Kelsey Lindbloom

Fueling the Future Phase 2: An Investigative Look Into the Use of Substrates in a Microbial Fuel Cell

My project title is “Fueling the Future Phase 2: An Investigative Look into the Use of Substrates in a Microbial Fuel Cell”. After performing Phase 1 of the experiment in which I looked at the most efficient substrate for feeding Shewanella putrefaciens in a petri dish environment, I decided to determine which substrate, potato starch, sucrose, glucose, or maltose, was the most sustainable efficient food source in a Microbial Fuel Cell environment.

Five microbial fuel cells were constructed based on simple guidelines created by other researchers. In the anode compartment, the substrates were combined with Shewanella putrefaciens and then grown in an anaerobic environment. The cathode compartment contained a salt water solution. The two compartments were connected by a resistor.

Data analysis of the sustainability and efficiency of the substrates was accomplished by measuring voltage, power, and current output. Average measurements for each substrate were as follows. Potato starch: 0.0022025 amps, 0.01744875 watts, 2.2075 milli-volts. Control: 0.000326 amps, 0.0009 watts, 0.3325 milli-volts. Sucrose: 0.000246 amps, 0.000078875 watts, 0.24625 milli-volts. Maltose: 0.000205 amps, 0.000092 watts, 0.20375 milli-volts. Glucose: 0.000549 amps, 0.002228 watts, 0.545 milli-volts.

The end results did not support my hypothesis. I had predicted that maltose would be the most sustainable efficient substrate. Potato starch was the most sustainable efficient substrate. Potato starch, in my experiment, was able to be used by Shewanella putrefaciens without a mediator and produced the highest outputs. Additional study of different types of starch will prove if all types are equally efficient.