Supporting Information

A Hybrid Hydrazine Redox Flow Battery with a Reversible Electron Acceptor

*Swapnil Varhade[a]‡, Zahid M. Bhat[a]‡, Ravikumar Thimmappa[a], Mruthyunjayachari C. Devendrachari[a], Alagar R. Kottaichamy[a], Manu Gautam[a], Shahid P. Shafi[a], Yogesh Kalegowda[a,b] and Musthafa Ottakam Thotiyl[a]**

[a]*Department of Chemistry and Centre for Energy Science, Indian Institute of Science Education and Research Pune, Dr Homi Bhabha Road, Pashan, Pune, India -411008.*

[b]*Department of Physics, School of Engineering, Dayananda Sagar University, Bangalore, India-560068*

**Email: musthafa@iiserpune.ac.in*

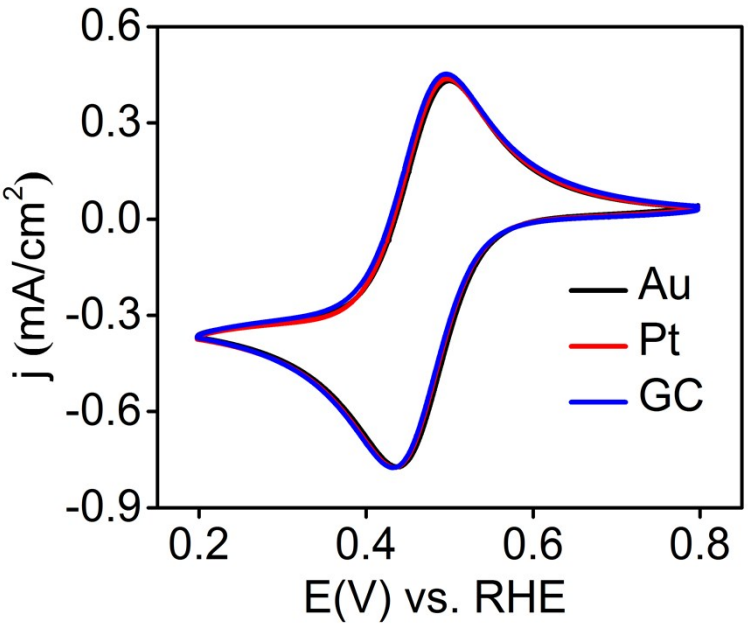

Figure S1: Cyclic voltammograms for ferricyanide (5mM) redox reaction at gold, platinum and glassy carbon electrodes at a scan rate of 10mV/s.

