

# Supporting Information

## Nitrogen-Doped Tubular Carbon Foams for Efficient Electroreduction of CO<sub>2</sub> to Syngas with Potential-Independent CO/H<sub>2</sub> Ratios

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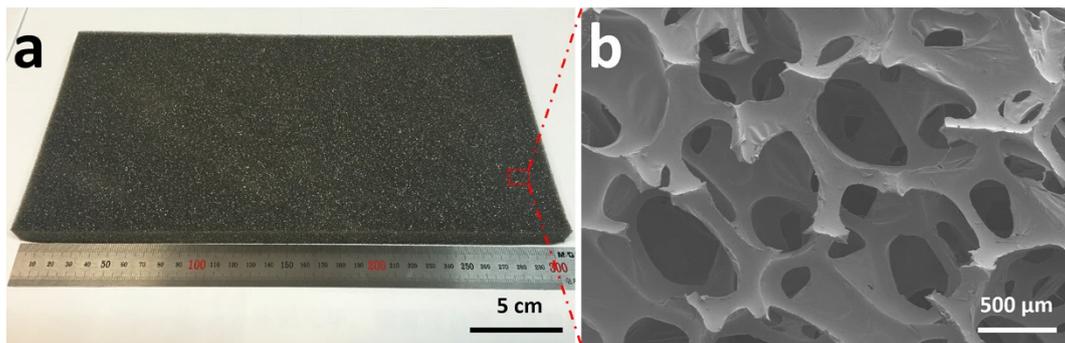
*b. College of Chemical Engineering, Beijing University of Chemical*

