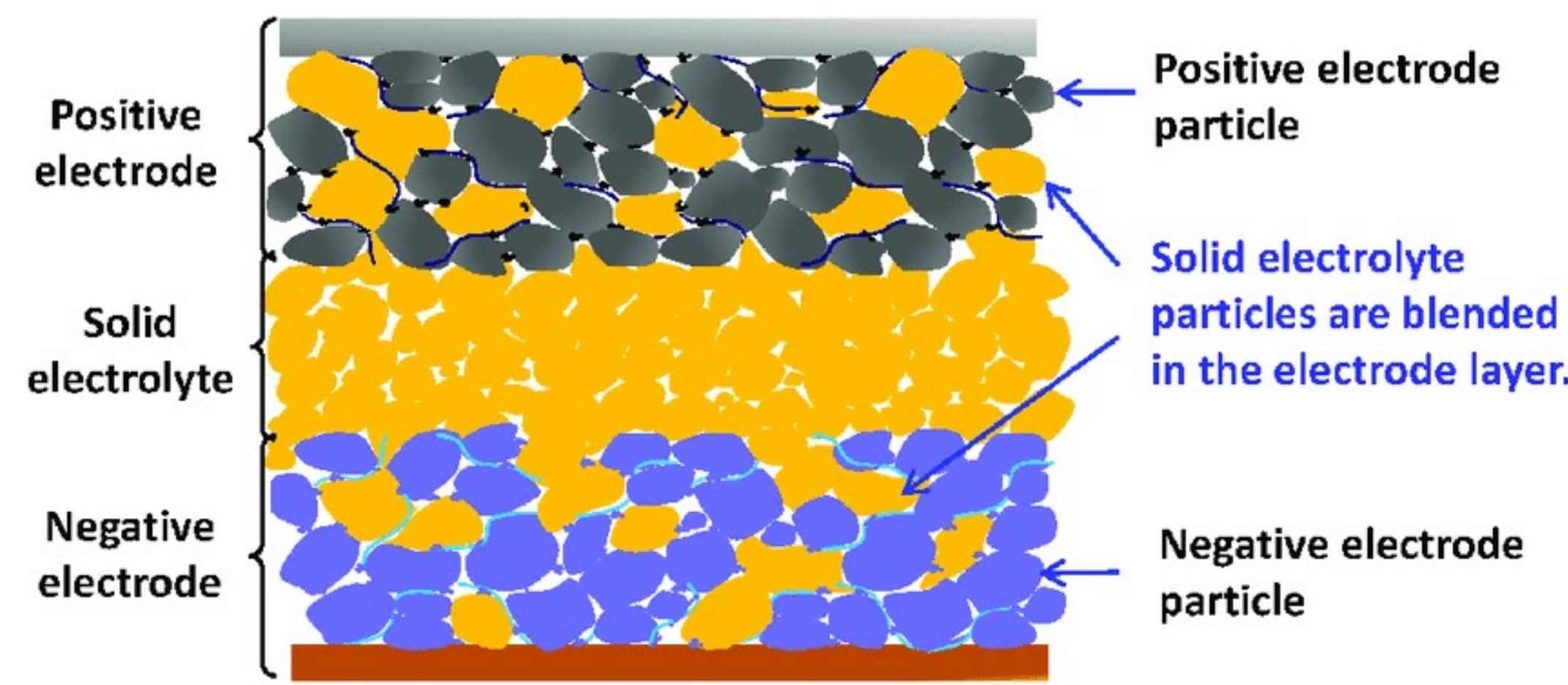


3D Printed Vacuum Chamber for Solid-State Battery Testing

Jason Williamson¹, Apolinar Guevarra², Ariana Kay³, Fei Wang⁴, Dr. Zheng Fan⁴
Needville High School¹, Foster High School², Refugio High School³, University of Houston⁴