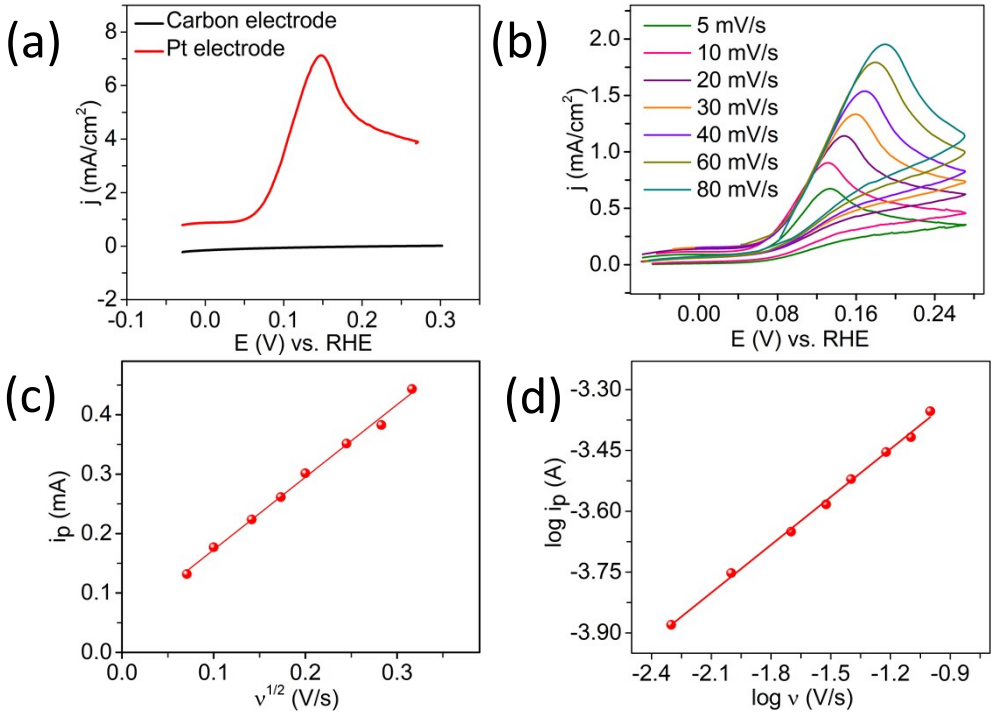

Figure S2: (a) Voltammogram for the oxidation of 10 mM hydrazine on a carbon and a Pt electrode at a scan rate of 10 mV/s, (b) cyclic voltammogram for the oxidation of 1 mM hydrazine in 1 M KOH on a platinum electrode at different scan rates, (c) plot of peak current against square root of scan rate and (d) plot of log of peak currents versus log of scan rates.

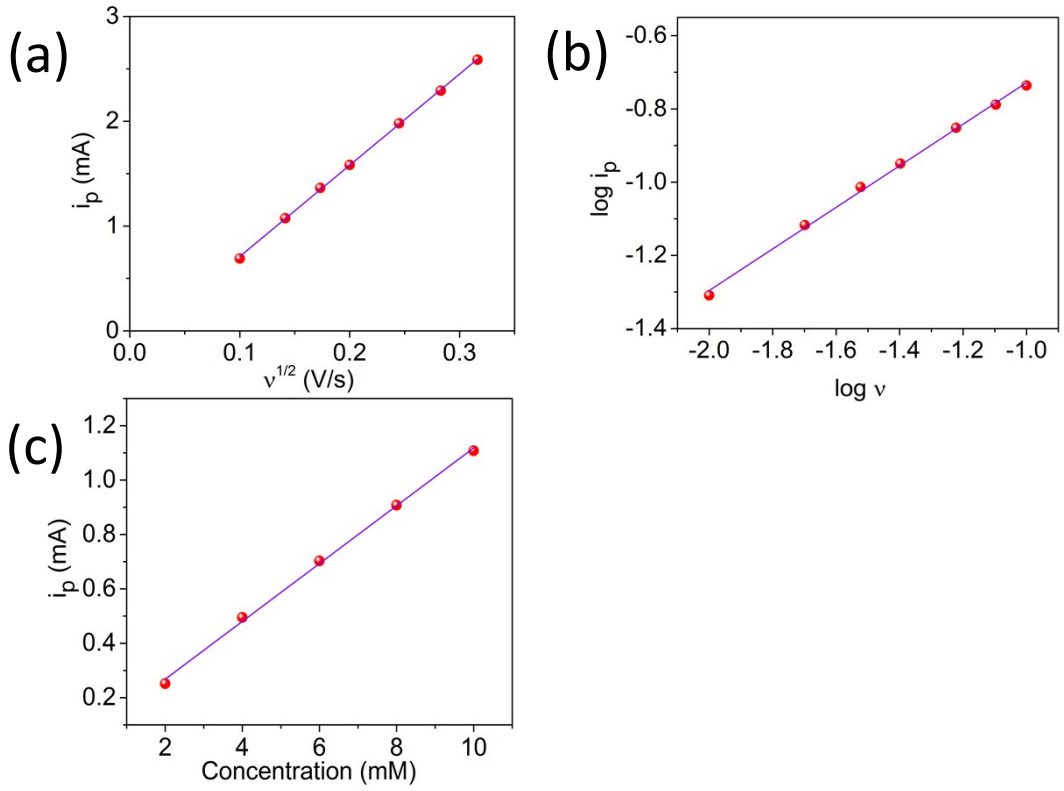

Figure S3: (a) Plot of peak currents against square root of scan rates and (b) plot of log of peak currents versus log of scan rates for 10 mM ferricyanide in 1 M KOH. (c) Plot of peak currents versus concentration for ferricyanide in 1 M KOH at a scan rate of 20 mV/s.

