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"Enhanced photostability of cuprous oxide by lignin films on glassy carbon electrodes in the carbon dioxide transformation"

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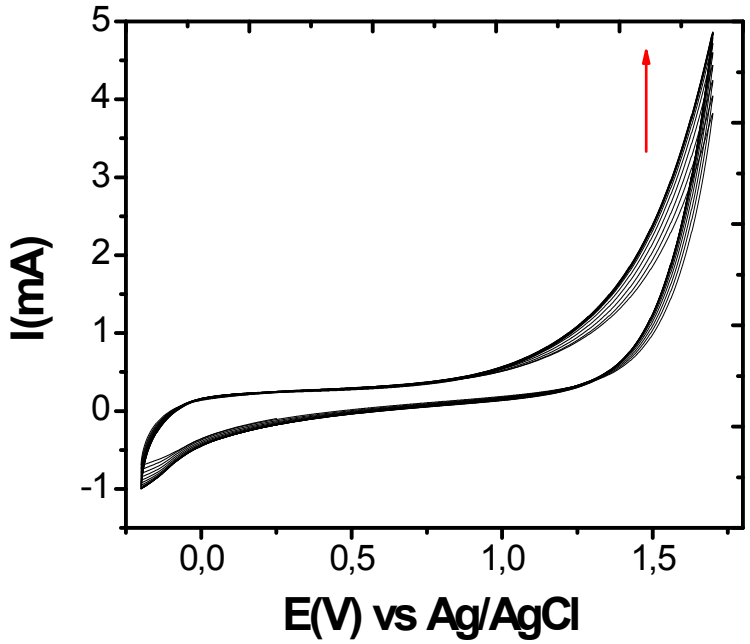

Figure S1: Cyclic voltammetry during 15 continuous cycles of glassy carbon electrode in buffer phosphate pH 7.4.

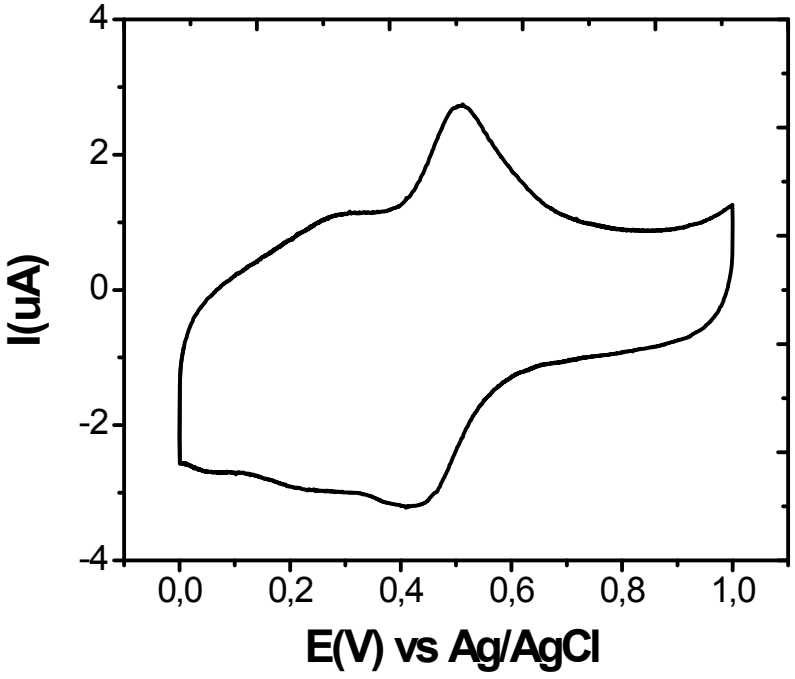

Figure S2: Cyclic voltammetry of lignin modified electrode (GC-LS) in 0.1M sodium sulfate. Scan rate 100 mVs^{-1}

NMR product detection and quantification

According to reported by Thomas F. Jaramillo et al [53] H^1NMR method allowed detect and quantified reaction products of CO_2 reduction taking directly products aliquots without the need to remove the Na_2SO_4.
Figure S4 shows a 1H NMR spectrum for quantification on a sample containing CO_2 reduction products and phenol and DMSO as internal standards. The products were comparing to commercial samples and database results.

