Airtight Transfer Vessel for SEM

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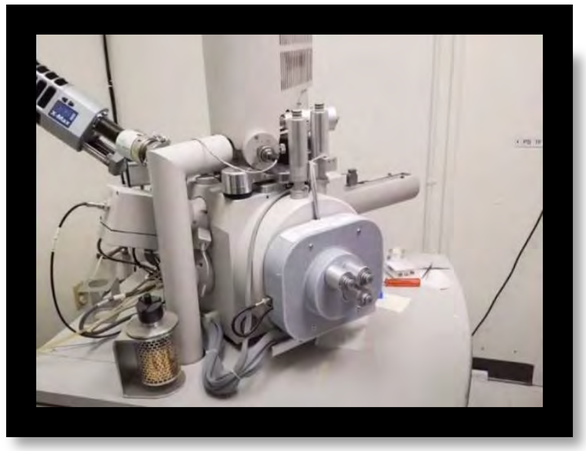
Overview

Our sponsor needs to study uncontaminated lithium in a Scanning Electron Microscope (SEM). Lithium is highly reactive; it spoils in air and combusts with water. He presently studies lithium in his argon chamber in his lab, which is about a 2 minute walk from the SEM.



Our Mission

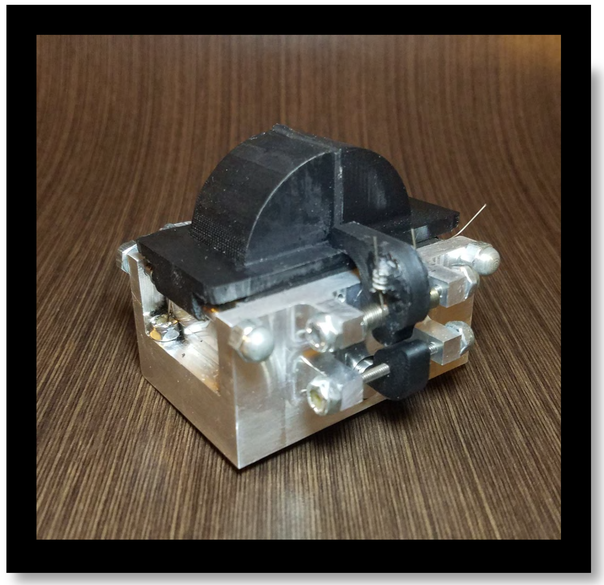
Design and build an airtight vessel that can transfer a lithium sample from the argon chamber in EIS-211 into the SEM without spoiling, and open in a 100 to 10 Torr vacuum pressure window to expose the sample to the scanning electron beam without remote or electronic feeds.

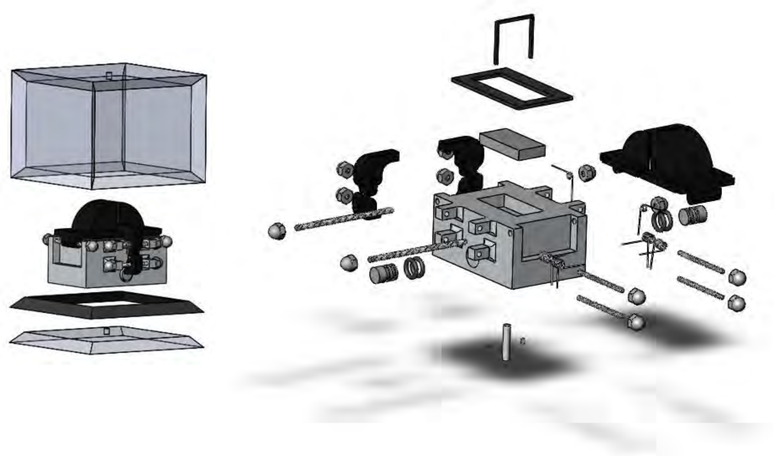
Results

60% of the opening mechanism works. Progress stopped mid-testing and function in SEM is to be determined.

Final Design

- Aluminum body
- 304 stainless steel sample platform
- Embedded pressure-reactive actuators
- Hinged lids with butyl seal





Manufacturing and Assembly

- Aluminum body CNC machined by 3rd-party manufacturer
- Stainless steel platform and butyl seals machined by team
- Lids and latches 3D printed in machine shop
- Entire vessel assembled by hand

Our Sponsor

Dr. Kevin Wood,
Associate professor of
Mechanical Engineering at SDSU

Additional Advisors

Dr. Scott Shaffar	Senior Design Instructor
Mike Lester	Fabrication Support