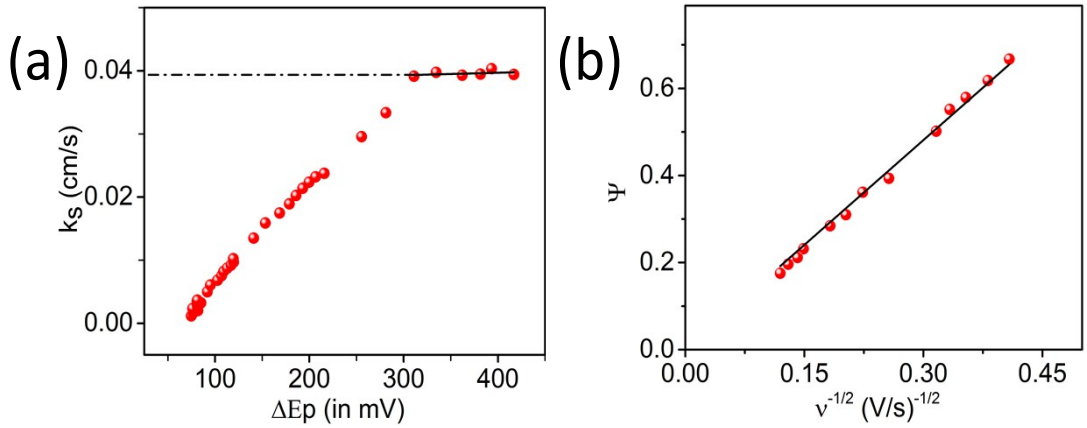

Figure S4: (a) Plot of change of heterogeneous rate constant with peak potential separation as per Klinger and Kochi method and (b) plot of kinetic parameter against inverse square root of scan rate to calculate heterogeneous rate constant by Nicholson method**.**

Table S1: Rate constant calculated from different methods for the redox reaction of ferricyanide in 1 M KOH on a carbon electrode.

Method	Rate Constant Values
RDE	3.4 X 10^{-2} cm/s
Klinger and Kochi	4 X 10^{-2} cm/s