*Technology, Beijing 100029, China.*

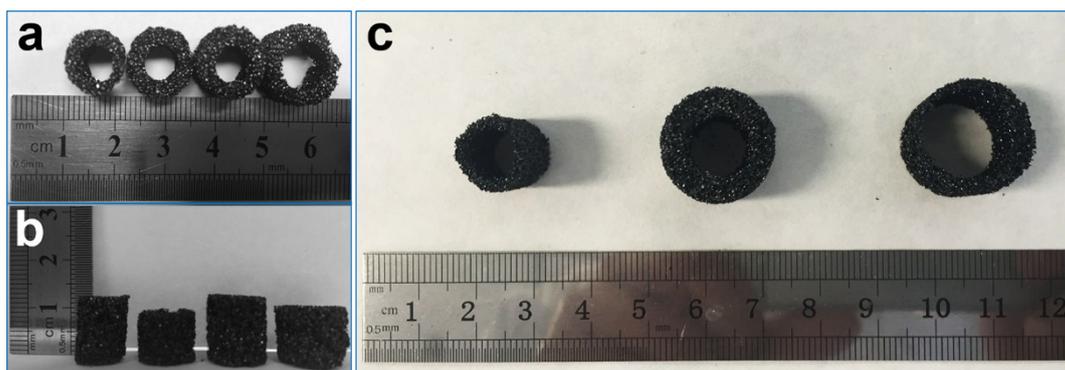
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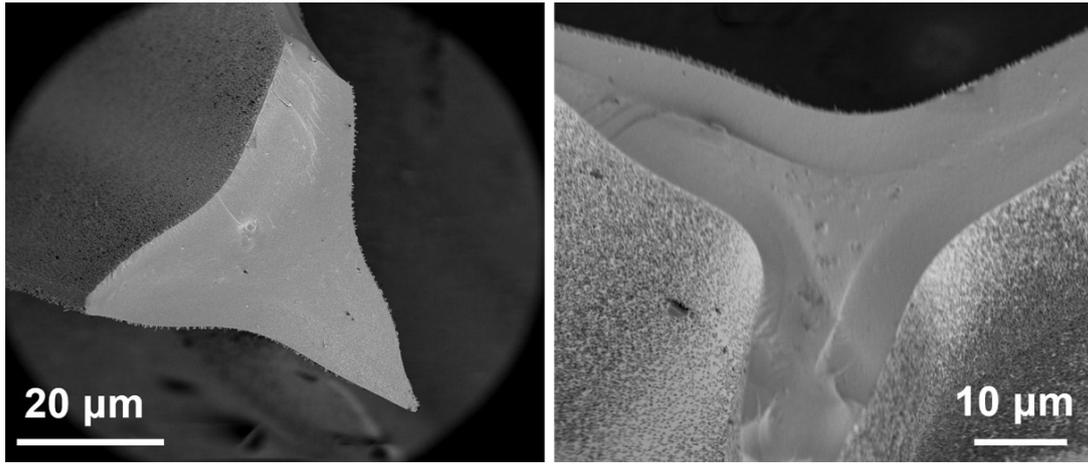
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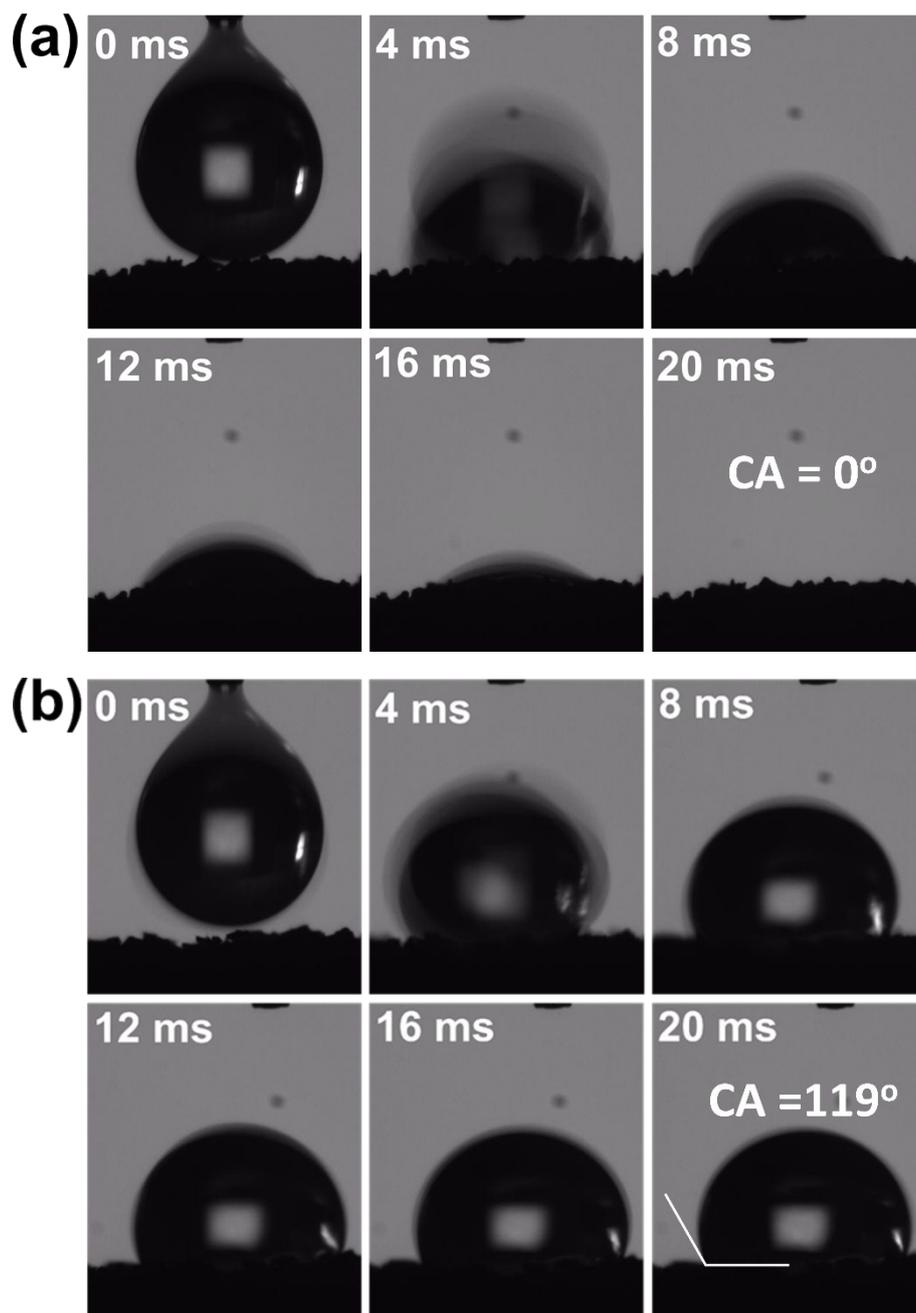
**Figure S1.** Optical image (a) and FESEM image (b) of the pristine PU foam.



