

Electronic Supplemental Information (ESI)

Self-Feeding Paper Based Biofuel Cell / Self-Powered hybrid μ -supercapacitor integrated system

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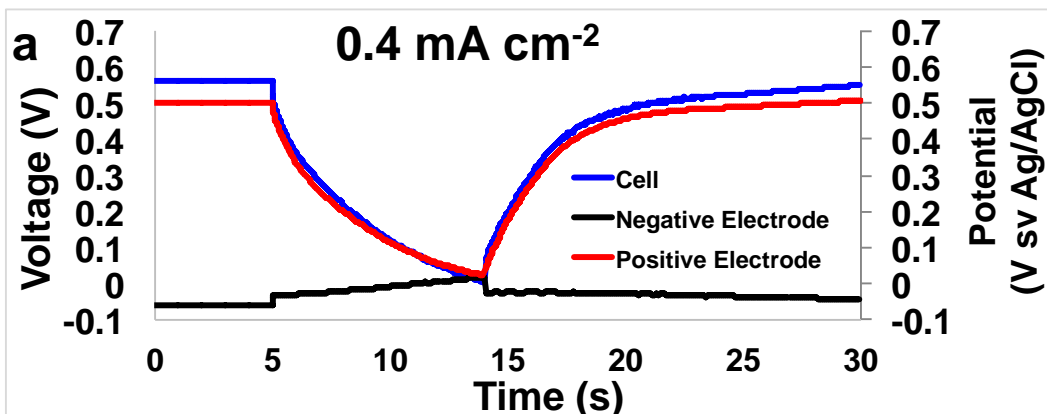
