

## SUPPLEMENTARY FIGURES

# On-Chip Enzymatic Microbiofuel Cell-Powered Integrated Circuits

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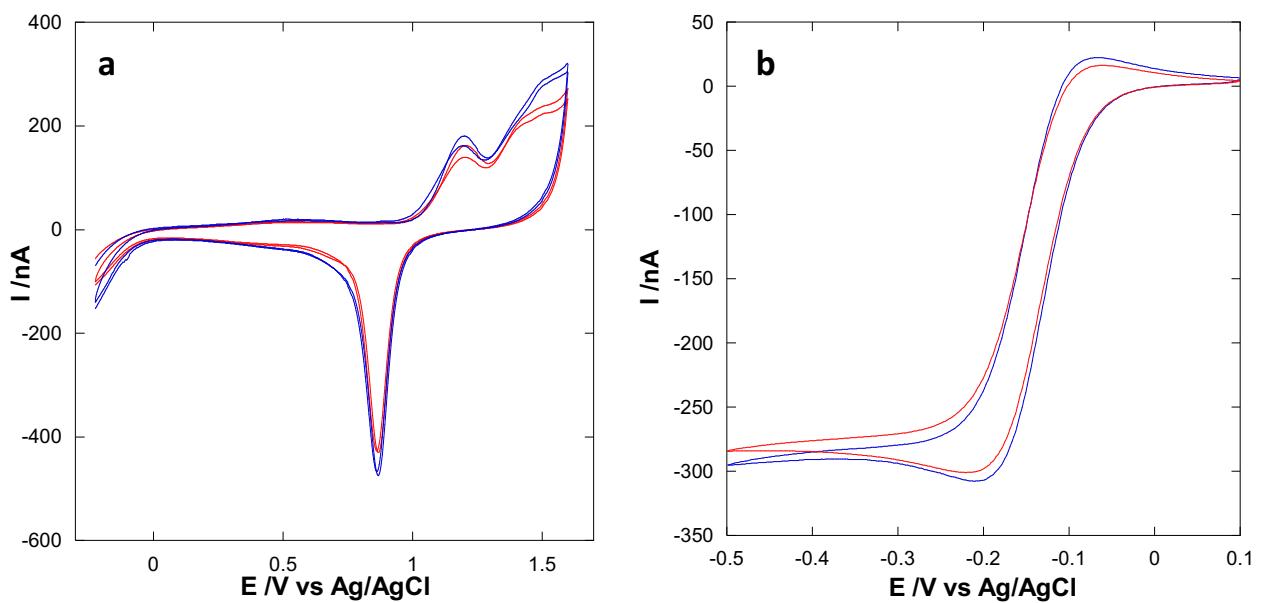


Fig SI1. Electrochemical characterization of the gold disk-microelectrodes integrated on the chip. a) Cyclic voltammograms in  $\text{H}_2\text{SO}_4$  0.1 M, 100 mV/s. b) Cyclic voltammograms in  $\text{Ru}(\text{NH}_3)_6\text{Cl}_3$  5 mM, 0.1 M NaCl, 2 mV/s.

