Supplementary material (ESI) for Journal of Materials Chemistry

The unique properties of a perfluoroalkyl-modified 2,2'-bipyridyl ruthenium complex in a Nafion™ membrane: attenuated leaching of a potential biofuel cell redox mediator

Paul A. Jelliss,* Shelley D. Minteer, Mitesh Patel, Aleksander Siemiarczuk, Michelle Watt, and Rudolph K. Winter

Supplementary Information.

Solution Cyclic Voltammetry of Complex 3

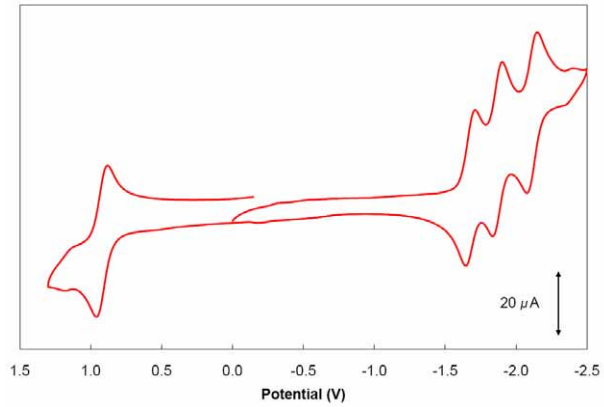

Figure S1. CV of complex **3**, 1.0 mM solution in MeCN, glassy carbon disc working electrode, $Ag/AgNO_3$ (10 mM) solution in MeCN reference electrode, platinum counter electrode.

Complex 3/TBAB-modified-Nafion™ Loading Experiment

2 cm × 2 cm square glass microscope slips were each fully covered with applications of 150, 175, and 200 μl solutions of 5 wt% TBAB-modified-Nafion™ in EtOH, dried in a desiccator and then soaked in 5.00 mL of 200 μM CH_2Cl_2 solutions of complex **3**. UV-vis measurements were made prior to and following soakings and complex **3** molarities determined from a concentration-absorbance calibration plot (not shown). The decrease in molarity was used to compute the molar uptake of complex **3** by the 2 cm × 2 cm film. Based on a sulfonate group concentration of 8.68×10^{-6} mol SO_3^- /g TBAB-modified-Nafion™ and an accurately measured volume-mass conversion of 4.18 mg/100 μl TBAB-modified-Nafion™, the average Ru:SO_3^- ratio could be calculated. Thus for a 200 μl (8.36 mg) TBAB-modified-Nafion™ deposit, 2.29×10^{-7} mol complex was absorbed, leading to a complex **3**:sulfonate group ratio of 0.28:1.0.

The plot in Figure S2 was used to estimate the limiting absorbance corresponding to the maximum loading of complex **3** for this size of glass slip and sulfonate group concentration by applying a quadratic fit to the data. The estimated maximum concentration depletion from the solution (determined from the concentration-absorbance calibration plot (not shown)) was then converted into molar uptake of complex **3** as described above to afford a maximum average complex **3**:sulfonate group ratio of 0.30:1.0.

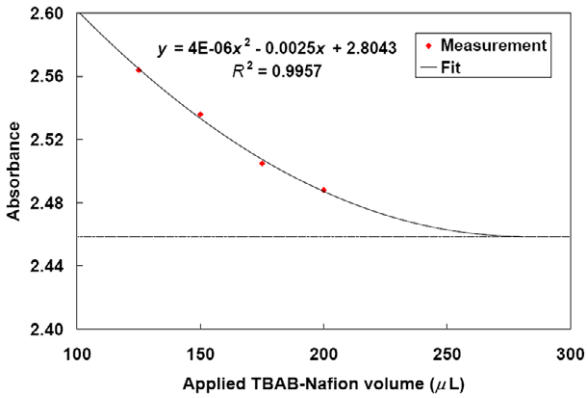

Figure S2. Plot of complex **3** CH_2Cl_2 solution (200 μM, 5.00 mL) absorbance *vs*. volume of TBAB-modified-Nafion™ EtOH solution (5 wt%) applied to one side of a 2 cm × 2 cm glass microscope slip.