



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY**

Name(s) Qianshu Gong	Project Number J1305
Project Title Hydroxide-ion Batteries: The Concept and Materials Engineering for High Capacity	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this project is to describe a proof-of-concept energy-storage device that consists of oxidized carbon and nickel oxide as the electrode materials</p> <p>Methods The anode and cathode materials were prepared by a controlled firing and precipitation reaction, respectively. Afterwards, ink coating of as prepared materials was used to prepare membrane electrodes. After charging, the battery was tested by electronics like the multimeter.</p> <p>Results The results showed that the battery is able to exert a voltage of up to 0.525 volts. Results showed that performance can be boosted by engineering carbon materials to control the amount of oxygen in carbon black. Results showed that the amount of oxygen in the materials greatly affects the overall performance of the battery.</p> <p>Conclusions A proof-of-concept battery is demonstrated that comprises of inexpensive materials, that is oxidized carbon and nickel hydroxide. The performance depends on the surface oxidization state of carbon and the particle size and shape of nickel hydroxide. This battery can be used in portable devices.</p>	
Summary Statement The hydroxide-ion battery provides an alternative solution to harvest energy in inexpensive materials.	
Help Received During my literature survey, I encountered many scientific terms that I did not understand, and so I asked my science teacher to explain them to me. However, I designed and created a prototype of the battery by myself.	