

Supporting Information:

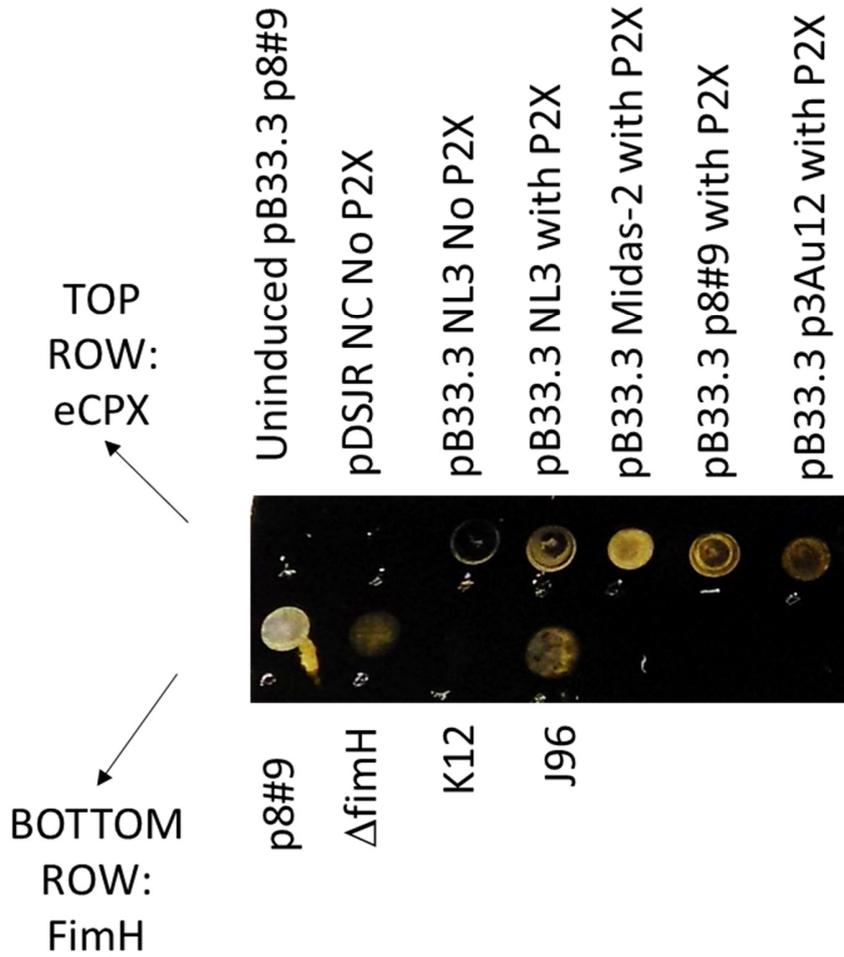


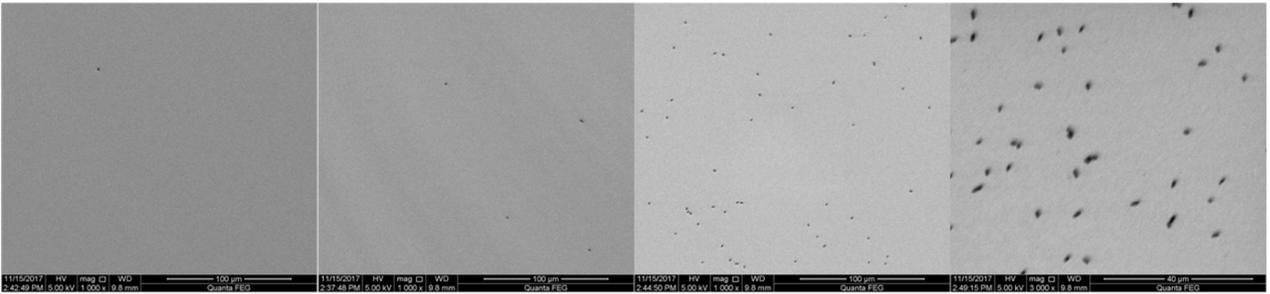
Figure S1: Photograph of a representative spot assay plate. The top row displays cells with the eCPX scaffold as noted while the bottom row shows cells that contain various forms of the fimbriae scaffold.