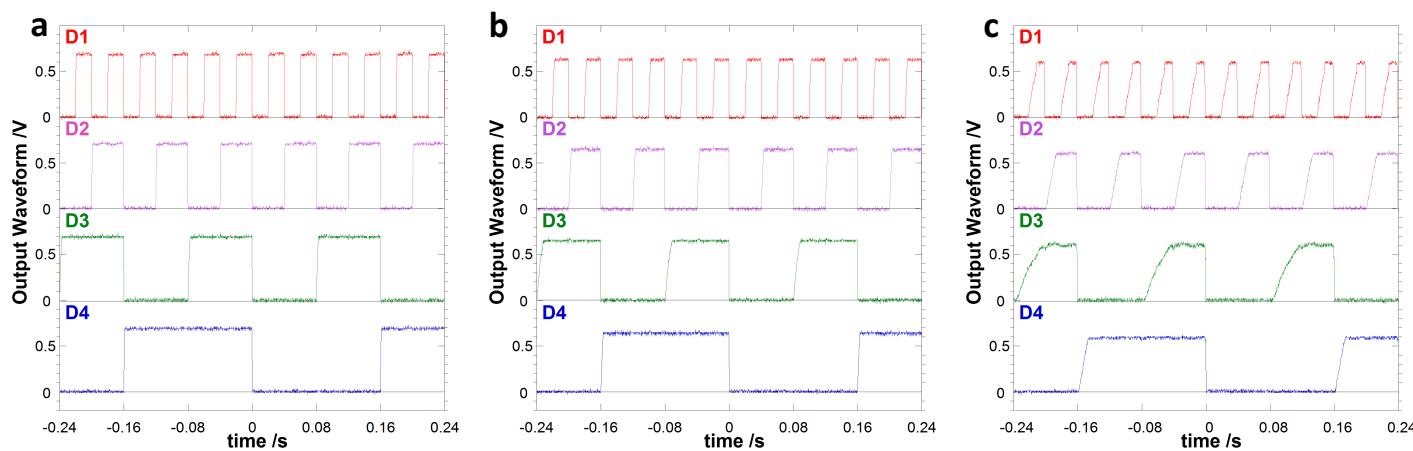
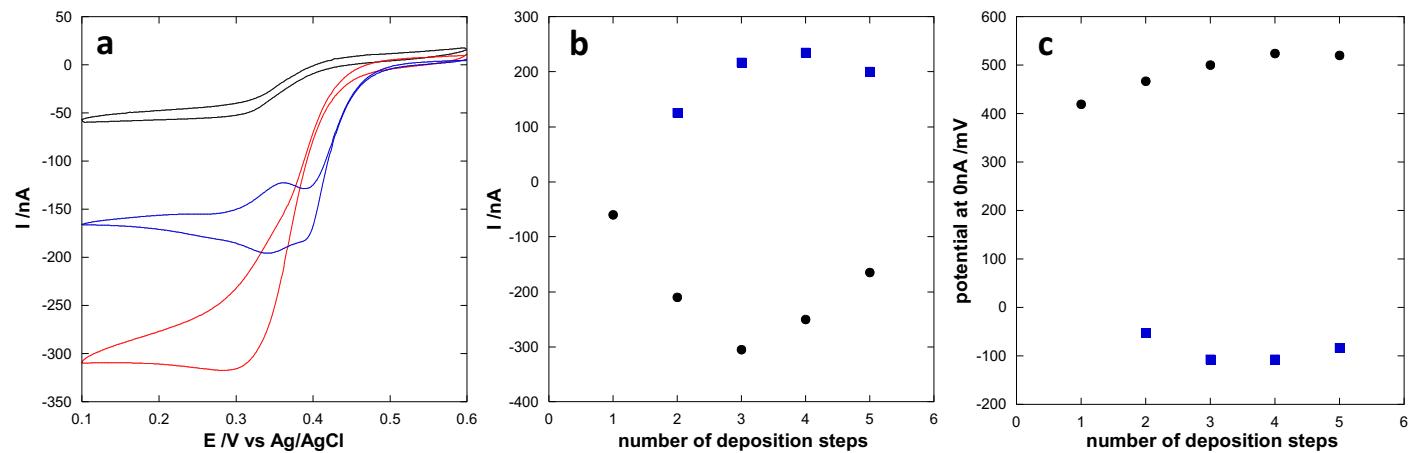


Fig SI2. Counting output signal quality for an input frequency of 50 Hz as a function of supply voltage with : a)  $V_{DD}=700$  mV. b) 650 mV. c) 600 mV. Supply voltage was delivered by a DC power supply (CLET 30-2, Convergie).



