

Microbial fuel cell

Free energy from mud, waste water or waste food. Assembly is simple, it needs 300 mL of fuel, 2-electrodes, and a vessel. Maximum voltage is 500-900 mV, which may take 1-12 weeks to reach.



Electrodes consist of nanoporous carbon attached onto a special alloy current collector. At least one year of operation has been tested without corrosion and power level is quite stable. Electrodes can be made at home or obtained from superaccu.com. Electrodes are reusable.

Container for the MFC can be done for example from 1.5 L NESTEA ice tea bottle, just cut the lower part and make 2 holes for the wires. Container can be closed with a bottom of another ice tea bottle. Note that small holes are necessary because microbes breathe air oxygen.



Fuel can be mud (low power), 1-2:1 mud/waste water mixture (medium power) or mud/food waste - such as potatoes and meat (highest power). It must be a viscous mass like fresh honey. If needed add tap water or if there is too much water, pour it out. Do not add too much waste water or there will be extensive methane evolution, which reduces efficiency of MFC.

Assembly is shown in video https://youtu.be/_zCsAfEbVRc . Add 1 cm of fuel at the bottom of container and knock to remove air bubbles. Note that if you take anaerobic mud and quickly add anode from deoxygenized package, then voltage will probably increase quicker. Also, fresh mud starts working quicker. Add anode (with black wire), 2-3 cm of fuel and knock air bubbles out. Add cathode (red wire), knock, insert wires through holes, and close the lid. It should start working itself, microbes are already present in the fuel. Proper cell with optimal fuel works at least a year without adding anything, but sometimes 20 mL of water needs to be added after every ~3 month or it may dry out.

Measurements

- 1) Voltage and current. A multimeter is needed. Test voltage and short circuit current until the voltage level reaches > 500 mV.
- 2) Voltage, current, and power. 1 multimeter, wires, and set of resistors (1Ω - $1M\Omega$) are needed.
- 3) Voltage, current, power, and internal resistance. 2 multimeters, wires, and set of resistors (1Ω - $1M\Omega$) or rheostat are needed..

Powering something useful

It needs serial connection of 3 or 4 cells to directly power a red or white LED, respectively.

Second possibility is to make a voltage increasing electrical scheme...

[This document will be supplemented]