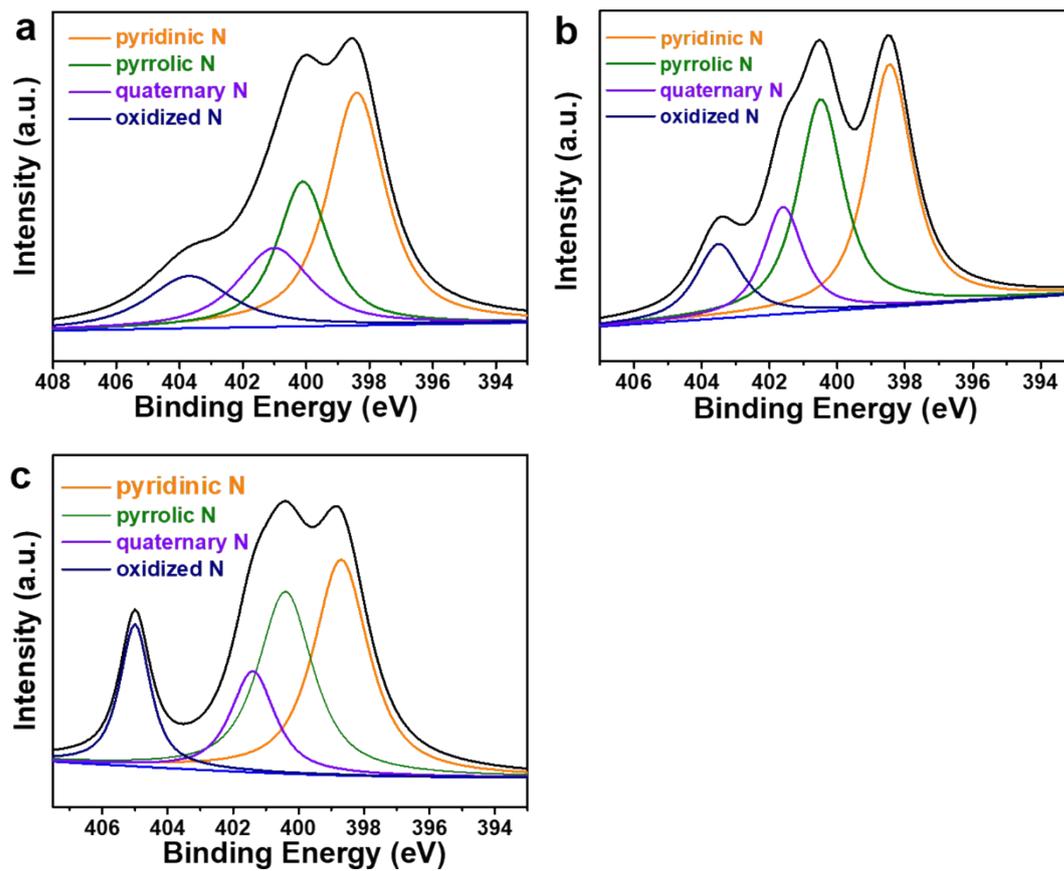
**Figure S2.** Photographs of the various 3D N-doped tubular carbon foam electrodes. (a) top-view. (b) side-view. (c) 3D N-doped tubular carbon foam electrodes with different diameters.



