CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Max Freedman

Project Number

36270

Project Title

Bang for Your Buck: Designing and Building Hydrogen Fuel Cells

Abstract

Objectives/Goals

This project investigates the properties and feasibility of hydrogen fuel cells made from common materials as an alternative energy solution.

Methods/Materials

Built a hydrogen fuel cell with a PEM (proton exchange membrane) and hydrogen generator. Tested power efficiency and performance with various voltages.

Results

The hydrogen fuel cell performance is determined by flow rate of hydrogen. As power into the generator increases the hydrogen flow rate increases, but reaches a limit and then performance declines. At its peak performance, fuel cell output was a constant 0.75 volts. The fuel cell is most efficient operating levels of power 14-21W.

Conclusions/Discussion

Performance of this fuel cell changes depending the rate of hydrogen produced. When rate of hydrogen is too fast, the efficiency drops. To get the best efficiency from the cell, more testing is required to determine the optimal rate of hydrogen. Possible variables include temperature, Nafion ratings, and pressure in the cell playing a part in changing the efficiency.

Summary Statement

I built and test a hydrogen fuel cell and generator using common materials.

Help Received

Adam Draeger helped me with apparatus construction. Max Dobrushin helped me with background research and edits. Patty Freedman helped me with graphic design and display board.