catalysts

Supplementary Material: Investigation of Earth-Abundant Oxygen Reduction Electrocatalysts for the Cathode of Passive

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Figures

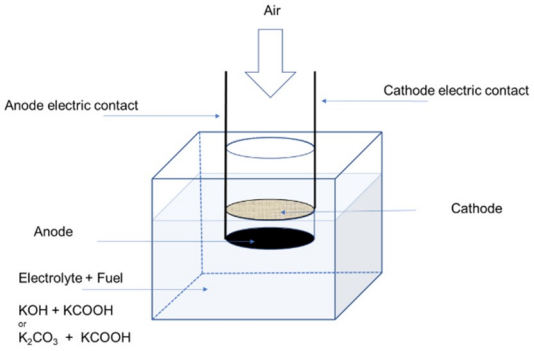

Figure S1. Schematics of the Passive Air-breading Direct Formate Fuel Cell utilized for testing the electrocatalytic activity and stability of the synthesized FeCo-N-C electrocatalyst. The anode is entirely immersed in the anolyte, and the fuel is transported to the electrode surface *via* natural diffusion. The cathode is opened to the air using a gas diffusion electrode.

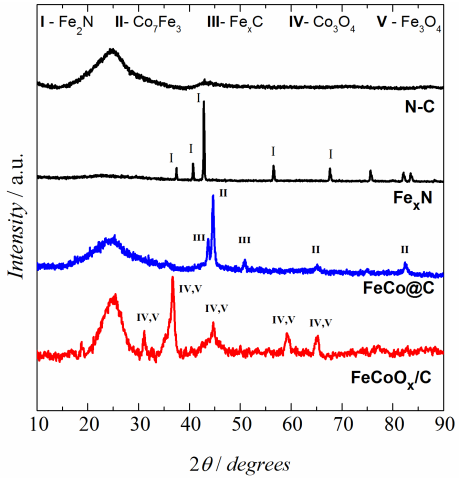

Figure S2. X-ray diffractograms obtained for the synthesized materials utilized as "blanks": $FeCoO_x/C$, FeCo@C, Fe_xN, N-C. The attribution of each peak is included in the figure inset.

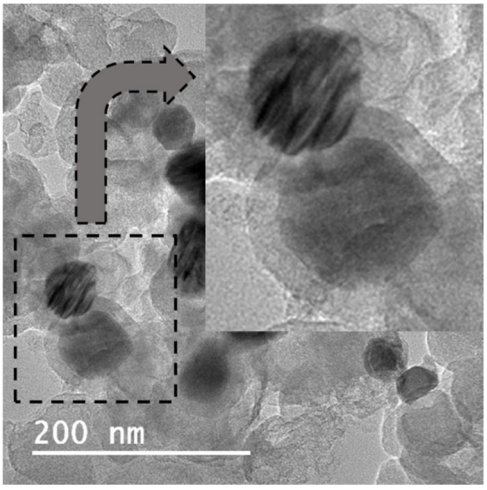

Figure S3. Transmission Electron Microscopy image of the carbon-encapsulated iron-cobalt nanoparticle, FeCo@C, prepared *via* thermal treatment at 1050 °C in Ar atmosphere. The inset shows the graphite carbon layer that entirely encapsulates the metallic nanoparticle.

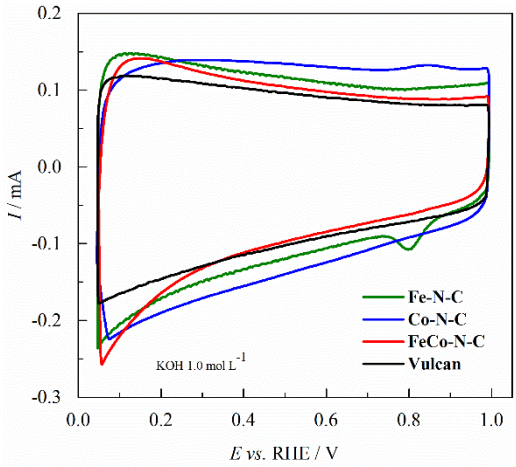

Figure S4. Cyclic voltammograms for Fe-N-C, Co-N-C, and FeCo-N-C electrocatalysts obtained in Ar-saturated 1.0 mol L^{-1} KOH electrolyte. The voltammogram for Vulcan was included for comparison. Scan rate: 50 mV s^{-1}.

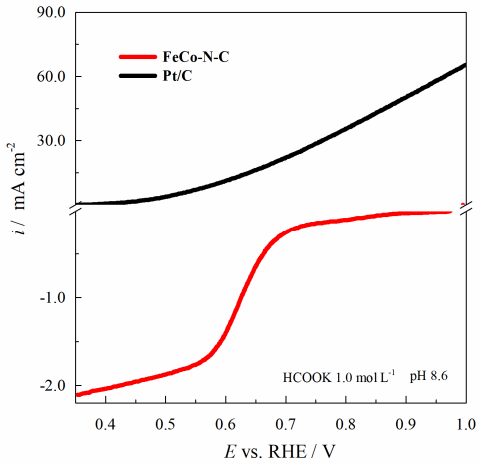

Figure S5. Polarization curves for the ORR on FeCo-N-C and Pt/C in O_2-saturated 1.0 mol L^{-1} HCOOK electrolyte. The curves show the selectivity for the ORR (or tolerance to the presence of formate) of the Fe-Co-N-C electrocatalyst, and the poor selectivity of Pt/C. Scan rate: 5.0 mVs^{-1}. Rotation rate: 1600 rpm.

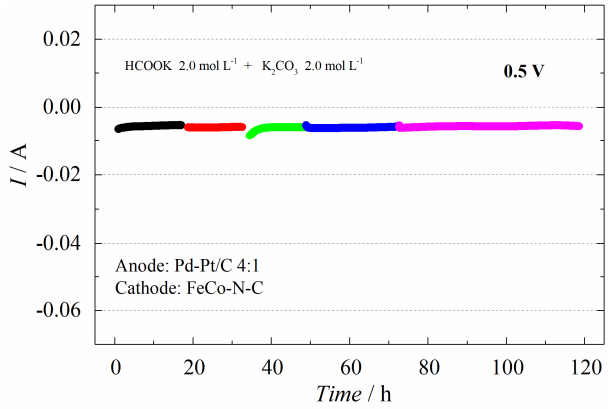

Figure S6. Durability test obtained in the passive air-breathing direct formate fuel cell conducted *via* potentiostatic measurements at 0.5 V in 2.0 mol L^{-1} KCOOH + 2.0 mol L^{-1} K_2CO_3 electrolyte, during 120 h. Cathode: FeCo-N-C; Anode: PdPt/C 4:1. The measurement was recorded at 25°C.