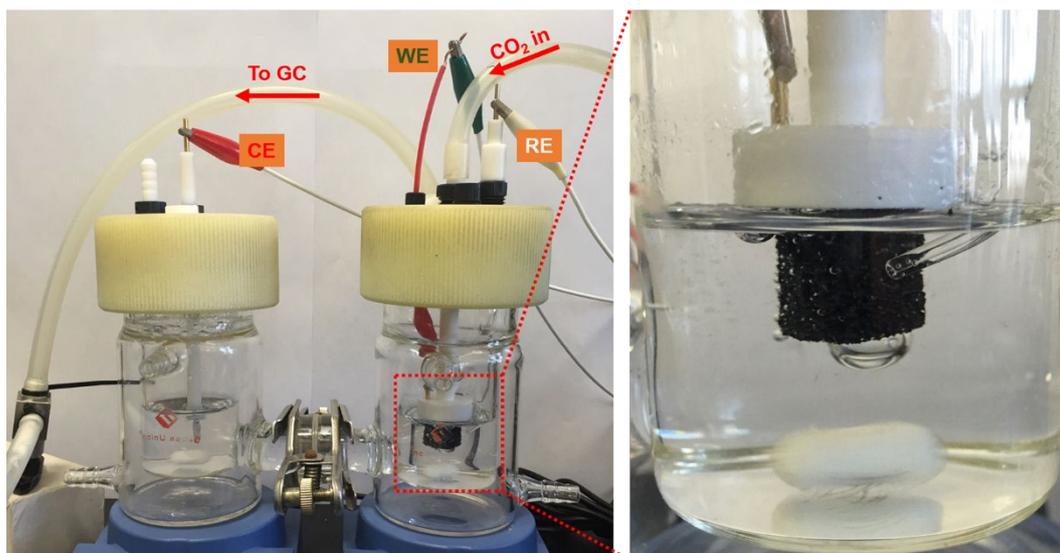
**Figure S3.** Cross-section view of the 3D carbon skeletons.



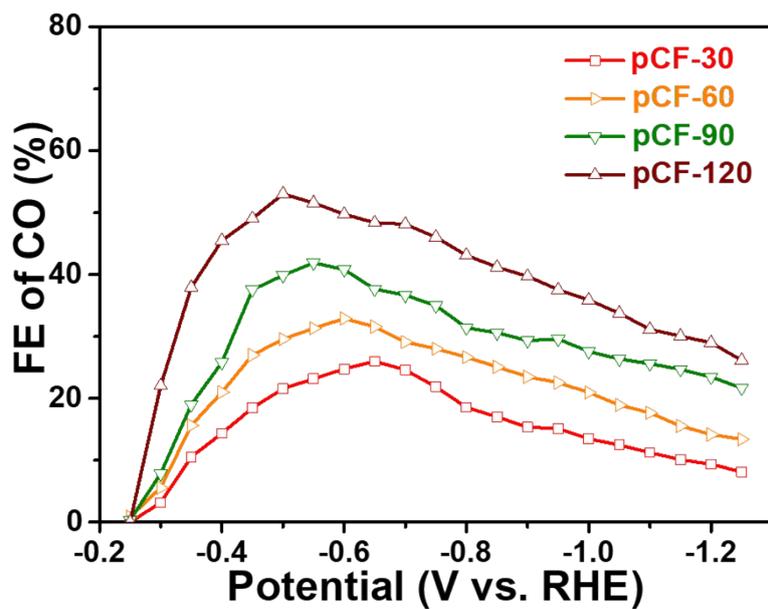
**Figure S4.** Measurements of the wettability of carbon foams. (a) Time-lapse images of a water droplet sinking in the N-doped carbon foam surface. (b) Time-lapse images of a water droplet resting on the pristine carbon foam surface.