**Fig SI3. Relationship between performance of planar hydrogel disk microelectrodes and number of hydrogel deposition steps (x 0.5  $\mu$ L).**

a) Cyclic voltammograms of the catalysis for cathodes with 1 (black curve), 3 (red curve) or 5 (blue curve) deposition steps. b) Maximal catalytic current for cathodes (black circles) and anodes (blue squares) as a function of number of deposition steps. c) Potentials at  $I=0$  nA. Obtained from CVs at 5 mV/s in phosphate buffer 100 mM pH 7.2 at 22°C and no forced convection, with 5 mM glucose for anodic catalysis.

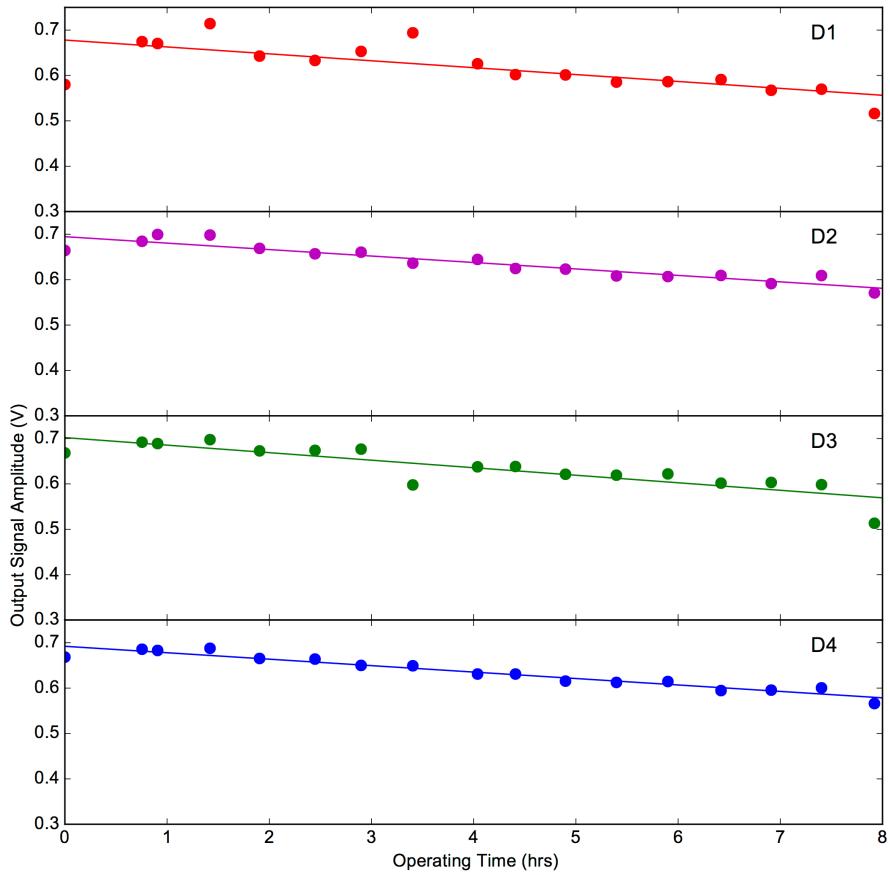


Fig SI4. Output performance (amplitude) over time for the 4 different channels of the μBFC-powered ripple counter.

