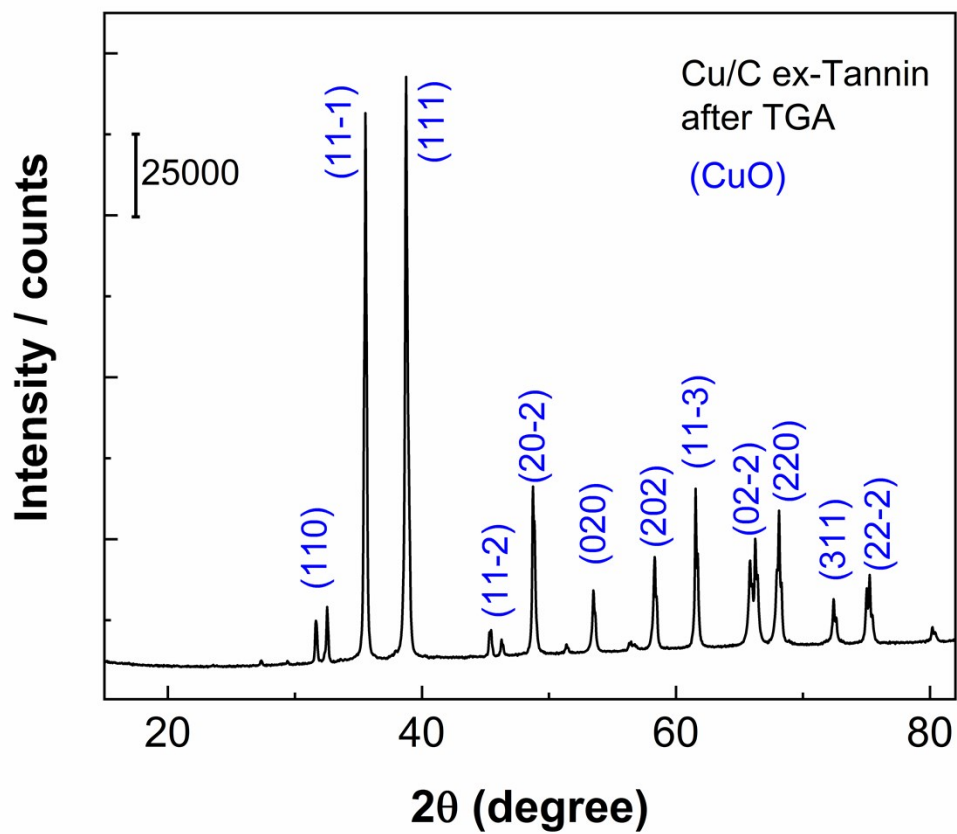


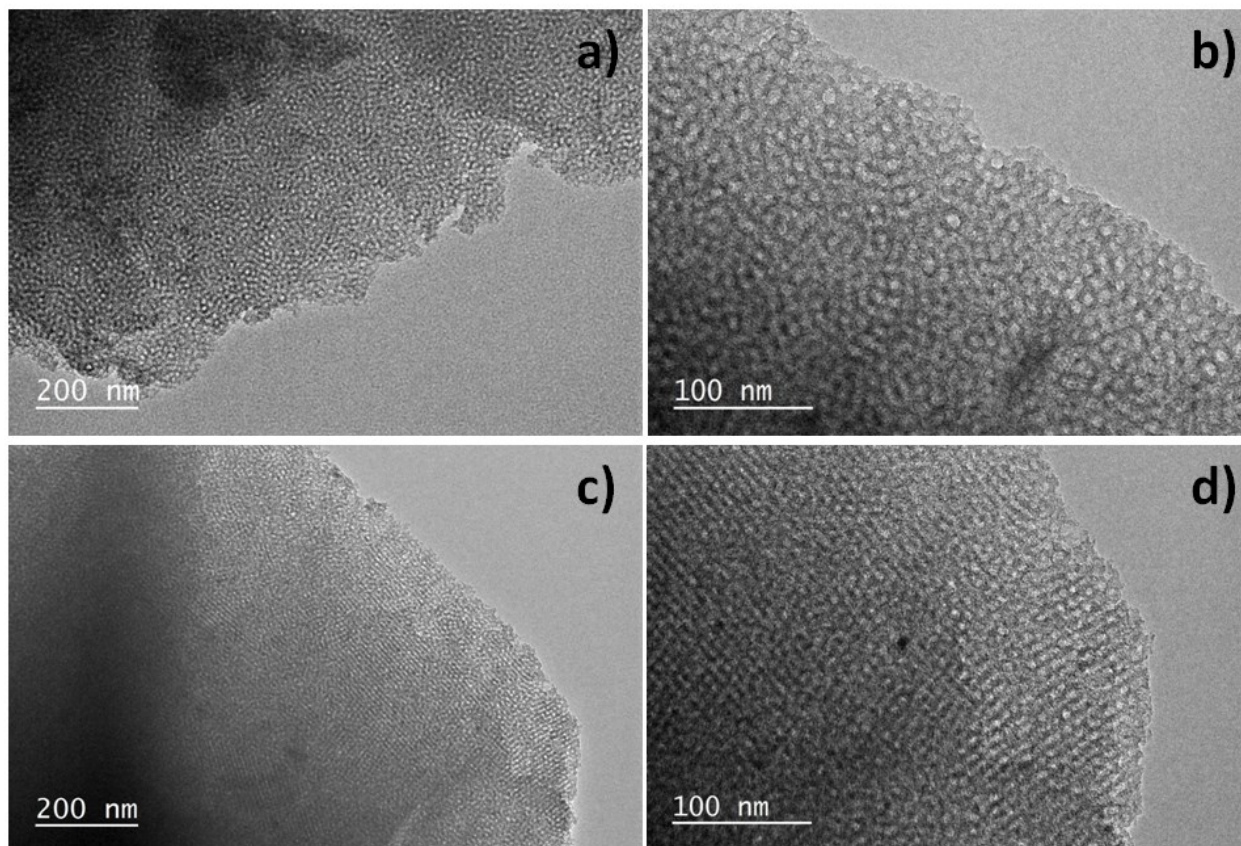
## Electronic Supporting Information

### **CO<sub>2</sub> electroreduction to fuels on mesoporous carbon-embedded copper nanoparticles**

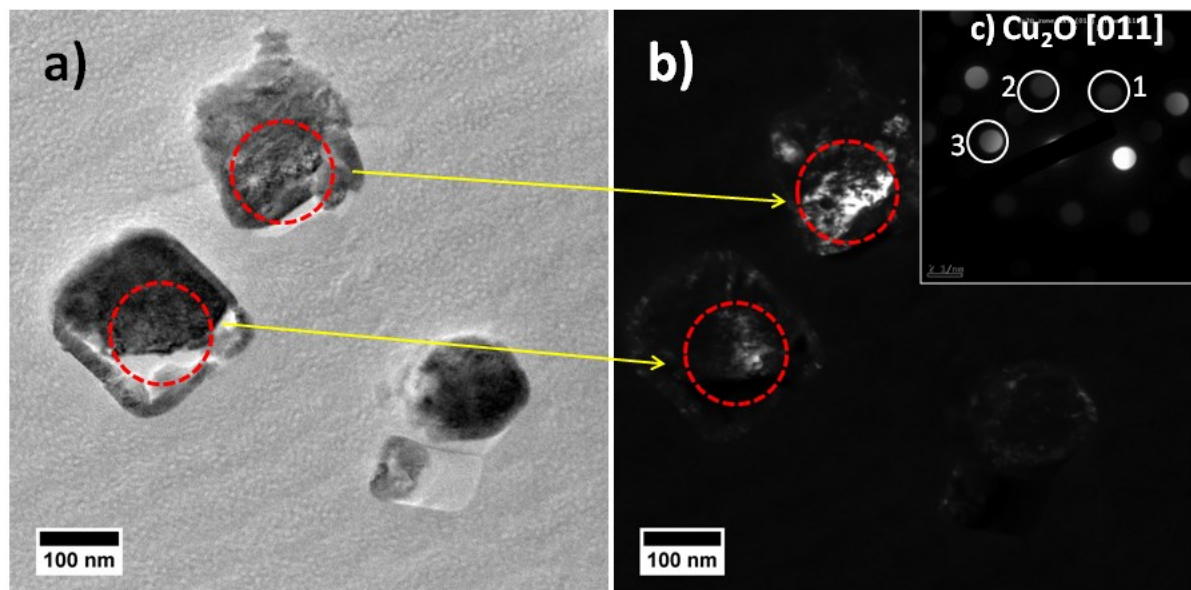
Nihat Sahin,<sup>a,b</sup> Wanderson O. Silva,<sup>b</sup> Mariana R. Camilo,<sup>b</sup> Edson A. Ticianelli,<sup>b</sup> Fabio H. B. Lima,<sup>b</sup> Julien Parmentier,<sup>c</sup> Clément Comminges,<sup>a</sup> Teko W. Napporn,<sup>a</sup> and Kouakou B. Kokoh<sup>a,\*</sup>