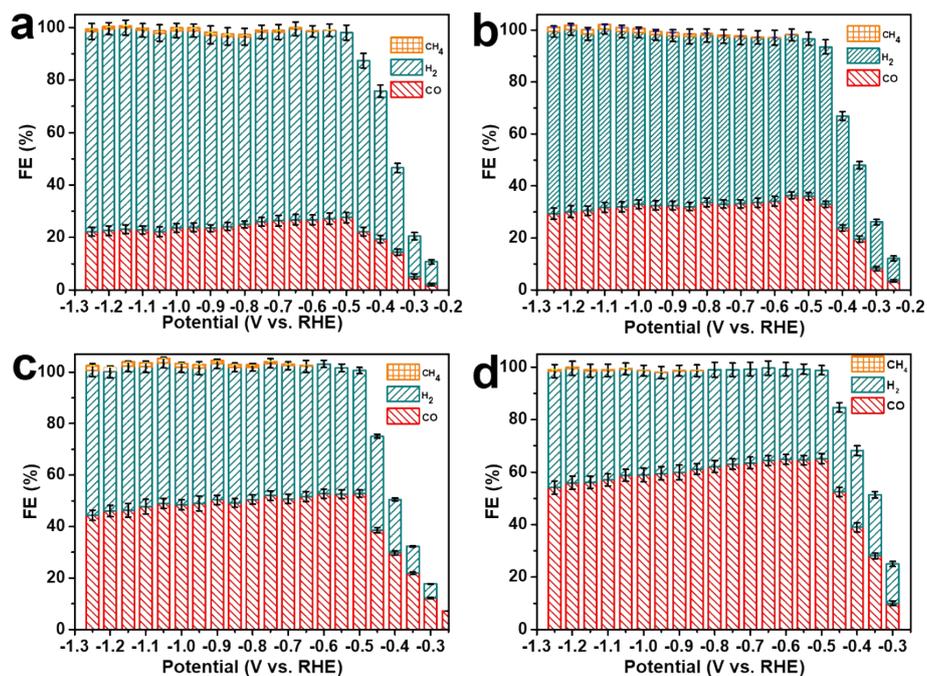
**Figure S5.** The high-resolution XPS spectra of N 1s of CF-30 (a), CF-60 (b), and CF-90 (c).



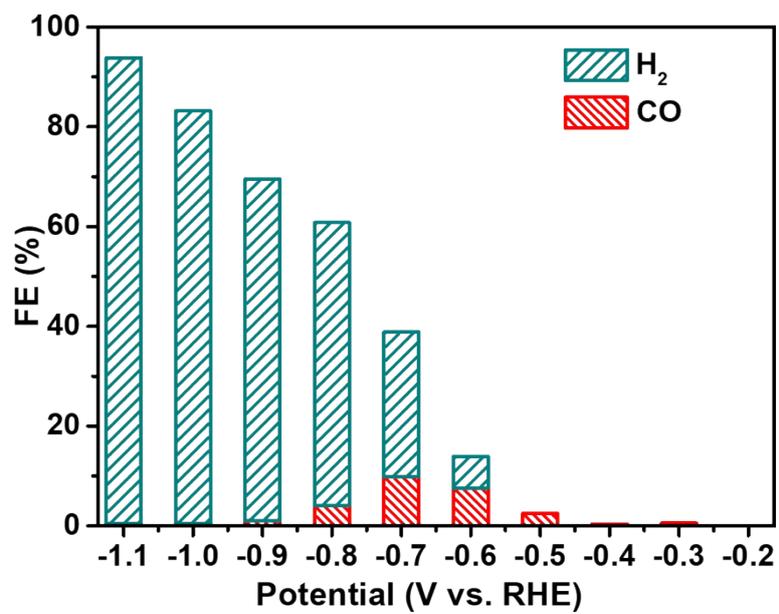
**Figure S6.** The tubular electrode assembled by N-doped carbon foam.



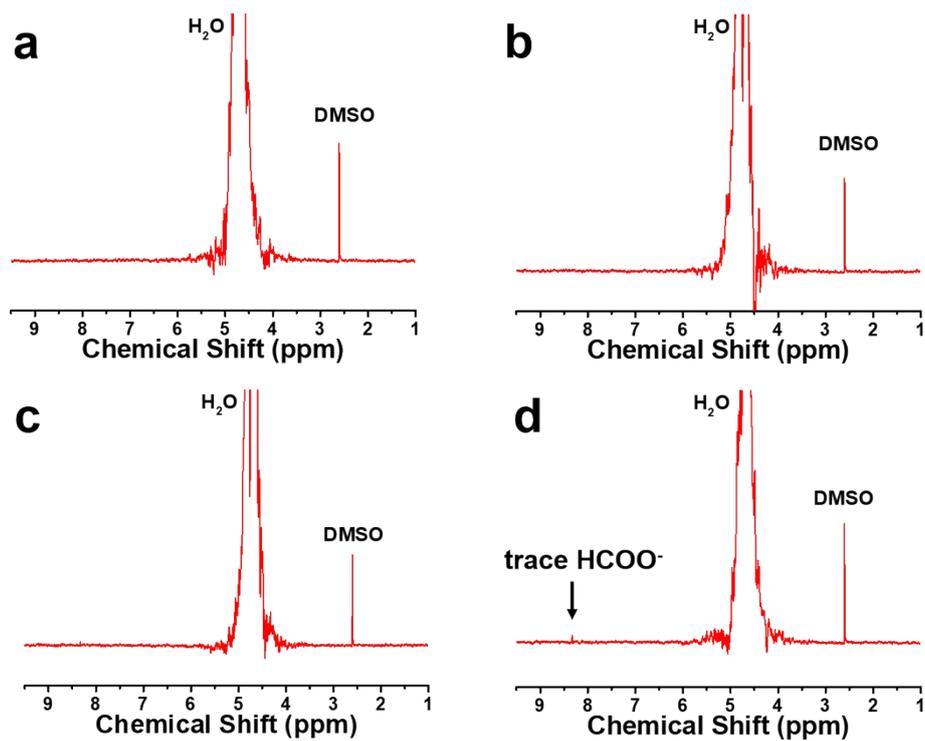
**Figure S7.** The FE of CO on various planar electrodes at different applied potentials.