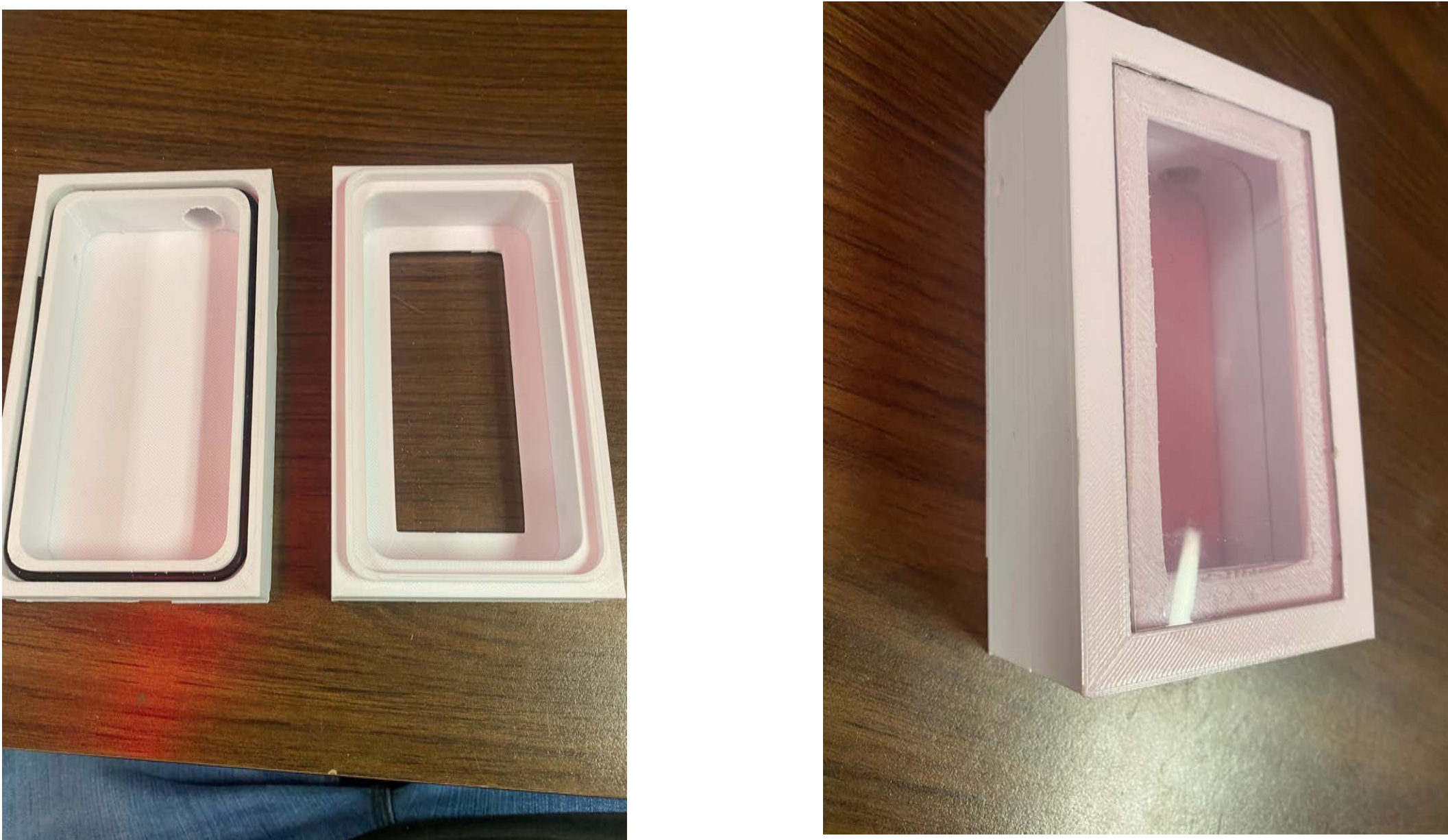
Introduction

Solid-state have a lot of advantages over conventional batteries, primarily due to the elimination of the risk of fire or explosion. However, one of the major drawbacks to the solid-state battery is that it is not fully understood why they fail. By determining what makes a solid-state battery to fail will allow scientists to optimize them for longer and more efficient use.



Methods

A 3D chamber was first designed using SolidWorks. This chamber was designed with a hole for the insertion of a gauge to measure the interior pressure, a hole to insert wires for different types of sensors to test for when a solid-state battery might fail, a hole to insert a tube in order to evacuate the air upon closing the chamber, and a clear window to make visual observations.



Results

A prototype of the chamber was successfully printed and assembled.