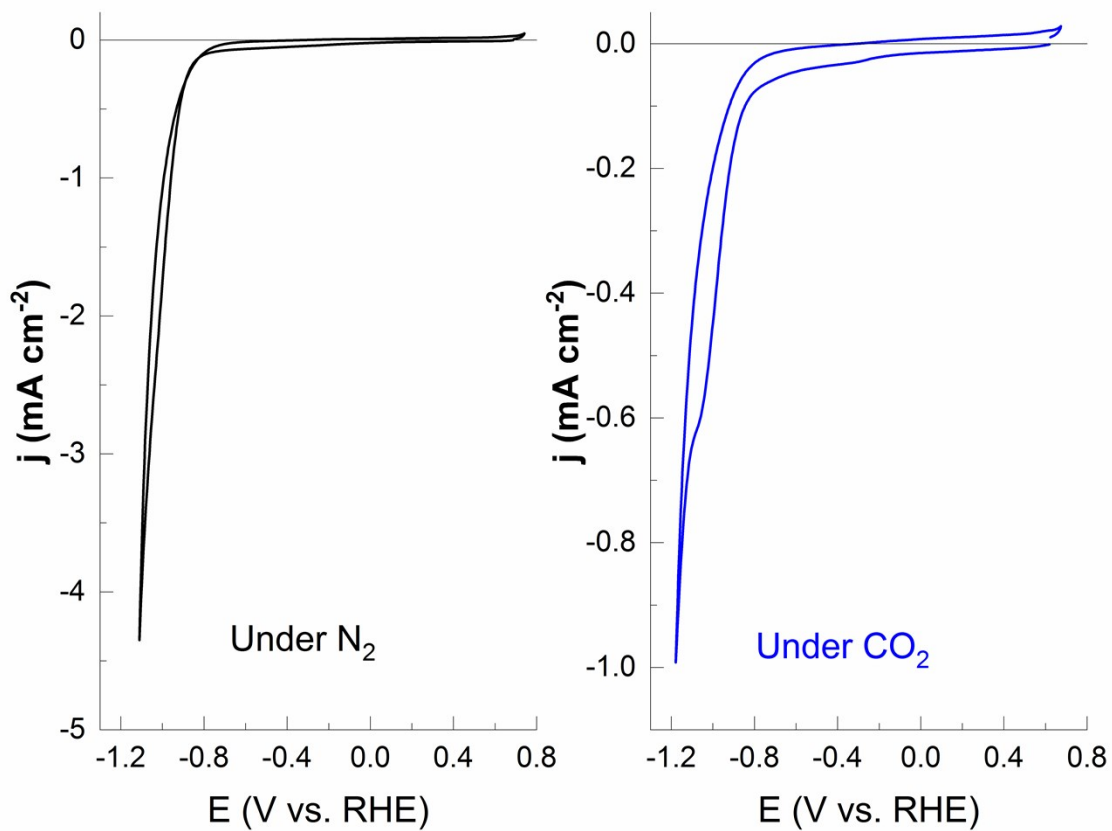
**Figure S1.** XRD patterns of the Cu/C ex-Tannin material recorded after the thermogravimetric analysis measurement under air atmosphere.