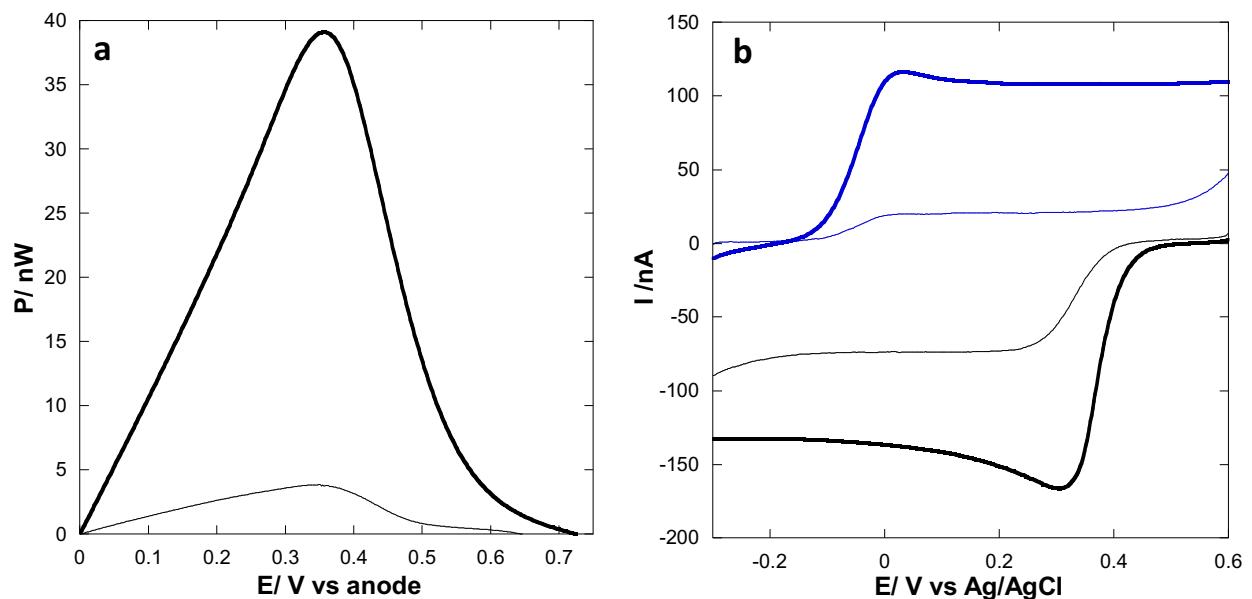


Fig SI5. Comparison between the performance of the enzymatic  $\mu$ -BFC at the initial stage and after 25 hours of continuous operation of binary counting. a) Initial (thick line) and final (thin line) power curves. b) initial (thick lines) and final (thin lines) catalysis at the anode (blue) and cathode (black).

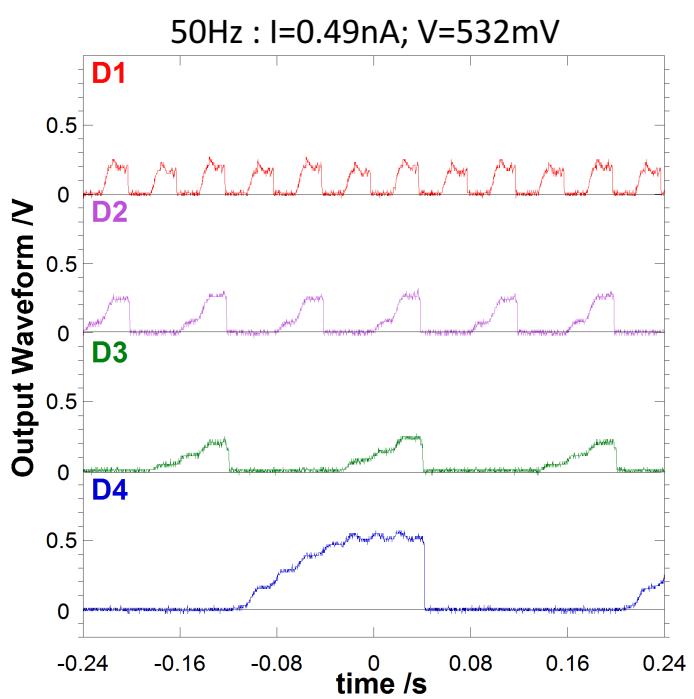


Fig. SI6. Counting signal after 25h of continuous operation in 5 mM glucose.