



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Bhargav Panguluru	Project Number J0624
Project Title Water to Fuel to Water	
Abstract Objectives/Goals To increase the efficiency of the electrolysis of water process with the use of cobalt nitrate catalyst. Methods/Materials Tested the efficiency of electrolysis of water process by measuring voltage drop across the Galvanostatic electrochemical cell by adding cobalt nitrate catalyst to the phosphate buffer solution. 0.1M Phosphate buffer solution pH 7.0; Cobalt nitrate; Nickel metal strips; 9V batteries; Breadboard; Electrical wire; 10K Ohm resistor; Multimeter Results The baseline voltage/efficiency of electrolysis of water is compared with the voltage/efficiency after adding the cobalt nitrate catalyst. The improvement in efficiency is significantly better. I saw the formation of Cobalt based catalyst electroplated on anode. I also saw the formation of hydrogen at cathode, and oxygen at anode as bubbles. Conclusions/Discussion The efficiency of electrolysis of water can be increased by cobalt catalyst. I indirectly proved Ohm's law and learned about measuring voltage and current. Also, I learned that keeping the current constant is the most important factor of this experiment. Three factors that affect the output are 1) Battery source. 2) Resistors. 3) Any change in the electrochemical cell. I also learned about bond formations, catalysts, and chemistry overall in this experiment. I saw the water-splitting reaction, the hydrogen forming at cathode, oxygen forming at anode, and also the catalyst forming at anode.	
Summary Statement I synthesized a cobalt based catalyst that effectively increased the efficiency of electrolysis of water process.	
Help Received I used internet to do my research and development, and followed the directions provided by MIT.	