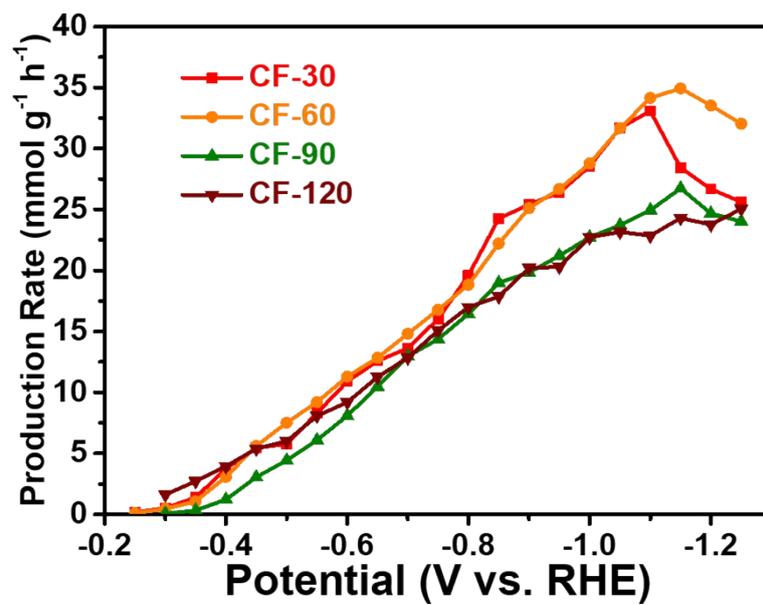
**Figure S8.** FEs of gaseous products on various N-doped tubular carbon foam electrodes at different applied potentials. (a) CF-30. (b) CF-60. (c) CF-90. (d) CF-120.



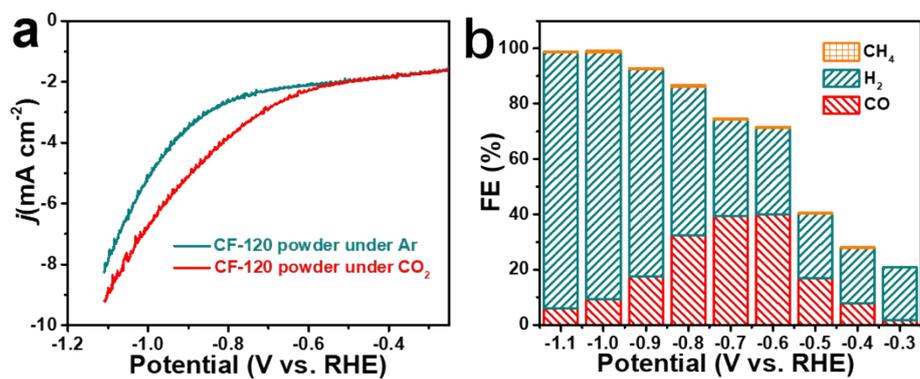
**Figure S9.** FEs of gaseous products on pristine CF.