Uninduced pB33.3 p8#9

pDSJR NC No P2X

pB33.3 NL3 No P2X

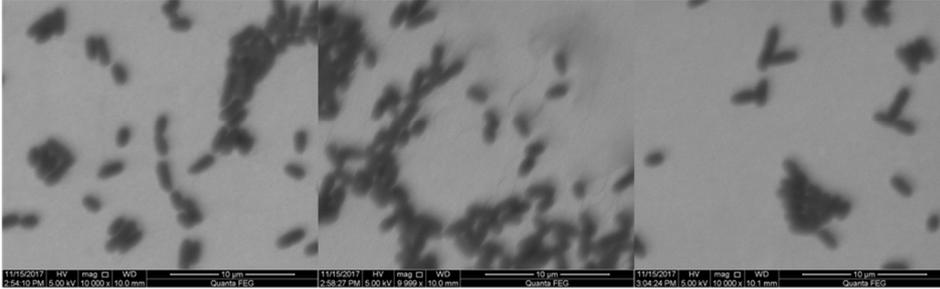
pB33.3 NL3 with P2X



pB33.3 Midas-2 with P2X

pB33.3 p8#9 with P2X

pB33.3 p3Au12 with P2X



FimH-p8#9

ΔFimH

K12

J96

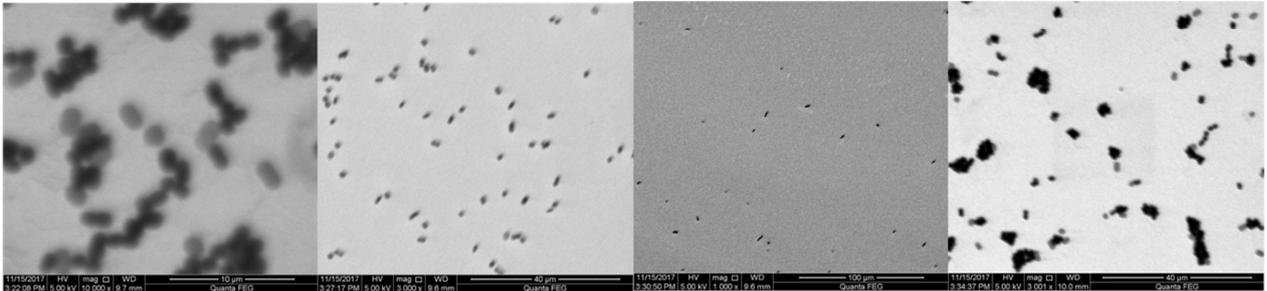


Figure S2: Representative SEM images taken in the center of the spots in Figure S1. Different zooms are used to capture images due to the very different cell densities observed with different scaffolds.

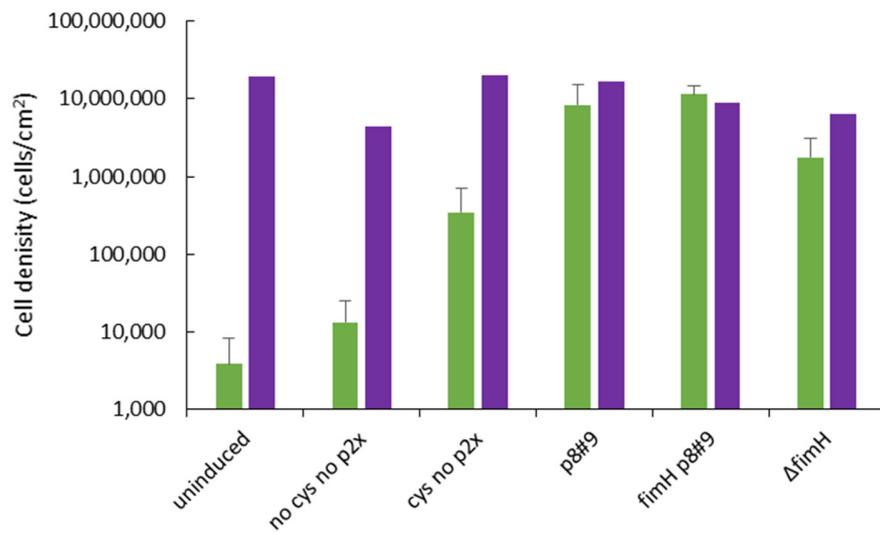


Figure S3: Comparison of the cell density on the anode of the μ L-MFC after operation (purple bars) with the cell densities observed in the spot assays (green bars). Across all runs the cell densities on the electrodes after operation are similar to the cell densities observed with the strongest affinity scaffolds and no trend is seen between the spot assay cell density and the electrode cell density.

