



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

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Project Title Fuel Cells: Which Catalyst to Choose?	
Objectives/Goals My objective for this experiment is to find out the catalyst that will make a fuel cell more efficient.	
Abstract	
Methods/Materials The materials used are: Five Catalyst wires/foil (Pt,Ni,Au,Cu,C), a DC Power Source, a voltmeter, an ammmeter, a jar, 1.25 cup of water with one teaspoon of baking soda, wires with banana clips to connect, a stopwatch, and a 20 Kilo Ohm resistor.	
Procedure: 1. Produce Hydrogen and Oxygen using electrolysis. 2. Disconnect DC power source and record voltage and current of the fuel cell with the 5 different catalysts. 3. Calculate efficiency using Power Density.	
Results The order of efficiency of the catalysts used in this experiment is as follows: Platinum (most efficient), Nickel, Carbon, Gold (least efficient).	
Conclusions/Discussion From the data collected, when a load is applied to the fuel cell, the cell with Platinum-Platinum as electrodes is able to generate the highest power density. A higher Power Density means that the fuel cell can produce more energy with more efficiency. This proves that the hypothesis is correct. While carbon has the highest open circuit voltage, it is not possible to draw much current from it. This means that Carbon is not useful in everyday uses such as powering appliances. This means that the open circuit voltage is not a conclusive measure for efficiency of a fuel cell. The important factor is the power density under load.	
Summary Statement I am trying to find out the most efficient catalyst in a fuel cell.	
Help Received I would like to thank Dr. S.R. Naryanan, the Fuel Cell Technical Team Lead at JPL, for providing the catalysts and fuel cell kit, and overall guidance.	