

# Battery Abuse Testing Laboratory

The BATLab is home to the world's largest and most comprehensive battery calorimetry laboratory, the DOE's largest lithium-ion cell prototyping facility, battery component analytical and diagnostic capabilities, and extensive failure-analysis and characterization tools.



The Battery Abuse Testing Laboratory (BATLab) at Sandia is an internationally recognized leader in energy storage system safety research, and is committed to serving the energy storage community and the national interest with cutting-edge research programs, the highest quality testing results, and leadership in battery safety and reliability.

## Energy Storage System Safety Research

The Battery Abuse Testing Laboratory (BATLab) at Sandia is an internationally recognized leader in energy storage system safety research. For more than 13 years, the BATLab has supported the U.S. Department of Energy (DOE) Office of Vehicle Technologies programs, whose goal is to enable new electric vehicle (EV) technologies. The BATLab also continues to support other DOE, Department of Defense, NASA, and private industry customers.

BATLab research and development (R&D) programs focus on:

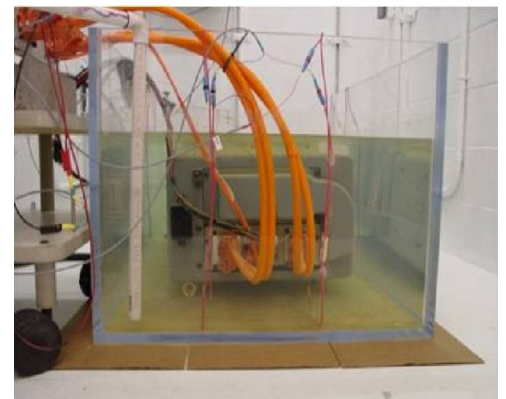
- Understanding the mechanisms that lead to energy storage system safety and reliability incidents,
- Developing new materials to improve overall energy storage system safety and abuse tolerance,
- Performing abuse testing,
- Advancing testing techniques,
- Performing detailed failure analyses,
- Developing strategies to mitigate energy storage cell and system failures.

## Abuse Testing

In order to ensure the safety and reliability, of battery systems, components must be stressed to extremes to determine when and how they will fail. Only when a manufacturer knows a battery's full performance envelope and its failure modes can it market a product with assured safety and reliability.

Sandia's BATLab provides comprehensive safety and reliability testing of capacitors, cells, batteries, and systems from milliwatt-hours to kilowatt-hours. Our capabilities include mechanical abuse, electrical abuse, and thermal abuse.

The BATLAB is equipped with four mechanical abuse test systems to perform a variety of



puncture, impact, or crush tests that can deliver up to 120,000 pounds of applied load, 24 channels of electrical test equipment up to 600 V and 200 A, and a variety of thermal enclosures and fixtures to abuse-test different cell formats, modules, and battery packs.

BATLab test-development activities include component testing for internal short circuits, battery separators, electrolyte flammability, failure propagation, and system-level abuse testing.

## Commercialization Path

The BATLab has had a number of partnerships over the years including cooperative research and development agreements (CRADA) and work for others (WFO) programs with industry and government agencies to study battery safety and reliability. Our past and current partners include: GM, Ford, and Chrysler through our affiliation with the USABC, NASA, Nissan Motors, SK Corp., Hitachi, A123, Enerdel, Quallion, Eaton Corp., Air Products, Exxon/Tonen, Dow Chemical, Solvay, University of Rhode Island, SEEO Corporation, BASF Corporation, and the Society for Automotive Engineers (SAE).

If you are interested in working with the BATLab, please contact Christopher Orendorff for more information.

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