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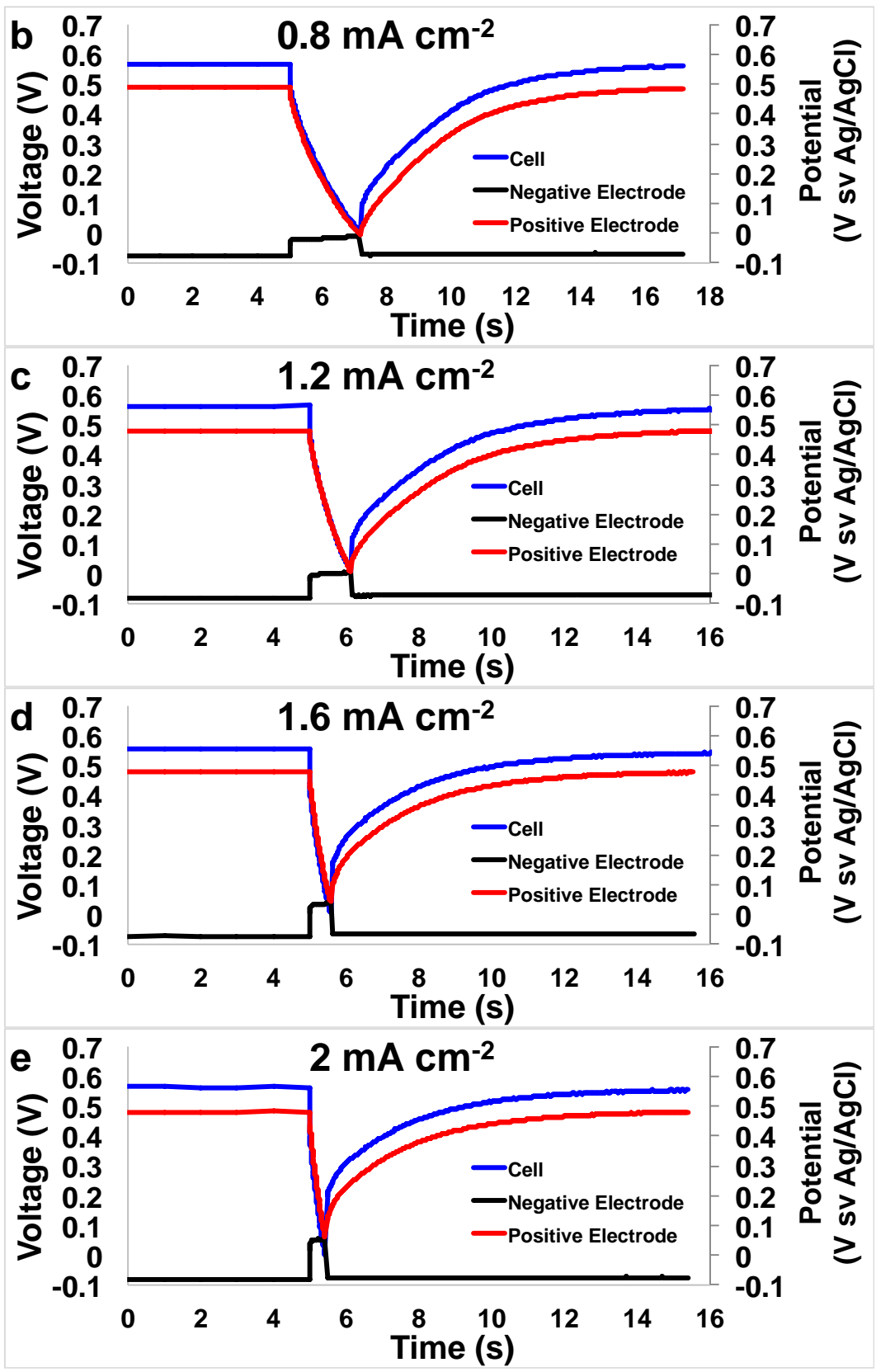
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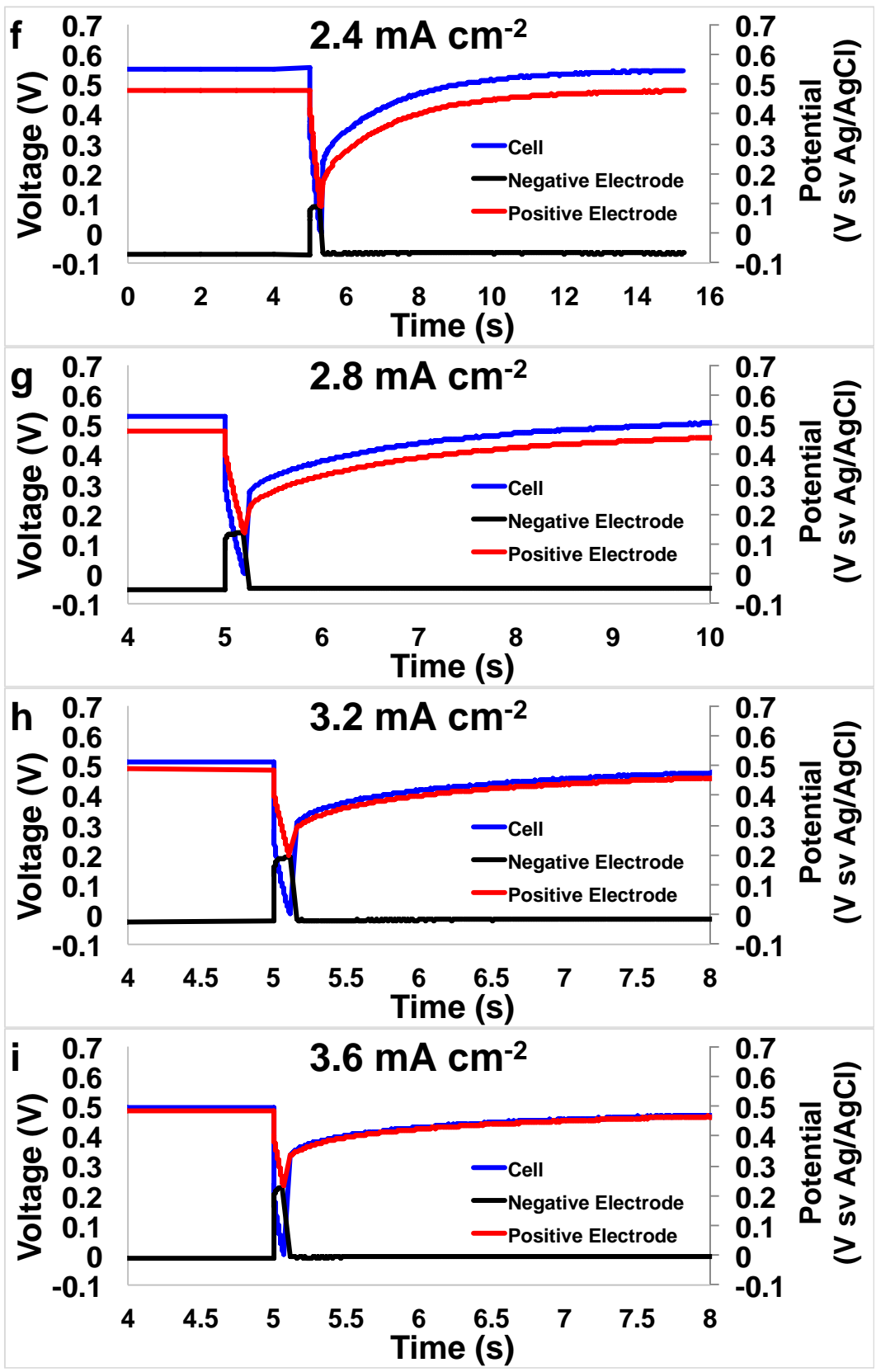
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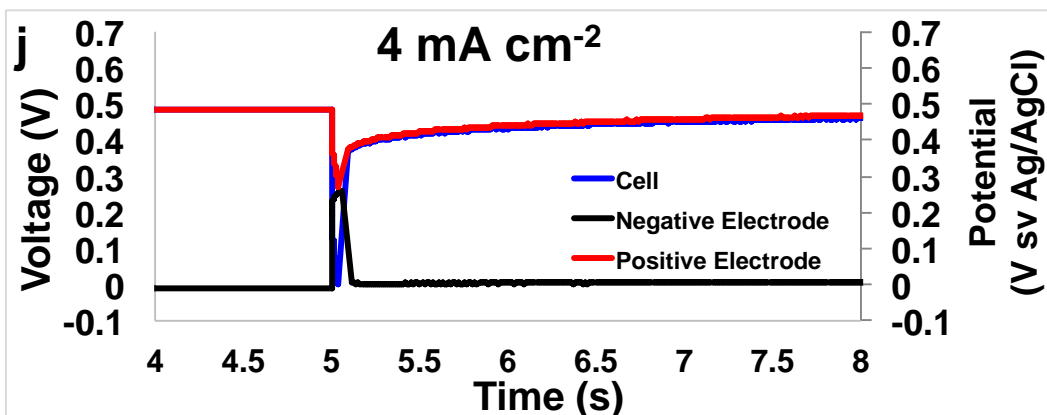


