

## **A Vitamin C Fuel Cell with a Non-bonded Cathodic Interface**

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Table S1- Comparison of vitamin-C oxidation on different electrodes

Electrode	$E_{\text{onset}}$ (V) vs SHE	$E_{\text{peak}}$ (V) vs SHE
Platinum	0.30	0.70
Carbon	0.40	0.83
CoPc	0.17	0.40

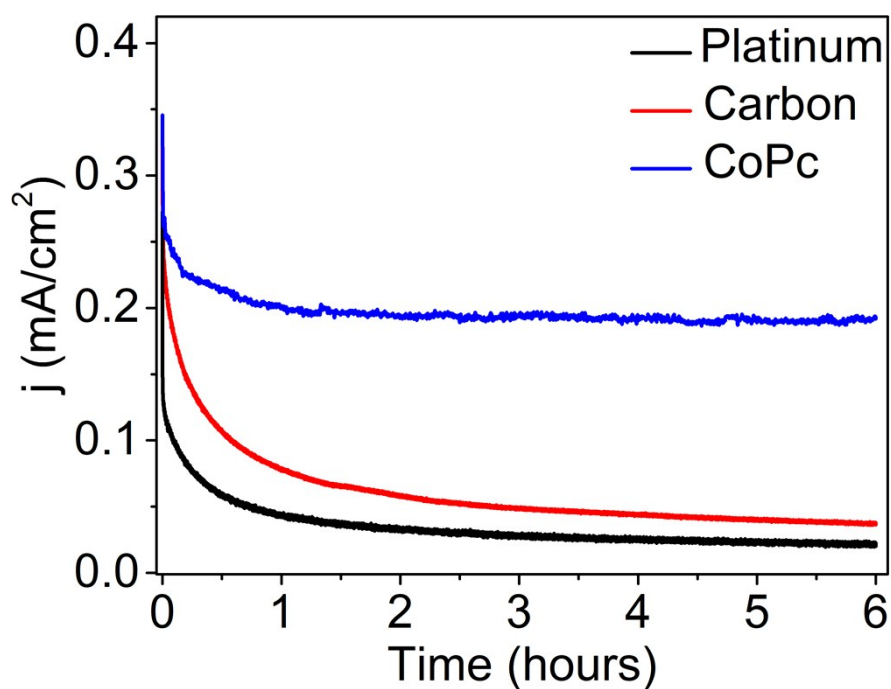


Figure S1: Chronoamperometry curves on Pt, GC, and CoPc at an overpotential of 340 mV.

Table S2- Comparison of charge transfer resistance ( $R_{\text{CT}}$ ) on different electrodes.

Electrode	$R_{\text{CT}}$ (kohm.cm <sup>2</sup> )
Carbon	7.778
Platinum	2.477
CoPc	0.102

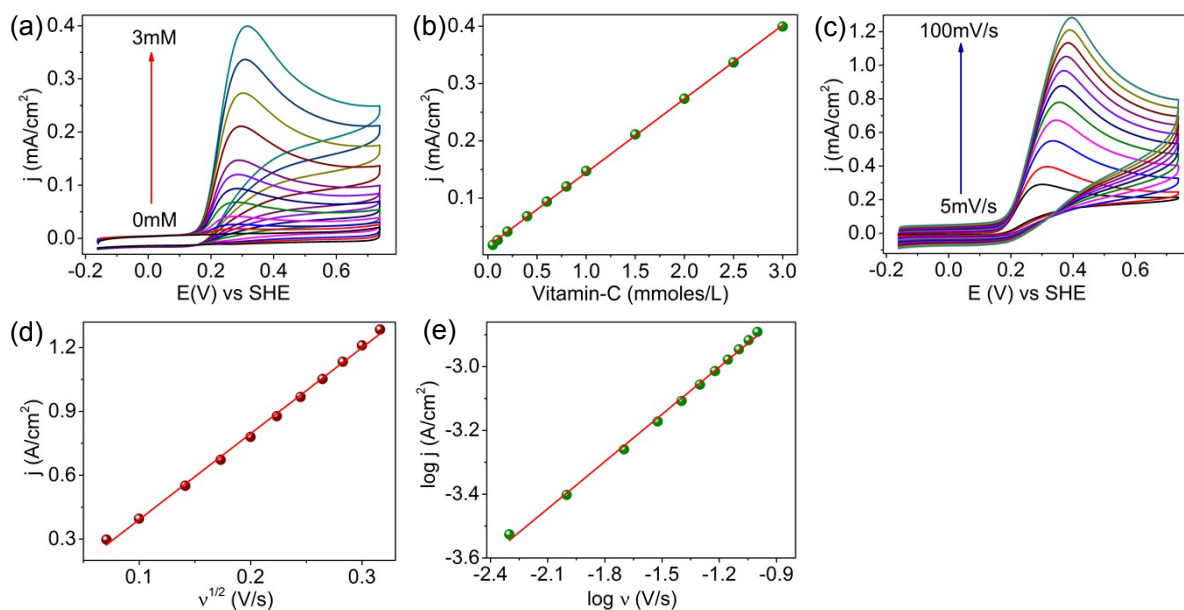
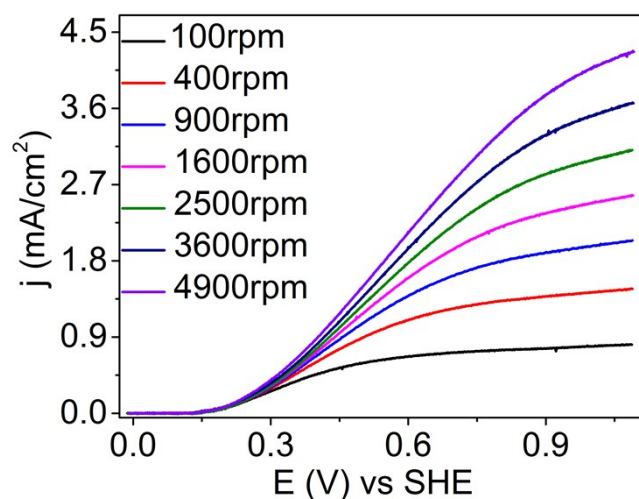


