SUPPORTING INFORMATION FOR

An Optimal Surface Concentration of Pure Cardiolipin Deposited Onto Glassy Carbon Electrode Promoting the Direct Electron Transfer of Cytochrome-*c*

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Figure S1. CV recorded at 50 mV s⁻¹ (**CV**, *Left*) and Nyquist plots from electrochemical impedance spectroscopy measurements recorded at OCP (**EIS**, *Right*) on gold electrodes unmodified (black) and modified by a 10 (green), 13 (orange) and 16 (blue) μ g cm⁻² cardiolipin deposit in K₄Fe(CN)₆/K₃Fe(CN)₆ (both at 5 mM) with 0.1 M phosphate buffer aqueous electrolyte at pH 7 under inert atmosphere (Ar).

Preparation of pyrolyzed photoresist film (PPF) samples

The PPF samples were prepared following a procedure reported from reference [35]. In summary, pieces of single-side polished n-type Si (100) wafer (Sil'Tronix) were ultrasonically cleaned in a series of solvents, then dried under Ar flow. A small amount of AZ4562 photoresist was spin-coated on the samples (4000 rpm for 30 s). The samples were then soft-baked at 90 °C for 30 min. After cooling, a second layer of photoresist was applied. The samples were pyrolyzed in a tube furnace, using a temperature ramp equal to 10 °C/min until 1100 °C was reached; this temperature was maintained for 1 h, then reduced back to room temperature. During the heating and cooling phases, a 95% argon + 5% hydrogen mixture were flowed through the tube furnace at 1 atm. Finally, the samples were briefly sonicated in acetone, methanol and 2-propanol, then dried with N₂. They were stored at ambient laboratory conditions for at least one week before use.

[35] P.A. Brooksby, A.J. Downard, Electrochemical and Atomic Force Microscopy Study of Carbon Surface Modification via Diazonium Reduction in Aqueous and Acetonitrile Solutions, Langmuir 20(12) (2004) 5038-5045.



Figure S2. CV recorded at 20 mV s⁻¹ on phosphatidylcholine-modified glassy carbon electrode in 0.15 mM cytochrome-c solution 10 mM phosphate buffer aqueous electrolyte at pH 7 under Ar.

Figure S3. **A.** <u>Cytochrome-*c* freely diffusing:</u> CV recorded at different scan rates (20, 50, 100, 200 and 500 mV s⁻¹) on a glassy carbon electrode modified by a 7 μ g cm⁻² cardiolipin deposit in 0.15 mM cytochrome-*c* in 10 mM phosphate buffer aqueous electrolyte at pH 7 under Ar and the corresponding variation of the anodic peak current (i_{pa}) as a function of the square root of the scan rate. **B.** <u>Immobilized cytochrome-*c*:</u> CV recorded at different scan rates (20, 50, 100, 200 and 500 mV s⁻¹) in 10 mM phosphate buffer aqueous electrolyte at pH 7 under Ar on a glassy carbon electrode modified by a 7 μ g cm⁻² cardiolipin deposit and cycled ten times in a 0.15 mM cytochrome-*c* solution for protein immobilization and the corresponding variation of the anodic peak current (i_{pa}) as a function of the scan rate.

For a quasi-reversible monoelectronic electron transfer, the peak current is proportional to the square root of the scan rate through the following equation, which allows to extract the diffusion coefficient (D) is [47] :

$$i_{\rm p} = 0.496 \ FAC \ (\frac{\alpha F \nu D}{RT})^{\frac{1}{2}}$$

where i_p is the oxidative peak current (A), *F* the Faraday constant (C mol⁻¹), *A* the electrode surface area (cm²), *C* the concentration of the redox specie (mol cm⁻³), α the transfer coefficient (here α =0.5), *v* the scan rate (V s⁻¹), *D* the diffusion coefficient (cm² s⁻¹), *R* the gas constant (J K⁻¹ mol⁻¹) and *T* the temperature (K).

[47] Savéant, J.-M., Single Electron Transfer at an Electrode. In Elements of Molecular and Biomolecular Electrochemistry, John Wiley & Sons, Inc.: 2006; pp 1-77.

Figure S4. CV (10 cycles) recorded at 20 mV s⁻¹ on unmodified (black lines) and modified (blue lines) glassy carbon electrodes with a 7 μ g cm⁻² cardiolipin deposit. **A.** Cytochrome-*c* immobilization by cycling in 0.15 mM cytochrome-*c* with 10 mM phosphate buffer aqueous electrolyte at pH 7 under Ar. **B.** Ten recurrent cycles in a cytochrome-free electrolyte after previous cycling and protein immobilization in a cytochrome-*c* solution.