Figure S1. Cell voltage and electrode potential profiles under full discharge/self-recharge cycle for SC-EFC at 0.4 (a), 0.8 (b), 1.2 (c), 1.6 (d), 2 (e), 2.4 (f), 2.8 (g), 3.2 (h), 3.6 (i), 4 (j) mA cm^{-2} .

Durability tests

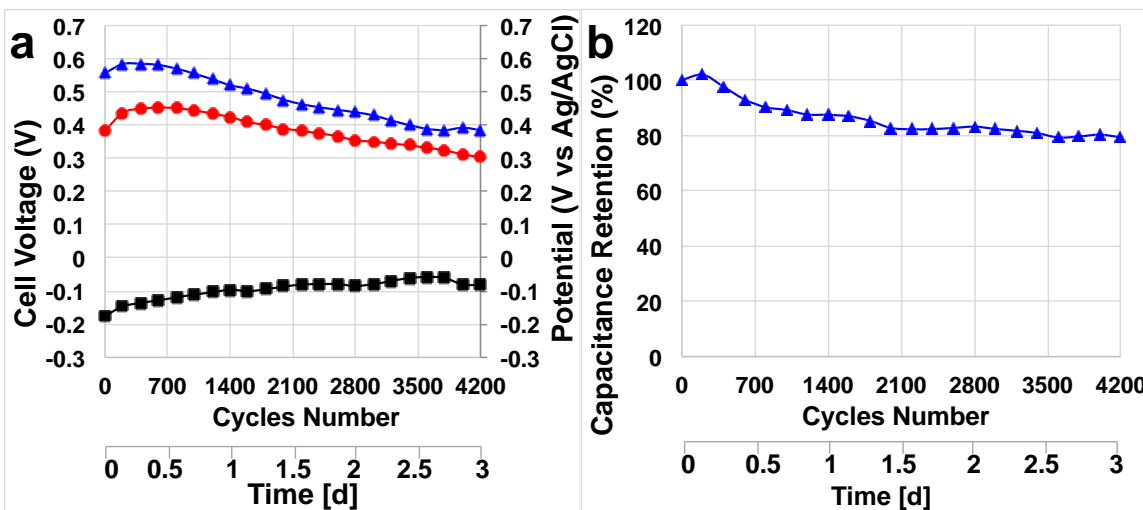


Figure S2. Cell voltage (blue curve), anode (black curve) and cathode (red curve) potentials during 4200 discharge/self-recharge cycles at 0.4 mA cm^{-2} (a). Capacitance retention ($\%C/C_0$), i.e. cell capacitance normalized to the capacitance featured at the first cycle (C_0), over 4200 discharge/self-recharge cycles (b).

Durability tests of 3 days, 4200 discharge/self-recharge cycles. Each cycle consisted in a full discharge at 0.4 mA cm^{-2} followed by 1 minute rest to allow the SC-EFC to restore completely the initial OCV value. The cell voltage (OCV), in rest conditions, as well as the anode and cathode potentials (OCP) throughout the experiment is shown in Figure 5.a. Maximum OCV was recorded after 400 cycles and was 0.59 V probably due to the wetting of the electrodes. The OCV decreased then constantly to roughly 0.4 V after 3 days (4200 cycles) losing approximately 30% of the initial value (Figure S2.a). Anode OCP increased constantly from an initial value of -0.2 V (vs Ag/AgCl) to -0.08 V (vs Ag/AgCl) (Figure S2.a). Interestingly, cathode OCP started from 0.4 V (vs Ag/AgCl) and then increased up to 0.46 V (vs Ag/AgCl) after 400 cycles and then decreased constantly to 0.32 V (vs Ag/AgCl) at the end of the experiments (Figure S2.a). The anode and cathode OCP trends might be due to the precipitation of salts on the electrode surface. Cell capacitance retention was another important parameter that was monitored along the 3 days experiments (Figure S2.b). Capacitance increased during the first 200 cycles capacitance and then decreased to 80% after 1.5 days which was kept almost constant until the end of the durability tests (Figure S2.b).