

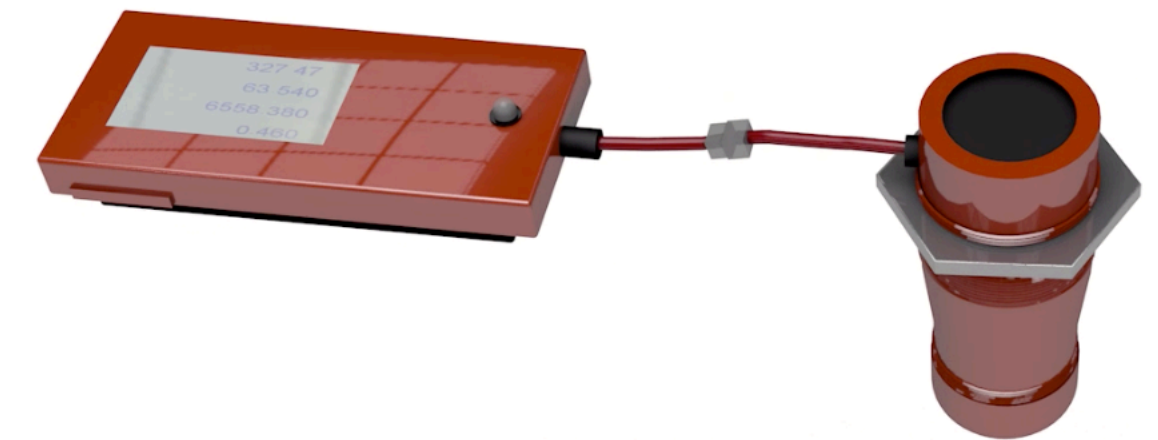
LITHIUM-ION BATTERY RECYCLING PRIZE



U.S. DEPARTMENT OF ENERGY

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Submission Title:	Lithium Failure Detection Unit
Submission Track:	Safe Storage and Transportation

A Public Document



Concept

- The success of lithium-ion battery (LIB) recycling is dependent on safely storing and transporting batteries.
- Lithium-ion thermal runaway events threaten the ability to deliver the LIBs to recycling facilities. LIBs are typically stored and transported in 55-gallon drums.
- The current standard monitoring methods, such as thermal imaging, are ineffective. They only react after a thermal runaway has propagated to other batteries.
- We have learned through research that LIBs release carbon monoxide (CO) gas before and after a thermal runaway. The temperature and pressure also increase.
- We propose integrating CO, pressure and temperature sensors with LIB drums for early detection and improved safety.

Approach

- Standard 55-gallon drum lids have a 2" port into which a detection device can be inserted.
- When equipped with the detector, in storage or transit, a LIB approaching thermal runaway will release CO and other gases. If the integrated CO sensor detects enough CO, personnel/operators will be alerted.
- As the LIB continues to fail and eventually explodes, the detector will sense large temperature and pressure spikes. These serve as redundant indicators of a problem.
- The alerts are sent to a central control station and mobile devices for maximum personnel reaction.
- In storage applications, the devices are registered so first-responders can immediately find and address the problem.

Potential Impact

- In the coming years, we will need to recycle tens to hundreds of thousands of pounds of LIBs, annually. The exposure to risk will only increase without a solution.
- Our early detection solution will reduce the threat of thermal runaway for the collection, storage and transportation segments of the LIB recycling process.
- The device will significantly reduce the number of incidents, hours of operational downtime and dollars of property damage. The 90% recovery target will become more viable.
- At an anticipated cost of \$90/unit, the detector will be cost-effective and scalable, making it accessible to all types of users.