Discussion

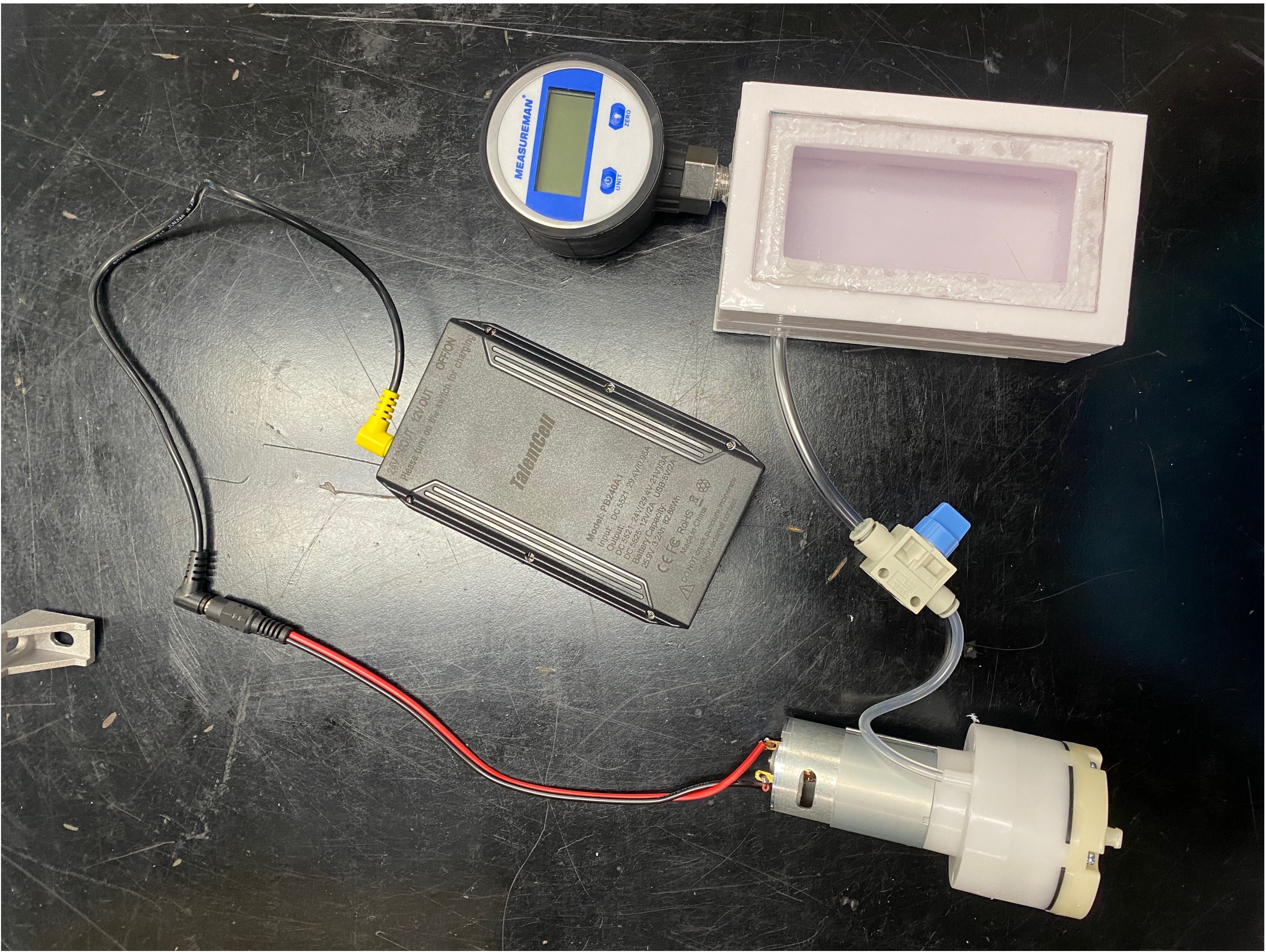
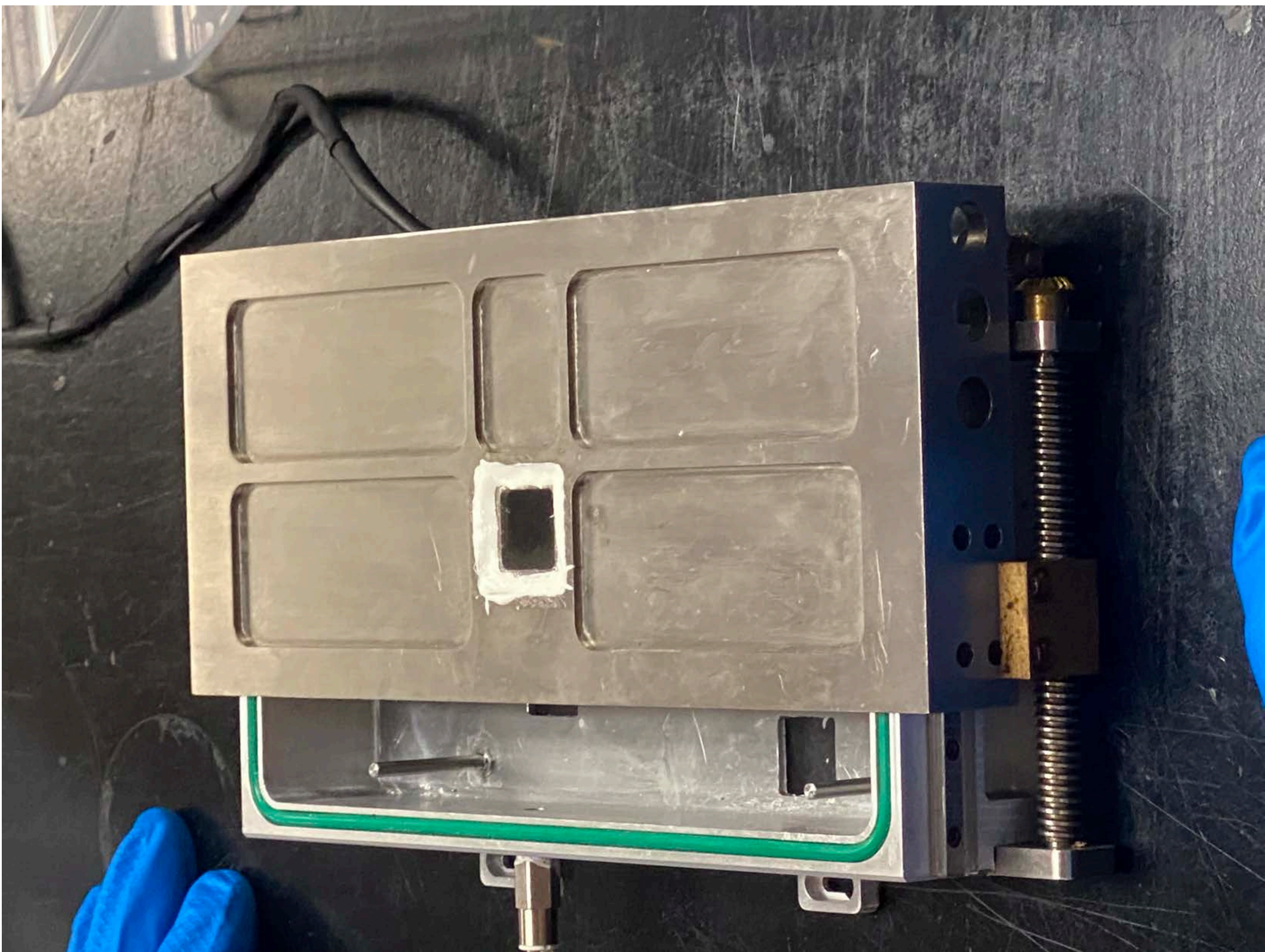
The remaining work to be done would involve attaching the sensors and testing the chamber for a vacuum seal that holds over time.

Acknowledgements

A big thank you to the National Science Foundation for the funding and support of RET COT Houston. Thank you also to the faculty and graduate fellows of the University of Houston.

Objective

The objective of this summer research work was to develop a 3D printed container for testing solid-state batteries in a vacuum chamber. By using a 3D printed chamber the testing process can be done more quickly and cheaper than the development of other materials. This type of material would allow for transportation of the batteries being tested and remaining in the vacuum seal.



References

https://www.researchgate.net/figure/Schematic-diagram-of-an-all-solid-state-battery_fig2_327379494



Grant #1855147



Needville High School