Figure S2- a) Vitamin C oxidation at different concentrations on CoPc modified carbon electrode in phosphate buffer of pH 7 at a scan rate of 10 mV/s, b) plot of peak current vs. concentration of vitamin C, c) scan rate dependence of vitamin C oxidation at 3 mM concentration on a CoPc electrode and d) plot of peak current vs. square root of scan rate, and e) plot of log (i) vs. log



(v).

Figure S3- Rotating disk electrode measurements for vitamin C (5 mM) oxidation on a CoPc modified glassy carbon disk electrode in phosphate buffer of pH = 7.

Table S3: Rate constants and number of electrons of Vitamin C oxidation on CoPc electrode from different methods.

Parameters	Method	Values
Number of electrons	Koutecky-Levich	2.0
Rate constant $K^0 \times 10^{-4}$ (cm sec <sup>-1</sup> )		5.1

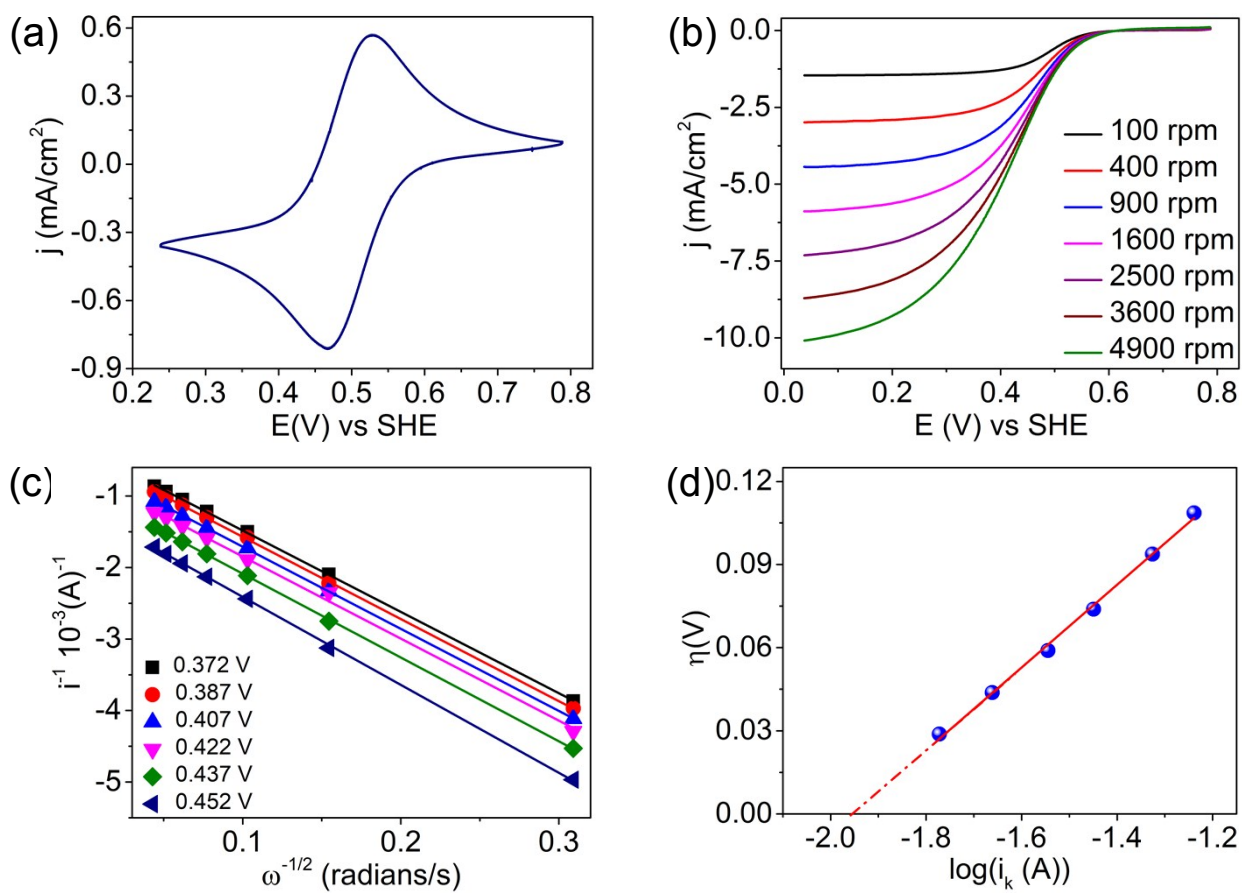


Figure S4- a) Cyclic voltammogram for the redox reaction of 10 mM ferricyanide (in phosphate buffer of pH = 7) on a glassy carbon based electrode at 10 mV/s scan rate, b) rotating disk electrode measurements for ferricyanide (10 mM in phosphate buffer of pH = 7) on a glassy carbon disk electrode, c) K-L plots at different potentials and d) plot of over potential vs. log of kinetic current.