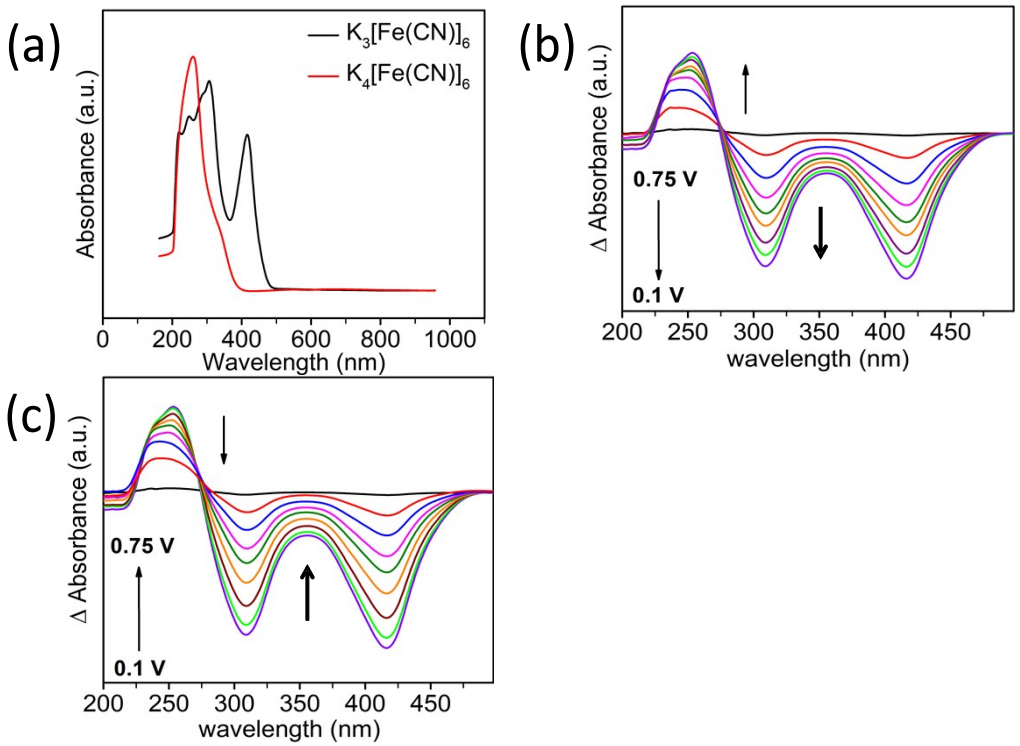

Figure S5: (a) UV spectra for ferricyanide and ferrocyanide complexes. In-situ spectroelectrochemistry data for ferricyanide (1 mM) in 1 M KOH during (a) reduction and (b) oxidation scans.

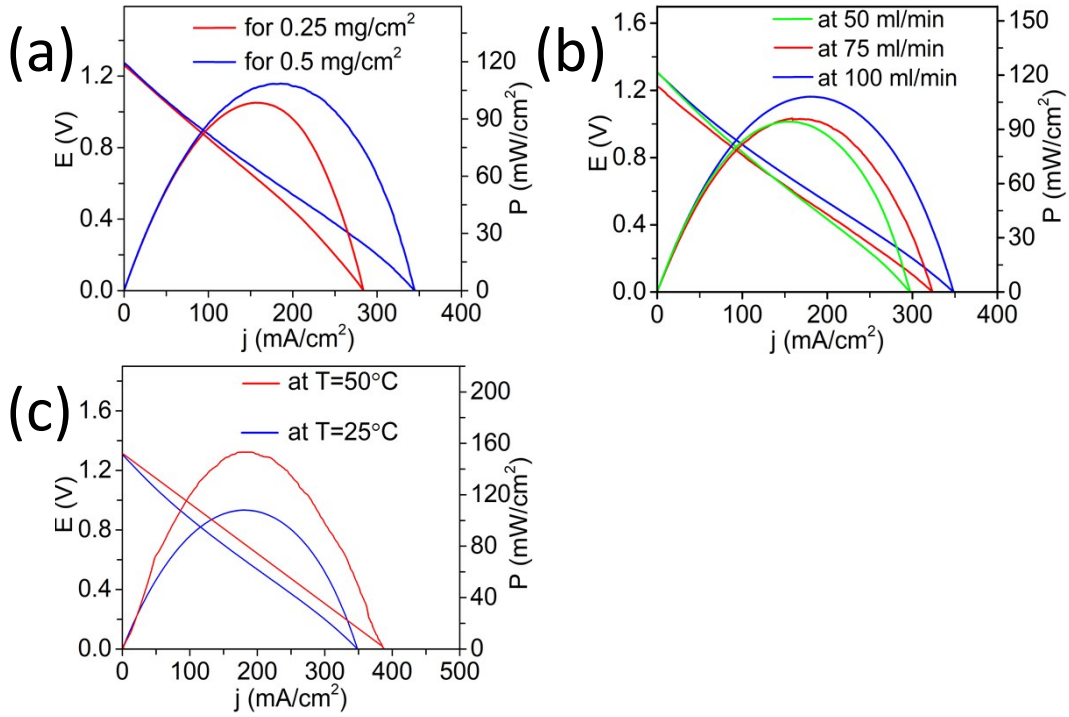

Figure S6: Polarization curves for DHFC-outer sphere fuel cell at (a) different anodic Pt catalyst loading, (b) different fuel flow rates and (c) different temperatures.