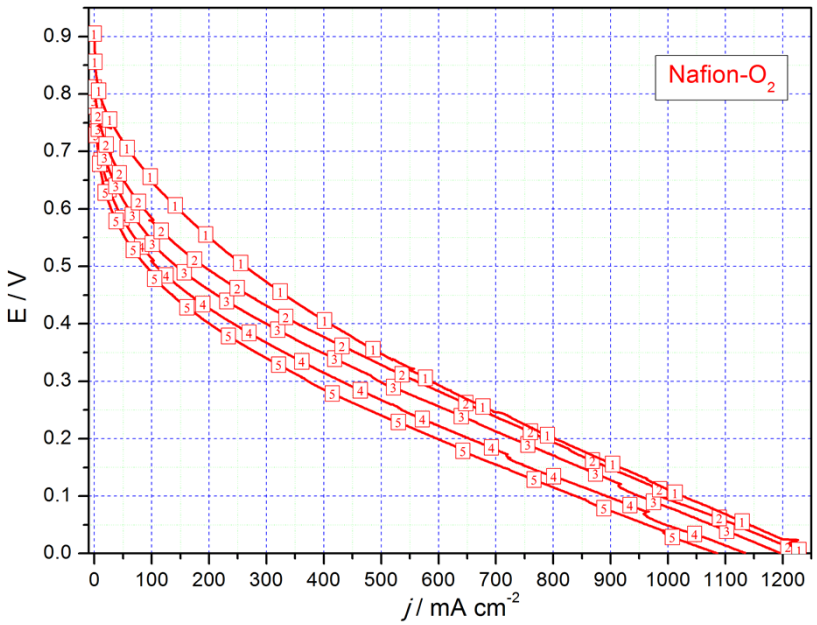

Fig. S9 Plolarization curves obtained throughout stability test of Nafion-O_2 (shown in Figure 9) at various times, i.e. 0 h (1), 2.0 h (2), 7.7 h (3), 26.4 h (4), and 50.0 h (5). The catalyst loading in the cathode is 3.95 mg cm^{-2}. The fuel cell temperature is 80 °C. See Experimental Section for other operation conditions.

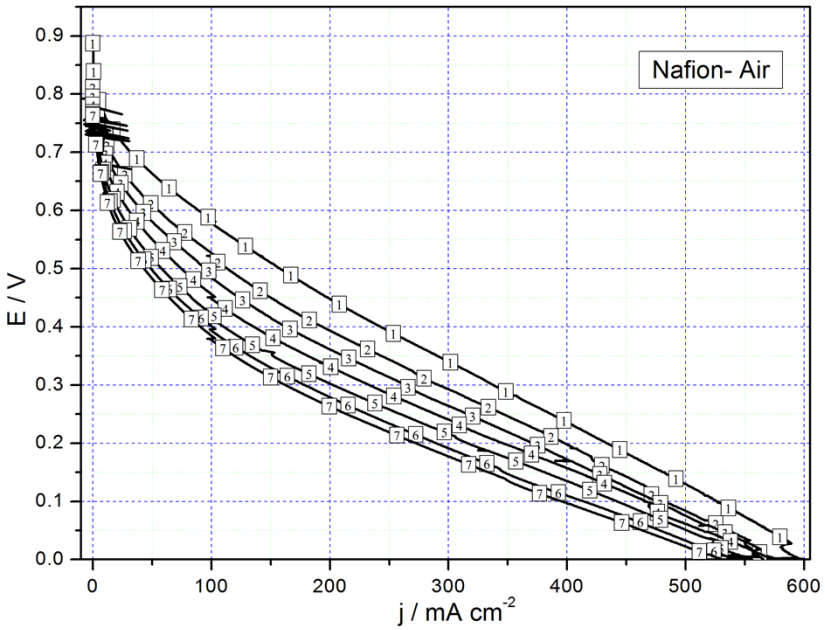

Fig. S10 Plolarization curves obtained throughout stability test of Nafion- Air (shown in Figure 9) at various times, i.e. 0 h(1), 2.0 h (2), 7.7 h (3), 26.4 h (4), 50.0 h (5), 75.6 h (6) and 100.0 h (7). The catalyst loading in the cathode is 4.08 mg cm^{-2}. The fuel cell temperature is 80 °C. See Experimental Section for other operation conditions.