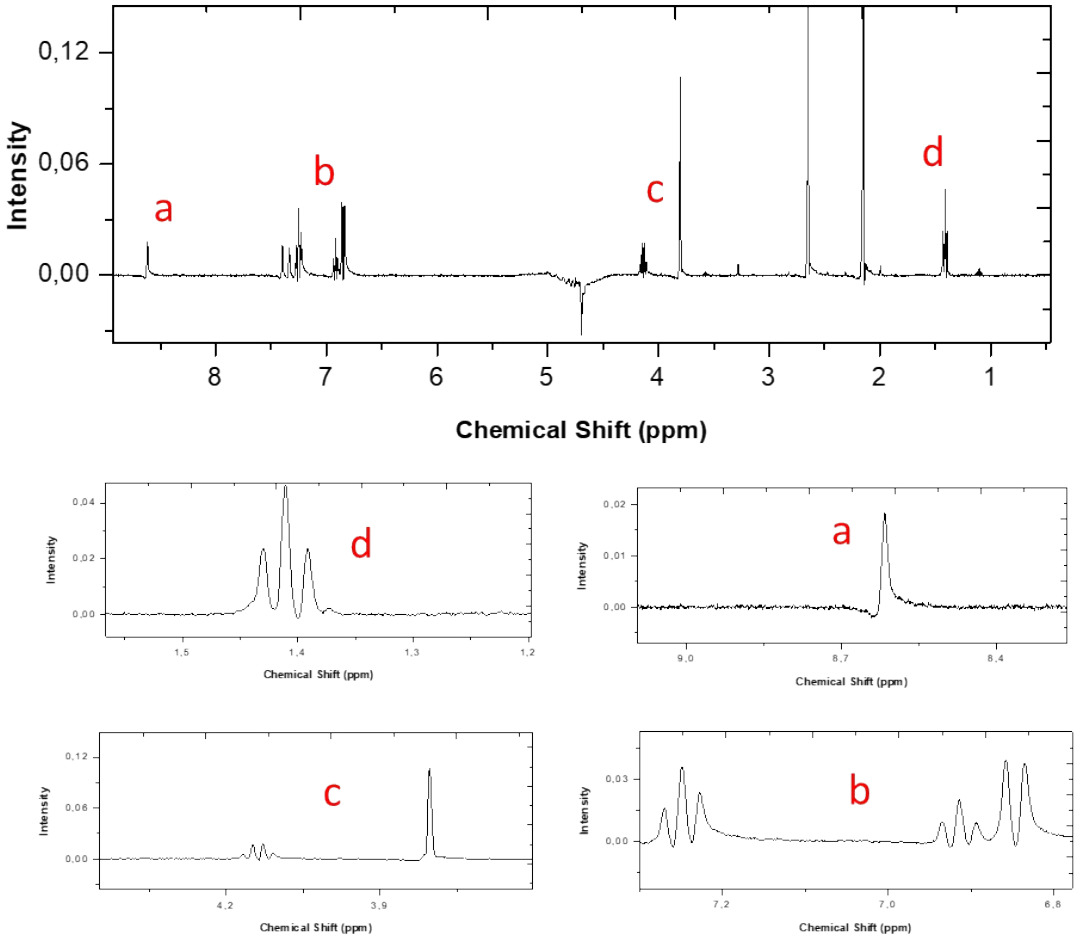

Figure S3: H1NMR spectrum of a sample in 0.1M sodium sulfate with the products of CO_2 reduction. The spectrum was acquired on a 400 MHz with water suppression. Peak assignments are given in Table 1.

Ethyl acetate and methyl formate quantification

For products quantification, standards curves were preparade using the peaks of the table 1. To decrease experimental error the concentration of products was comparing with internal standards obtained the relative area vs phenol and DMSO. With this information using linear regression the concentration for ethyl acetate and methyl formate was 172 ppm and 250 ppm respectably.

