



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Pranav S. Moudgalya	Project Number J0214
Project Title Energy of the Future: Using a Microbial Fuel Cell to Harness Bacterial Power Production	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals How does the feeding source of the nonpathogenic bacteria <i>Shewanella oneidensis</i> affect its ability to generate usable power through bioelectrogenesis?</p> <p>Methods/Materials Major materials in my research included Microbial Fuel Cells (and their related components), potting soil, and the sugar substrates used to enhance the power output of the fuel cells. To calculate the power being produced, a multimeter was used in assisting the process. To get an accurate measurement of bacterial colonies inside of my fuel cell, I modified the research used to establish a calculator provided online by Mohamed Y. El-Naggar.</p> <p>Results My research showed overall, arabinogalactan was indeed the most effective substrate producing an average of 131,240,179 colonies, 5.66 microwatts, and a peak power of 32.41 microwatts per trial. However, the second most effective was actually dextrose, and in large numbers ahead of fructose. While fructose was only able to produce an average of 48,157,289 colonies, 2.3 microwatts, and a peak power of roughly 23.79 microwatts per trial, dextrose proved to be a lot more effective. The MFCs using dextrose as a substrate produced on average about 83,333,367 colonies, 4.2 microwatts, and a peak power output of about 35.98 microwatts per trial.</p> <p>Conclusions/Discussion In conclusion, the power of microbial fuel cells will be greatly enhanced through my research as we now have a proven method regarding how to enhance their power output. In specific, arabinogalactan will prove to be a efficient substrate to create energy, however, by using sugar-based substrates, we will be able to optimize power production that won't require complex materials or heavy funding.</p>	
Summary Statement I researched methods to optimize the potential of bacteria derived energy through the use of Microbial Fuel Cells.	
Help Received This research project was designed to be effective and impactful without the use of laboratory grade instruments. My mother (Dr. Rajini Moudgalya) also helped in providing me an understanding of basic principles regarding microbiology and the phases of bacterial growth.	