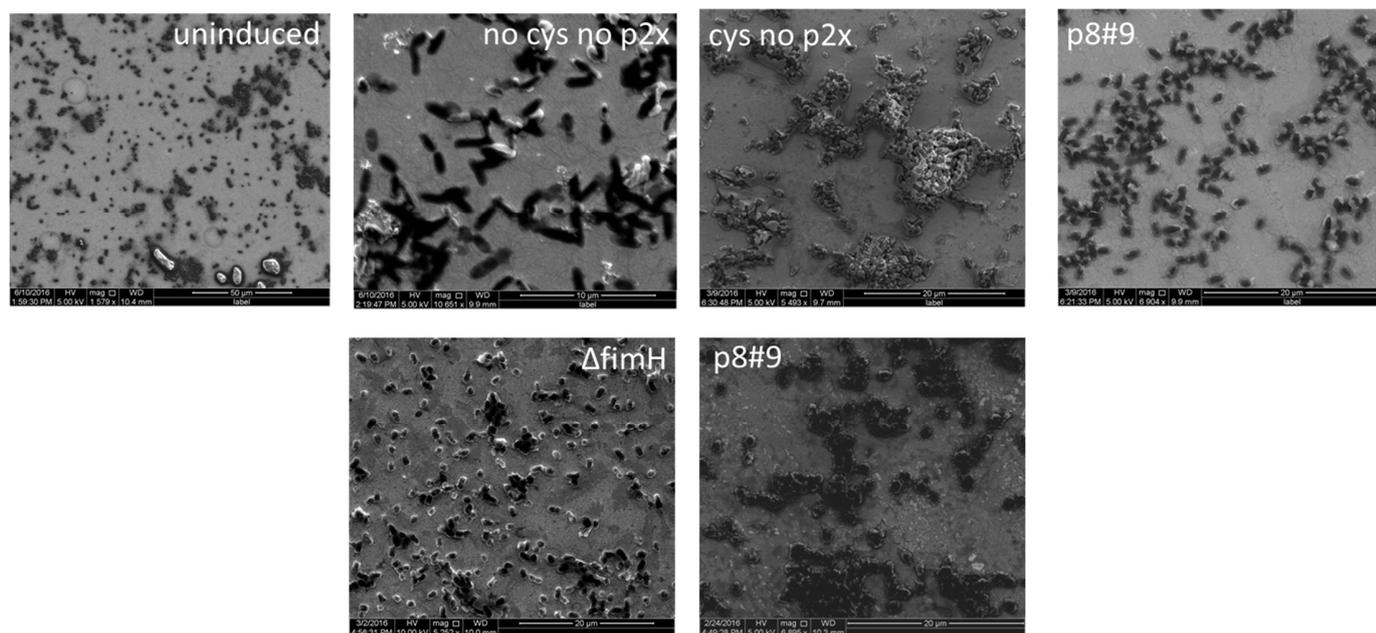


Figure S4: Representative SEM images of the μ L-MFC anodes after operation. The top row shows experiments with the eCPX scaffold while the bottom row is for the fimH scaffold. Similar cell densities are seen across all runs.