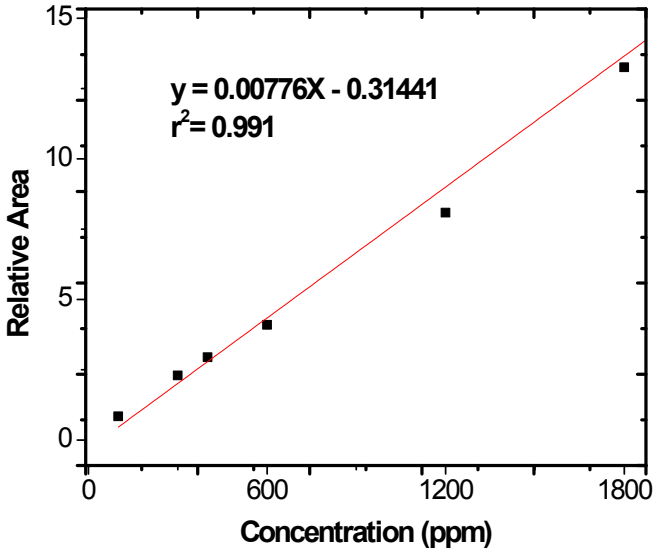

Figure S4: Standard curves for ethyl acetate using standard samples

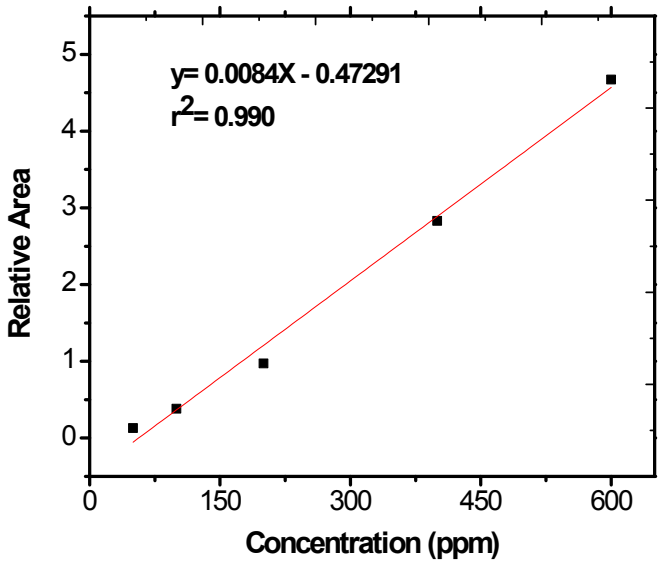

Figure S5: Standard curves for ethyl acetate using standard samples

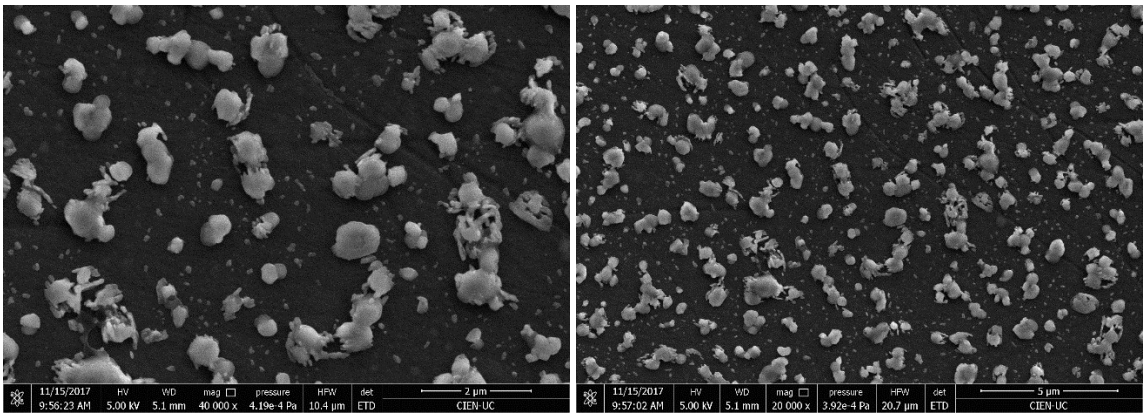

Figure S6: SEM images of glassy carbon electrode modified with lignin