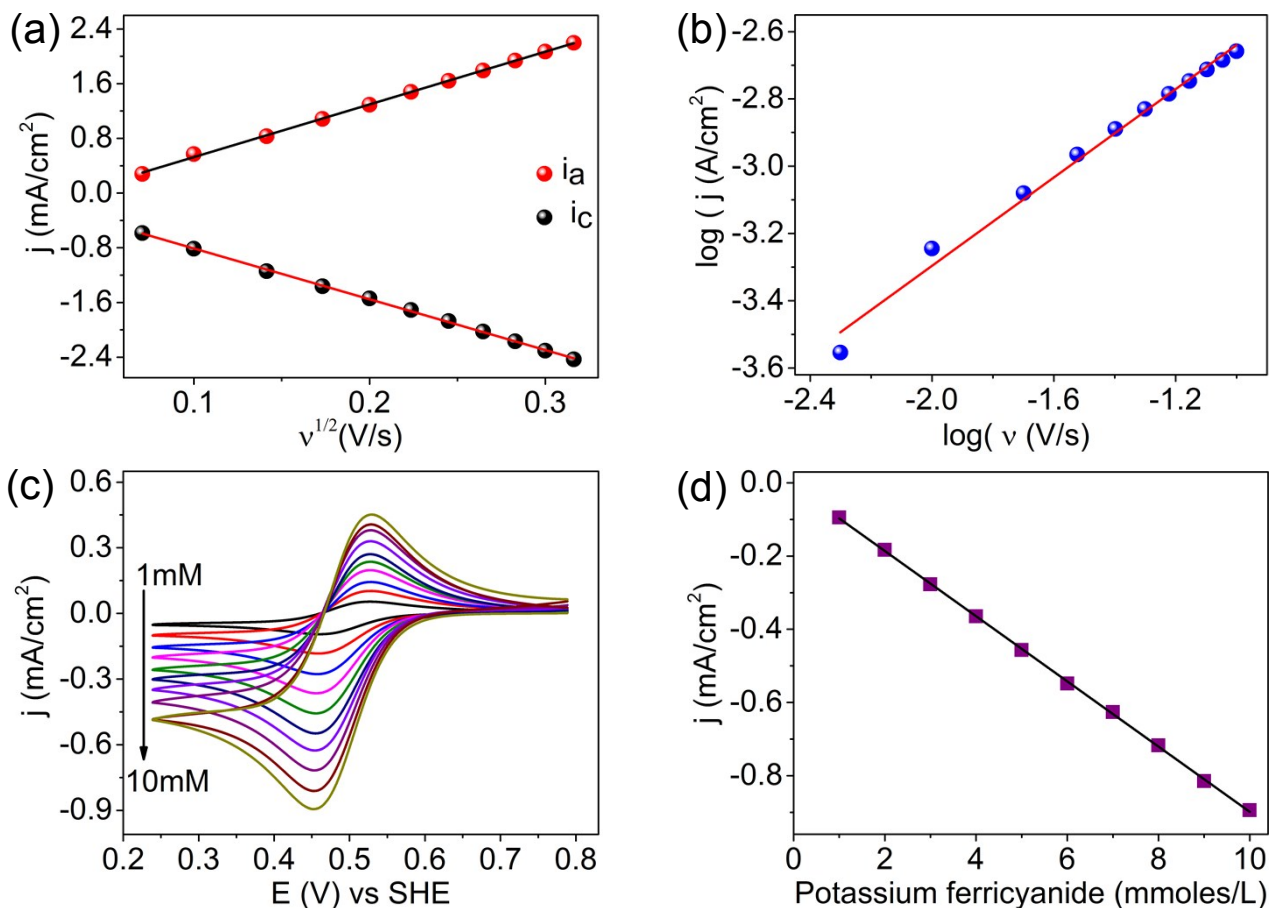


Figure S5- a) Plot of oxidation and reduction peak currents for ferricyanide (10 mM) vs. square root of scan rate, b) plot of  $\log(i)$  vs.  $\log$  of scan rate, (c) cyclic voltammogram for the redox reaction of ferricyanide at different concentration and (d) corresponding peak current vs. concentration plot.

Table S4- Rate constants and number of electrons of ferricyanide on carbon electrode from different methods.

Method	Rate constant $K^0 \times 10^{-2}$ ( $\text{cm sec}^{-1}$ )	Number of electrons
Koutecky-Levich	6.0	0.99
Klinger and Kochi	6.7	