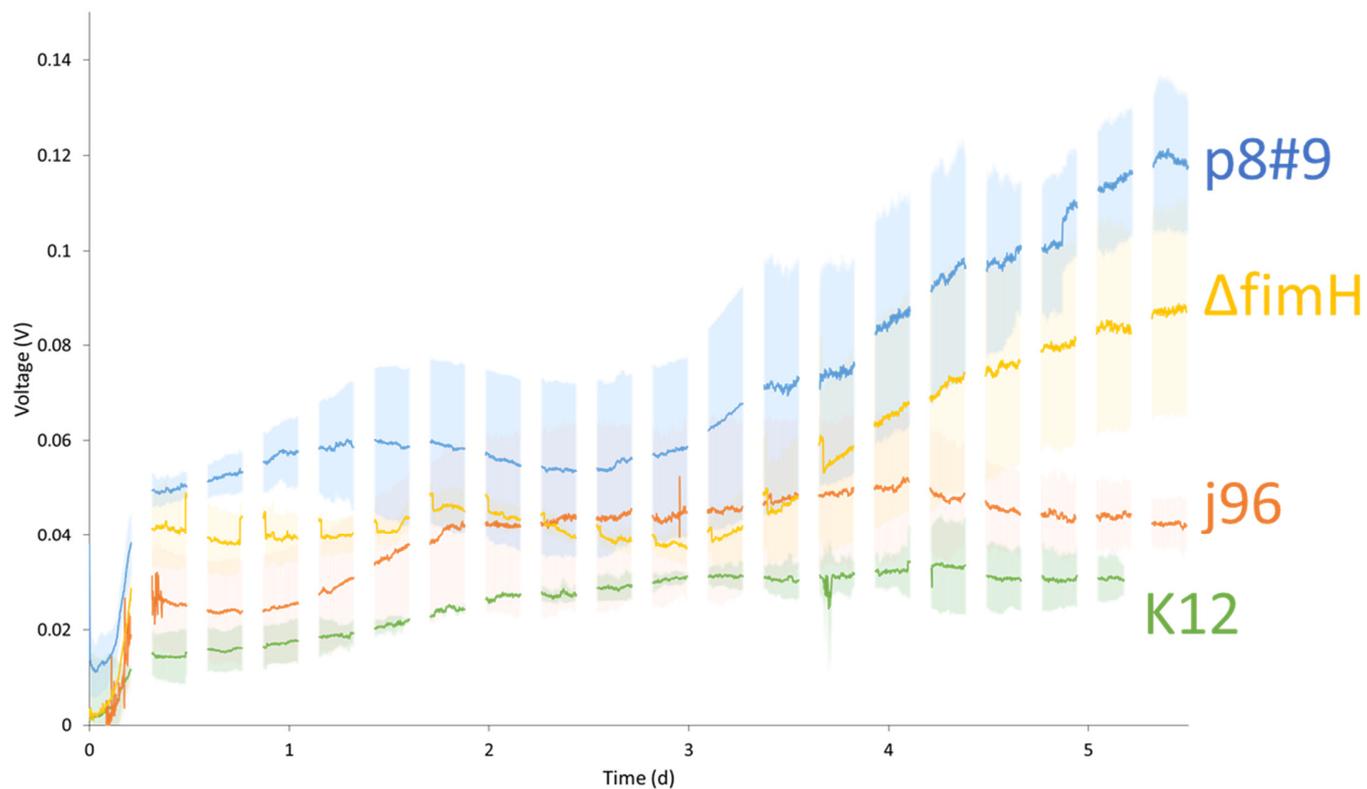


Figure S5: Voltage in U-tube microbial fuel cells held at 1 MΩ and inoculated with fimH strains displaying either the p8#9 peptide, the wild type fimH (j96), a mutant lacking fimH or an unengineered K12 strain. The shaded regions show one standard error away from the average (n= 3, p8#9, j96, ΔfimH; n=2 for K12). Cells displaying the p8#9 peptide have the highest voltages, with ΔfimH and j96 having intermediate voltages and K12 cells having the lowest voltage.