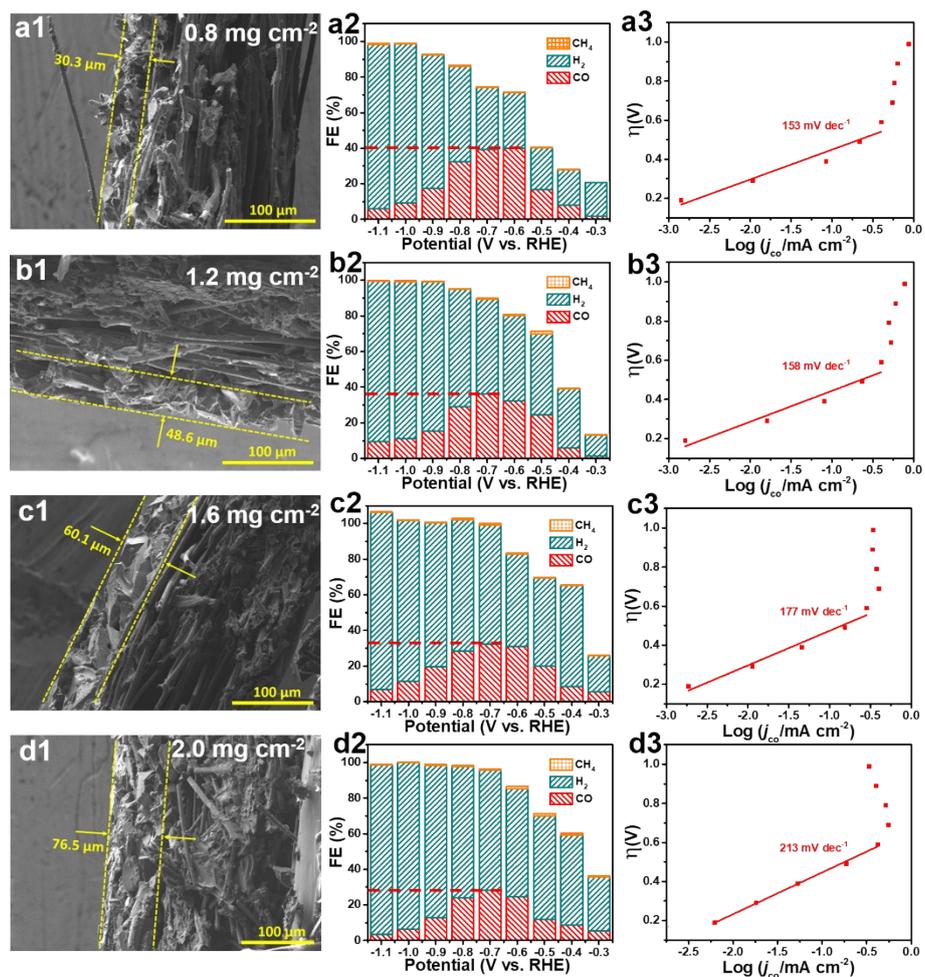
**Figure S10.**  $^1\text{H-NMR}$  spectra of the electrolyte after 4 h  $\text{CO}_2$  reduction electrolysis at  $-0.60$  V vs. RHE for CF-30 (a), CF-60 (b), CF-90 (c), and CF-120 (d).