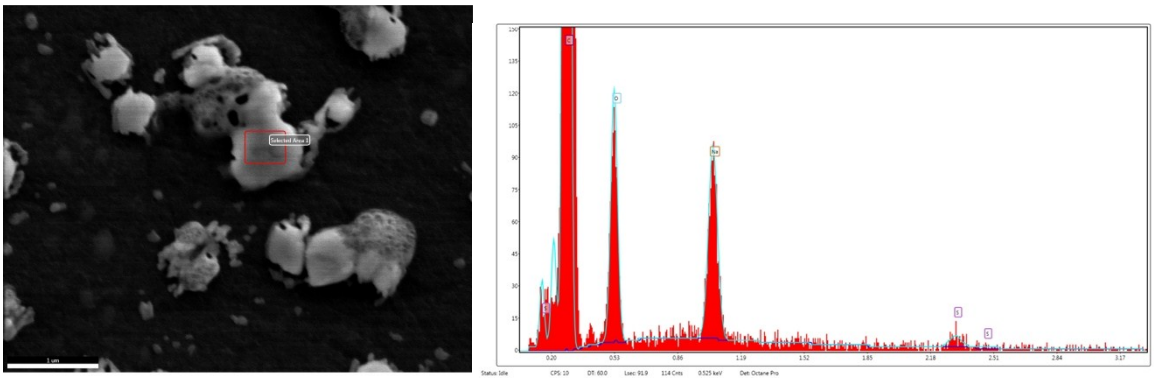

Figure S7: SEM images of glassy carbon electrode modified with lignin and EDX analysis of red box in the SEM image.

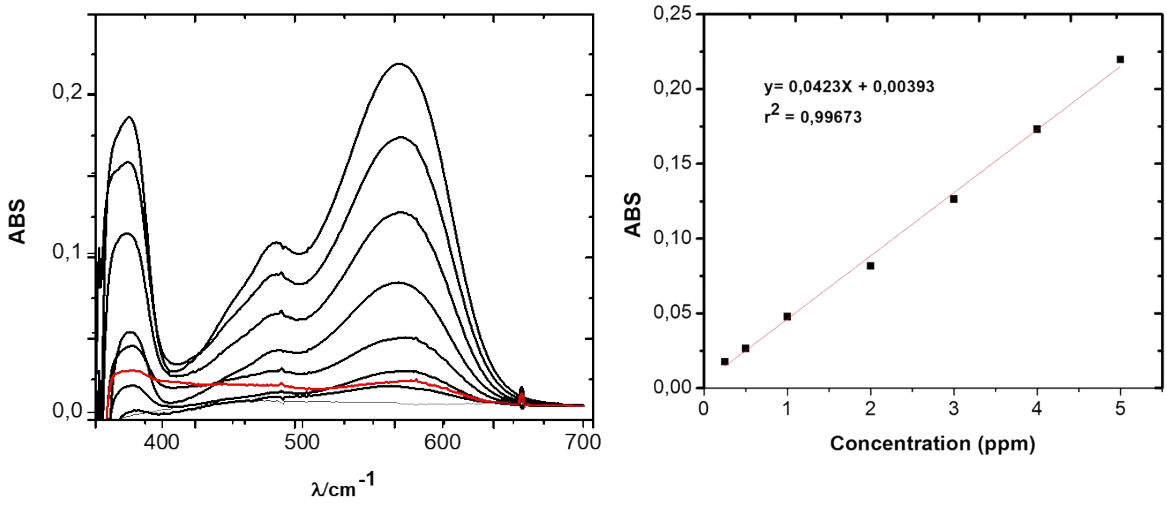

Figure S8: a) UV-Vis spectrum of formaldehyde detection by chromotropic acid method. b) calibrate curve from 0.25 ppm until 5 ppm for formaldehyde detection