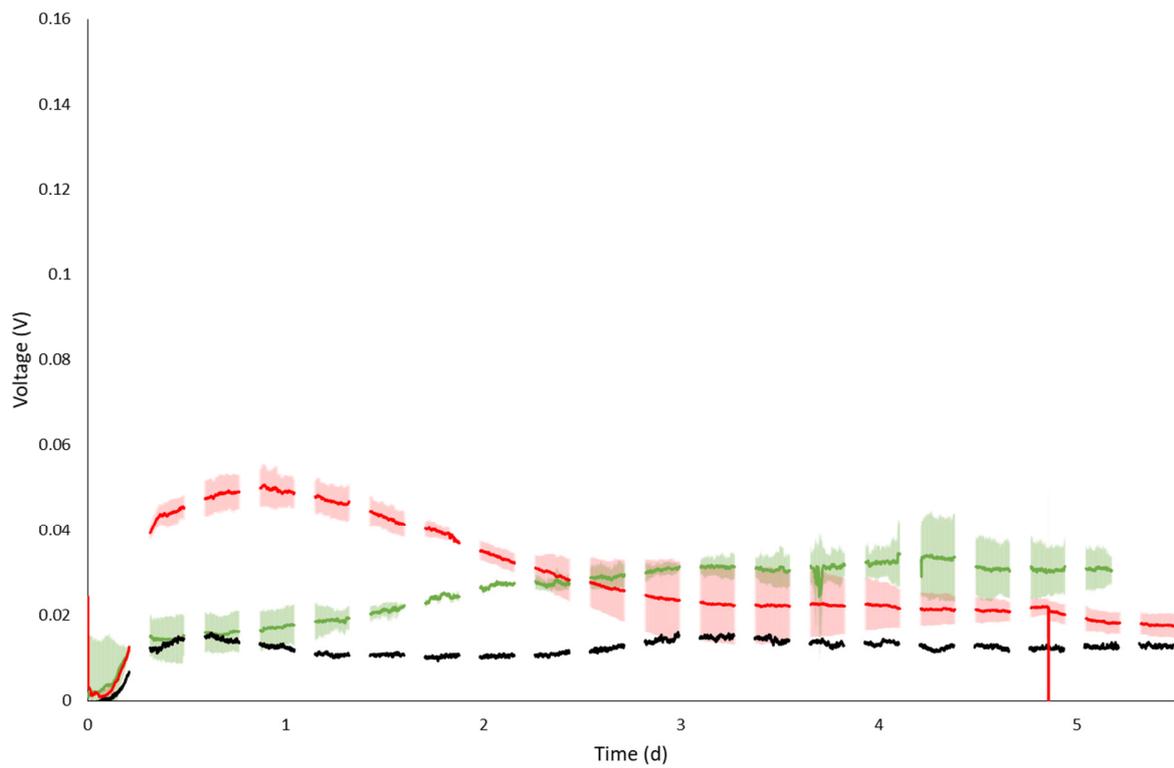


Figure S6: Voltage in U-tube microbial fuel cells held at 1 M Ω and inoculated with either induced (red) or uninduced cells (green) for the eCPX scaffold with the p8#9 peptide. The K12 cells are shown in (black) for comparison. The shaded regions show one standard error away from the average (n= 2).