Nicholson	2.8	

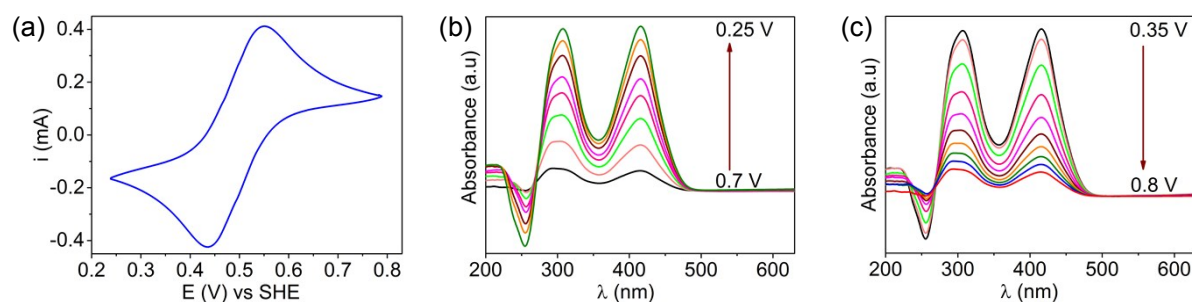


Figure S6. a) Cyclic voltammogram for ferricyanide acquired during UV-Visible spectroelectrochemistry, b) corresponding in-situ UV-Vis spectra during reductive scan and c) during oxidative scan. The spectrum of ferricyanide was taken as the background signal throughout the measurement.

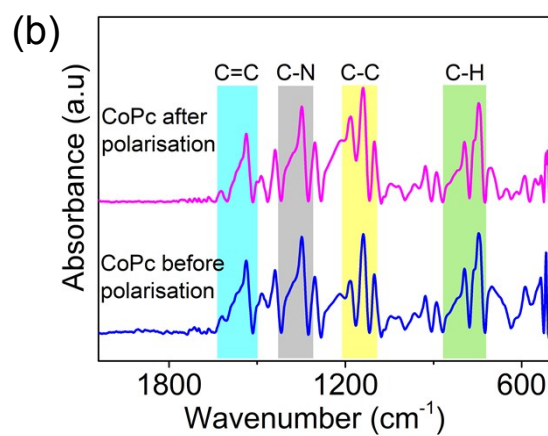
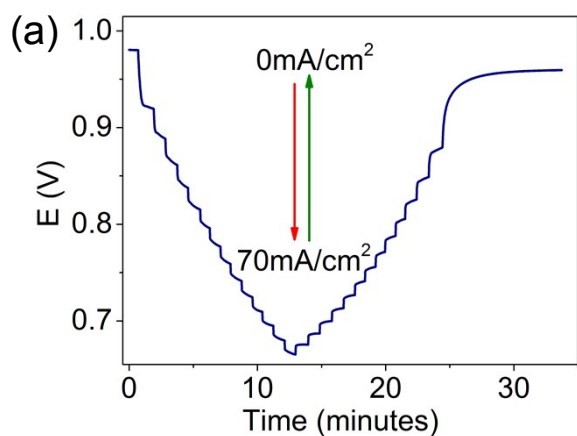


Figure S7- a) Cell voltage at different discharge current densities and b) Stability of the CoPc electrode before and after long term stability tests.