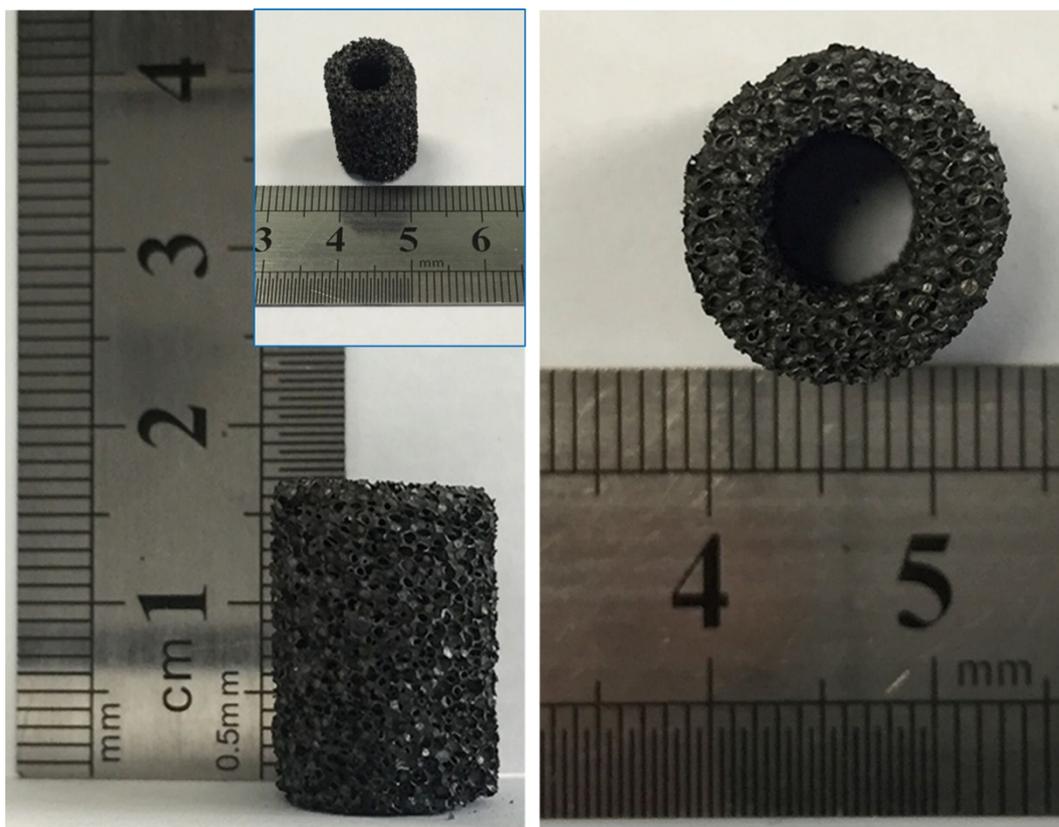
**Figure S11.** H<sub>2</sub> production rates of various samples at different applied potentials.



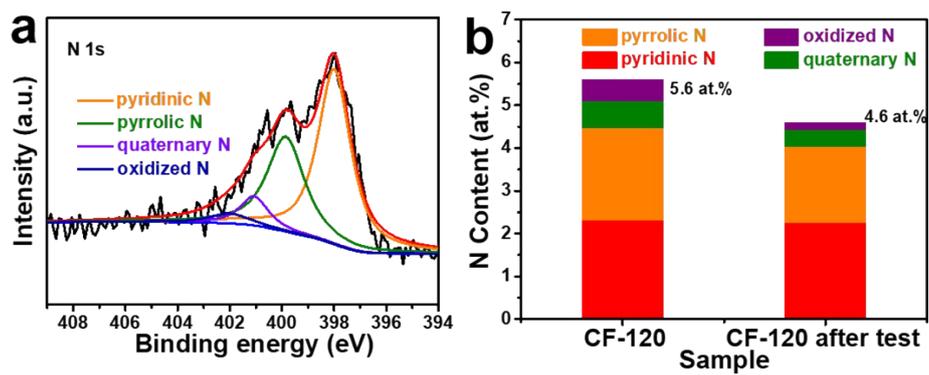
**Figure S12.** Performance of CF-120 powder catalyst (catalyst loading: 0.8 mg cm<sup>-2</sup>). (a) Linear sweep voltammetric curves in the Ar (blue line) or CO<sub>2</sub>-saturated (red line) 0.1 M KHCO<sub>3</sub> aqueous solutions with a 20 mV s<sup>-1</sup> scan rate. (b) FEs of gaseous products.



**Figure S13.** The cross-sectional FESEM images (a1, b1, c1, d1), FEs of gaseous products (a2, b2, c2, d2) and Tafel plots (a3, b3, c3, d3) of the CF-120 powder electrodes with different catalyst loadings (a: 0.8 mg cm<sup>-2</sup>, b: 1.2 mg cm<sup>-2</sup>, c: 1.6 mg cm<sup>-2</sup>, d: 2.0 mg cm<sup>-2</sup>).



**Figure S14.** Photographs of the electrode used in actual experiment (left: side-view; right: top-view).



**Figure S15.** (a) The high-resolution XPS spectra of N 1s of CF-120 after 8 h test. (b) The content and types of N in CF-120 and CF-120 after 8 h test.