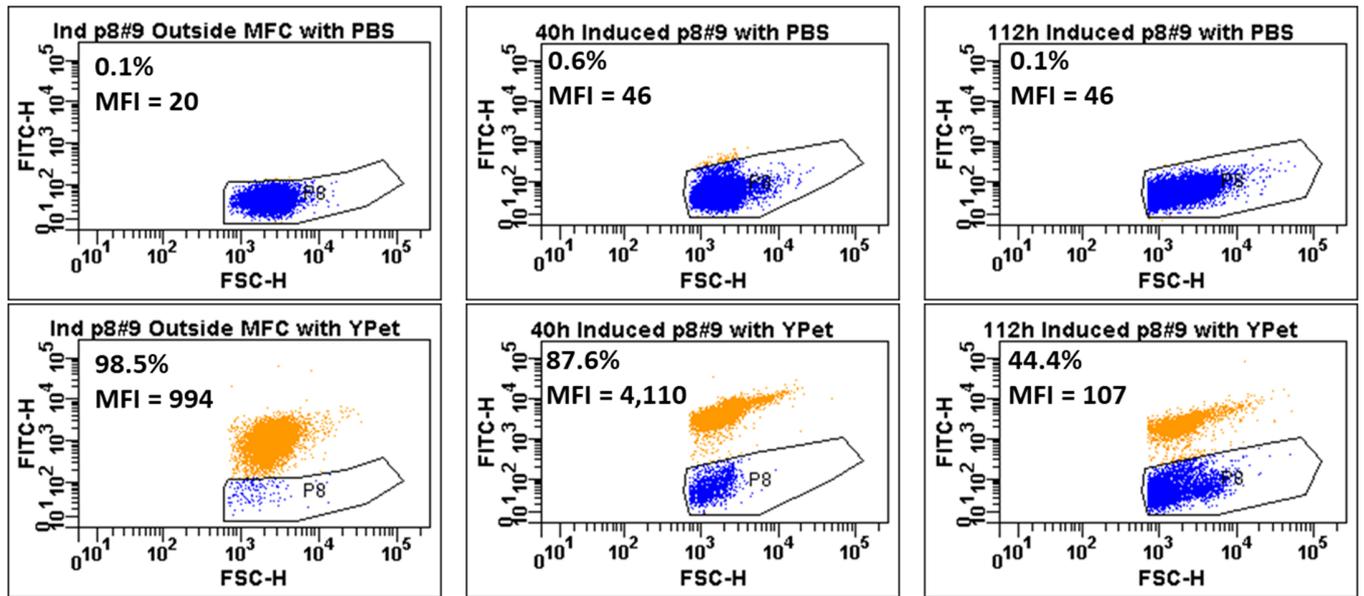


Figure S7: Expression of the eCPX scaffold in planktonic cells taken from running microbial fuel cells at 40 h (middle) and 112 h (right) along with expression outside of a microbial fuel cell for comparison (left). The top row shows control measurements of fluorescence without the YPet fluorescent molecule while the bottom row shows measurements with YPet added. Expression remains high after 40 h, with only a slight decrease in the number of cells binding YPet (87.6 vs 98.5 % outside of an MFC). However, by 112 h less than half of the cells bind YPet and the median fluorescence intensity (MFI) has also declined, suggesting that not only the number of cells expressing eCPX has declined but also the per cell expression as well.

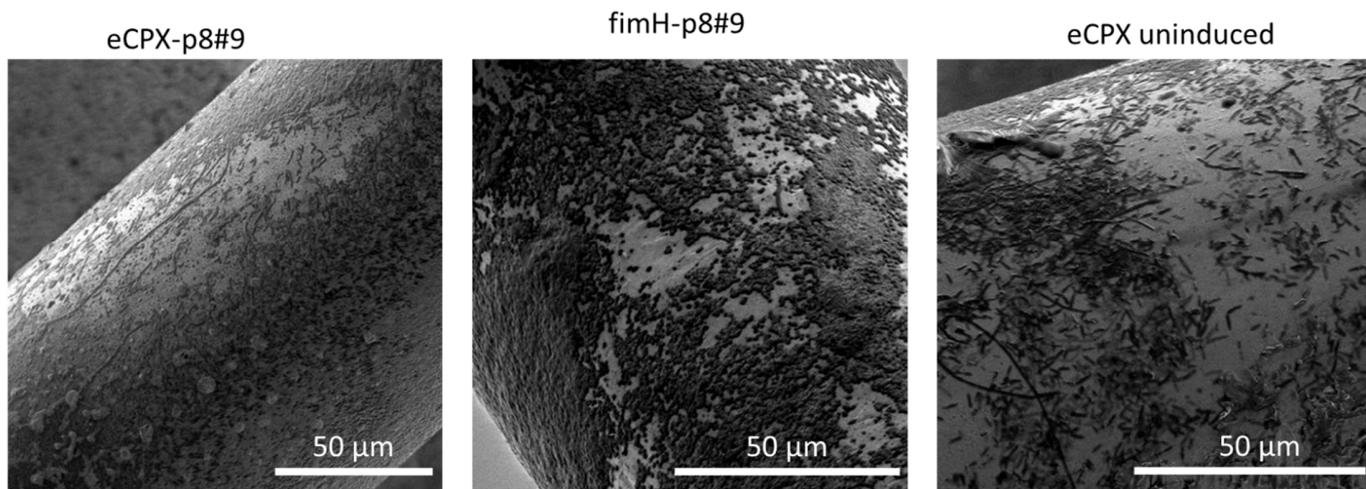


Figure S8: Representative SEM images taken of the anodes after operation of the U-tube microbial fuel cells. Most of the electrodes are covered with cells, with some areas having multiple layers of cells. Some filamentous cells can be seen, especially in the eCPX samples.