Supercapacitive Microbial Fuel Cell: Characterization and analysis for improved charge storage/delivery performance

Jeremiah Houghton[1], Carlo Santoro[1], Francesca Soavi[2], Alexey Serov[1], Ioannis Ieropoulos[3,4], Catia Arbizzani[1], *Plamen Atanassov[2]

[1] Department of Chemical & Biological Engineering, Center for Micro-Engineered Materials (CMEM), University of New Mexico, Albuquerque, NM 87131, USA.

[2] Department of Chemistry "Giacomo Ciamician", Alma Mater Studiorum - Università di Bologna, Via Selmi, 2, 40126 Bologna, Italy.

[3] Bristol BioEnergy Centre, Bristol Robotics Laboratory, Block T, UWE, Coldharbour Lane, Bristol BS16 1QY, UK

[4] Biological, Biomedical and Analytical Sciences, UWE, Coldharbour Lane, Bristol BS16 1QY, UK

***corresponding author**

Plamen Atanassov, Center for Micro-Engineered Materials (CMEM), Department of Chemical & Biological Engineering, University of New Mexico, Albuquerque, NM 87131, USA, e-mail: plamen@unm.edu

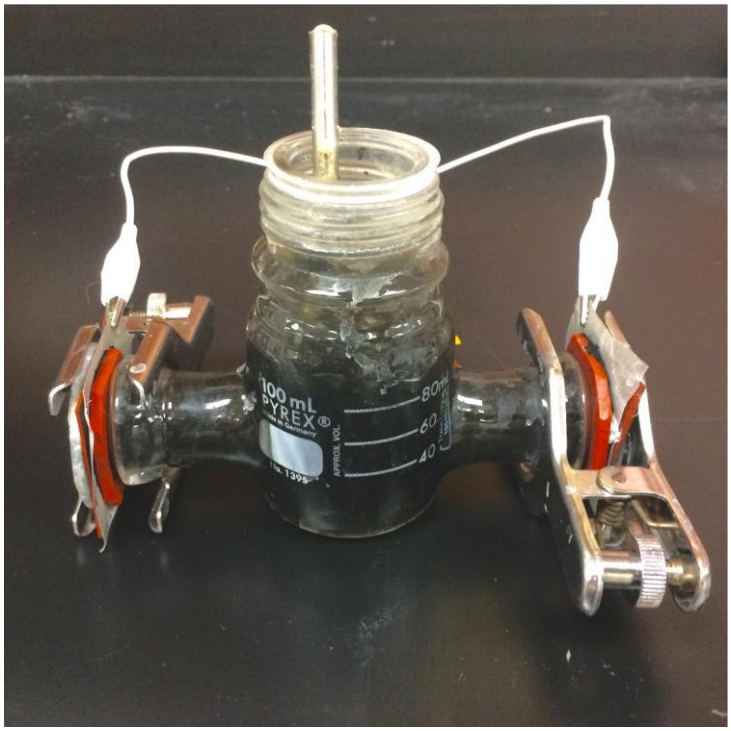

Figure S1. SC-MFC device.

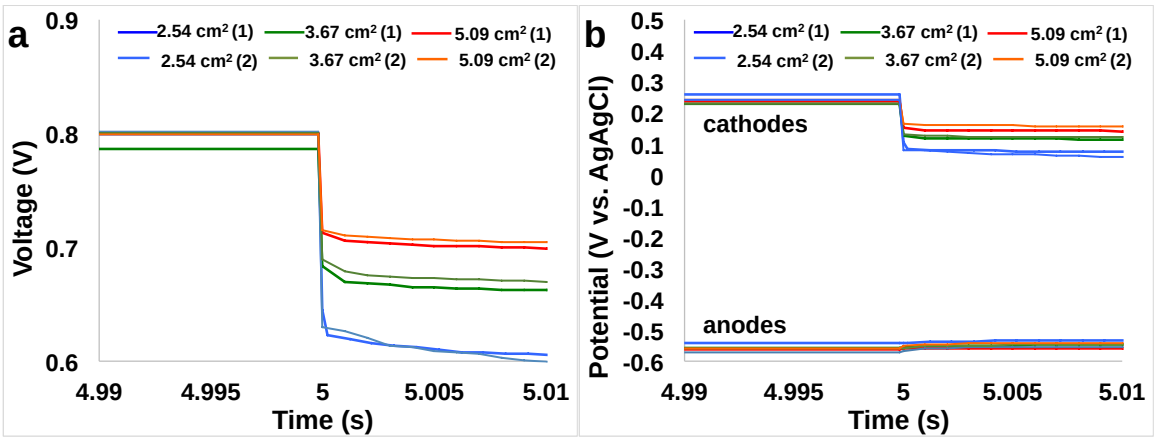

Figure S2. Cell voltage (a) and electrode potential (b) profiles under 10 ms pulses at 3 mA for SC-MFCs with different cathode area.