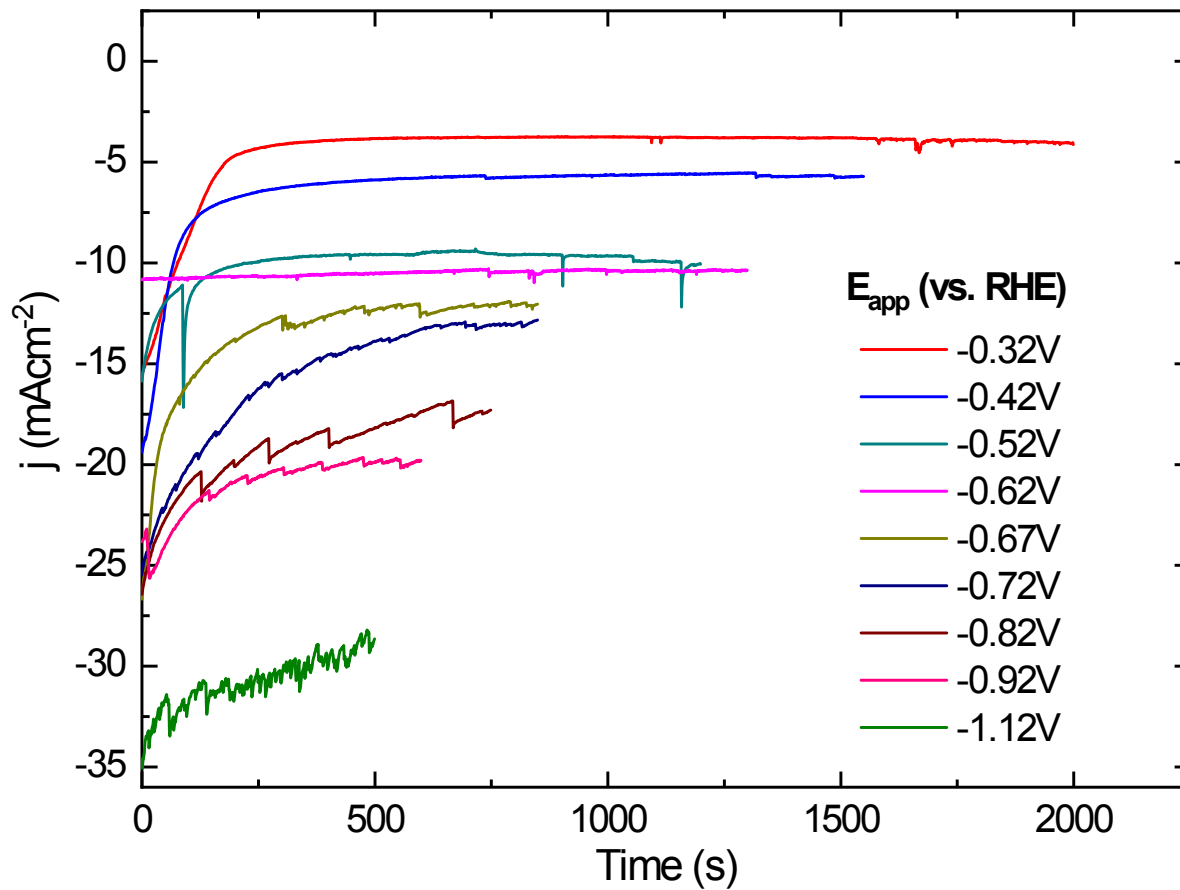
**Figure S2.** Transmission electron microscopy (TEM) images of the metal-free mesoporous carbon materials at different carbonization temperatures (a, b at 400 °C) and (c, d at 900 °C) under Ar for 18 min.



