CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Aakash N. Shah

Project Number
J0227

Project Title
Microbial Fuel Cell

Abstract

Objectives/Goals
In this project my goal is to build a microbial fuel cell using a mud sample from a stream and determine if this device can harvest the electrons that the anaerobic bacteria create. Secondly, I am also measuring the amount of electricity harvested.

Methods/Materials
Compression Fitting; Sandpaper; Acrylic Cement; Nickel Epoxy; Copper Wire; Electrical Tape; PVC Pipe; Nylon Rope; Safety Goggles; Ruler; Permanent Marker; Drill or Drill Press; Scissors; Wire Stripper; Plastic Wrap; Aluminum Foil; Measuring Cups; Pot; Stirrer for Solution; Plastic Spoon; Stove; Table Salt; Refrigerator; Plastic Bag; Buckets; Plastic Jug; Top Soil; Shovel; Tap Water; Distilled Water; Digital Kitchen Scale; Aquarium Air Pump; Tubing; Acrylic; Storage Containers; Carbon Cloth; Digital Multimeter; Alligator Cables ; Petri Dish; Agar # 30 grams

Results
Hour: 0.02W-0.05W
Day: 0.48W-1.2W
Week: 3.36W-8.4W
Month: 14.4W-36W
Year: 172.8W-432W

Conclusions/Discussion
My result was that the microbial fuel cell did in fact harvest the electrons that the anaerobic bacterias create. As said previously, I also measured the amount of electricity the microbial fuel cell can produce. I came across the fact that it produced a different amount every hour. The results are the following: I measured the amount of voltage and current my microbial cell generated. The microbial fuel cell I built generates ~0.02-0.05 watts per hour. Though this is small, over time it creates quite an amount of energy; for example, the microbial fuel cell produces 0.48-1.2 watts per day, 3.36-8.4 watts a week, 14.4-36 watts per month, and even 172.8-432 watts a year! Furthermore, if you increased the size, the amount of energy harvest increases; for instance, a cubic meter large microbial fuel cell can produce as much as 50 watts per hour! This little machine could power a light bulb and much more with these methods. And if purification centers used the fuel cell over time, the numbers would just keep multiplying. My experiment was a success but could have been improved. Some of the areas I would like to have explored more are: (a) what can impact the efficiency of electricity generation of my cell and (b) does temperature or pressure have effect on the amount of electricity being harvested. Overall, this project was a great learning experience

Summary Statement
My goal is to build a functioning microbial fuel cell.

Help Received
Parents bought materials; Dad helped dig mud; Parents escorted me to places;