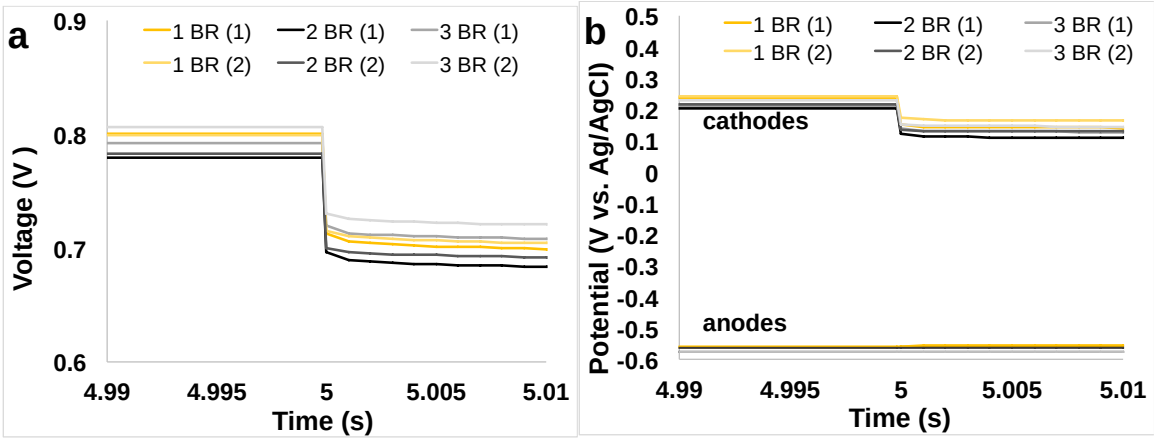

Figure S3. Cell voltage (a) and electrode potential (b) profiles under 10 ms pulses at 3 mA for SC-MFCs with different anode area.

Table S1. P_{max}, P_{pulse} (2 s), P_{pulse} (10 ms) of different SC-MFCs with different anode and cathode areas.

n. anode brush	Anode brush area cm^2	Cathode area cm^2	P_{max} mW	P_{max} W m^{-3}	P_{max} W m^{-2}
1	9	2.54	2.65±0.05	21.2±0.4	10.4±0.2
1	9	3.67	4.1±0.1	32.64±0.8	11.1±0.27
1	9	5.09	5.58±0.08	44.6±0.64	11.0±0.16
1	9	5.09	5.58±0.09	44.6±0.64	6.2±0.09
2	18	5.09	5.68±0.08	45.4±0.72	3.16±0.05
3	27	5.09	6.1±0.27	48±2.16	2.2±0.1

n. anode brush	Anode brush area cm^2	Cathode area cm^2	P_{pulse} (2 s) mW	P_{pulse} (2 s) W m^{-3}	P_{pulse} (2 s) W m^{-2}
1	9	2.54	1.38±0.07	11±0.56	5.43±0.28
1	9	3.67	2.0±0.13	16±1.04	5.31±0.35
1	9	5.09	2.5±0.25	20±2	4.93±0.49
1	9	5.09	2.5±0.25	20±3	2.79±0.28
2	18	5.09	2.9±0.15	23±1.2	1.61±0.08
3	27	5.09	3.53±0.09	28.2±0.72	1.31±0.03

n. anode brush	Anode brush area cm^2	Cathode area cm^2	P_{pulse} (10 ms) mW	P_{pulse} (10 ms) W m^{-3}	P_{pulse} (10 ms) W m^{-2}
1	9	2.54	2.3±0.13	19±1.04	9.2±0.51
1	9	3.67	3.63±0.09	29±0.72	9.9±0.25
1	9	5.09	5.1±0.21	41±1.68	10.1±0.41
1	9	5.09	5.1±0.22	41±1.68	5.7±0.23
2	18	5.09	5.6±0.11	44±0.88	3. ±0.06
3	27	5.09	6.0±0.16	48±1.28	2.23±0.06