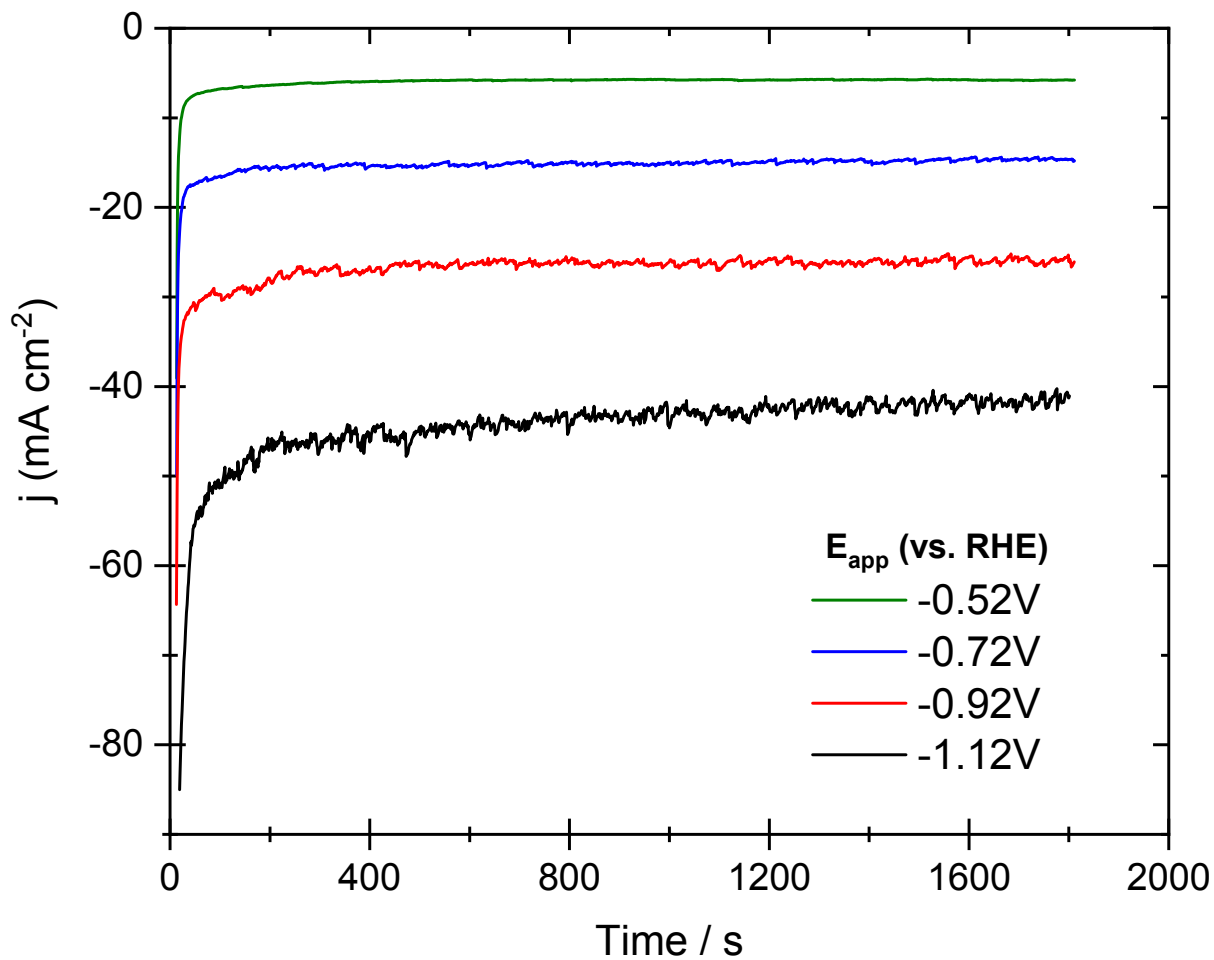
**Figure S3.** The cross-section TEM (CS-TEM) micrographs of Cu/Tannin (a) bright field, (b) dark field CS-TEM micrographs, and the inset image (c) the inset image the selected area electron diffraction (SAED) pattern as regards the dark field plane of  $\text{Cu}_2\text{O}$  (111) at zone axis [011]. The  $d$ -spacing spots indexed as 1, 2 and 3 are determined as 0.221, 0.254 and 0.256 nm, respectively.



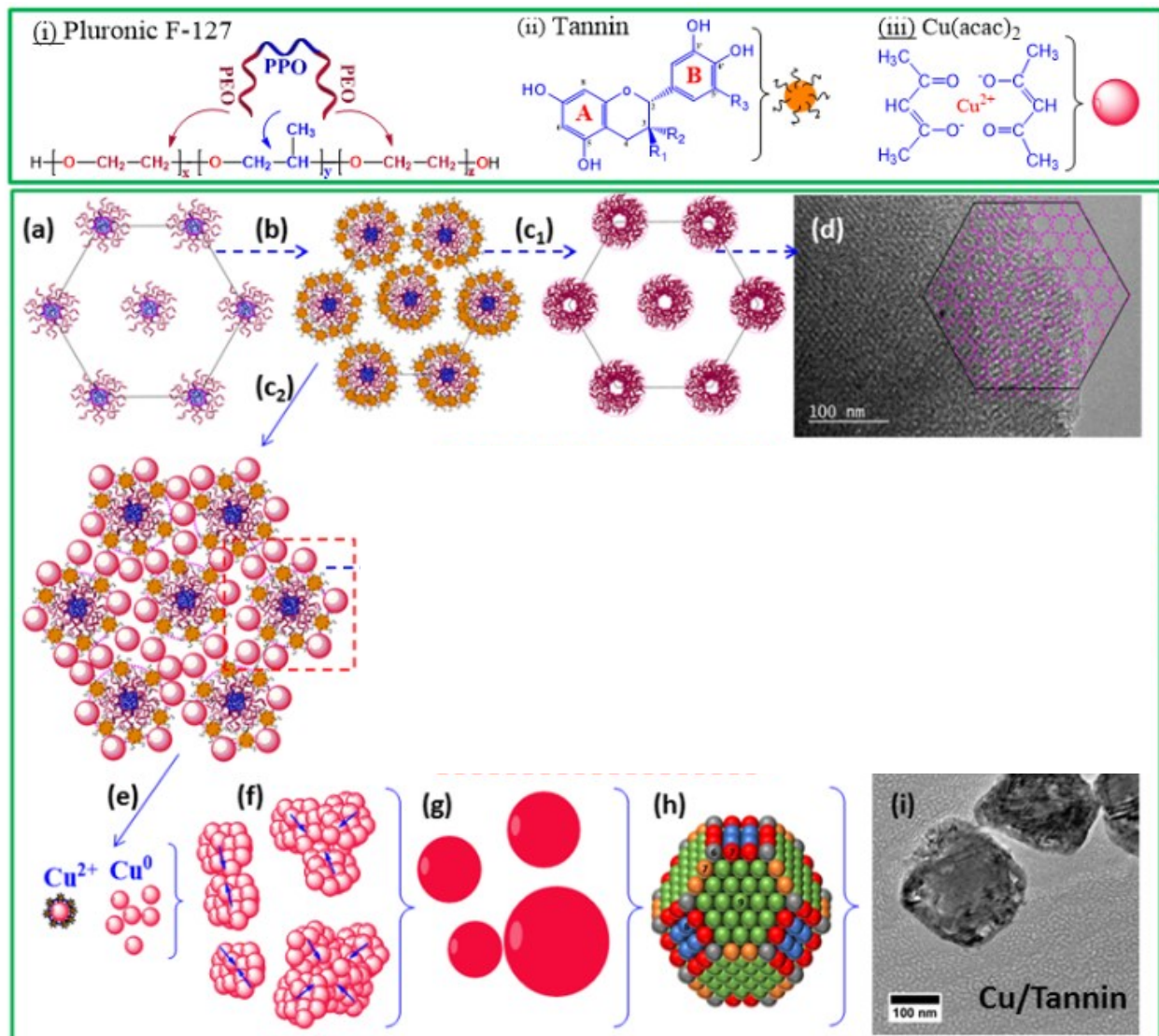
**Figure S4.** Cyclic voltammograms of metal-free mesoporous carbon material recorded at 50 mV s<sup>-1</sup> scan rate in 0.4 mol L<sup>-1</sup> KHCO<sub>3</sub> with 4.0 mM KCl.



**Figure S5.** Chronoamperometry curves of Cu/C ex-Tannin catalyst at various electrode potentials in  $\text{CO}_2$ -saturated  $0.4 \text{ mol L}^{-1} \text{ KHCO}_3$  electrolyte containing  $4.0 \text{ mM KCl}$ .



**Figure S6.** On-line DEMS measurements of chronoamperometry curves of Cu/C ex-Tannin catalyst at various electrode potentials in  $\text{CO}_2$ -saturated  $0.4 \text{ mol L}^{-1} \text{ KHCO}_3$  electrolyte containing  $4.0 \text{ mM KCl}$ .



**Figure S7.** Schematic illustration of the one-pot soft templating Evaporation-Induced Self-Assembly (EISA) route for mesoporous carbon-embedded nanostructured copper material synthesis.



**Table S1.** Data obtained from the fixed-potential electrolysis, *in-situ*  $\mu$ -GC and HPLC analyses of CO<sub>2</sub> reduction using nanostructured Cu/C ex-Tannin porous electrodes.

Electrode potential E (V vs. RHE)	Current density  j  (mA cm <sup>-2</sup> )	Coulombic Charge (C)	Faradaic Efficiency (F.E %)		
			HCOOH	CO	H <sub>2</sub>
-0.32 V	3.9	55.2	11.6	4.0	45.8
-0.42 V	5.7	61.9	16.5	5.4	55.1
-0.52 V	9.9	75.5	24.8	9.7	45.8
-0.62 V	10.4	62.2	31.2	5.6	47.2
-0.67 V	11.9	72.3	17.5	5.2	48.5
-0.72 V	13.0	76.0	25.4	4.7	56.2
-0.82 V	17.7	90.5	19.4	3.7	56.4
-0.92 V	19.8	79.0	28.1	4.4	52.1
-1.12 V	28.4	96.4	18.4	1.5	77.1