

# ARGONNE'S CELL ANALYSIS, MODELING, AND PROTOTYPING (CAMP) FACILITY



Cell production equipment in dry room

## BACKGROUND

Advanced vehicle technologies, such as plug-in hybrid electric vehicles (PHEVs) and electric vehicles (EVs), benefit from the development of safe, cost-effective batteries. Many novel lithium-ion chemistries for PHEV/EV batteries are being created by U.S. Department of Energy (DOE) programs. These promising, new, exploratory materials are often developed in small coin cells. However, to be useful in vehicle applications, new battery chemistries must be tested in cell formats that are larger than a few mAh in capacity, preferably in the range of 0.2 to 3 Ah.

To speed up the evaluation of new battery materials, DOE sponsored work at Argonne to develop the capability to make prototype pouch and 18650 cells in a dry-room environment. The result was Argonne's Cell Analysis, Modeling, and Prototyping (CAMP) Facility.

## ABOUT CAMP

The goal of the CAMP Facility is to design, fabricate, and characterize high-quality prototype cells using the latest discoveries in high energy anode and cathode battery materials created at Argonne and in research labs around the world. Its manufactured cells have at least a 200 mAh capacity and enable a realistic and consistent evaluation of candidate chemistries in a timely manner and in a close-to-real industrial format. The CAMP Facility is appropriately scaled to help new materials move more easily from bench top discovery to industrial production.

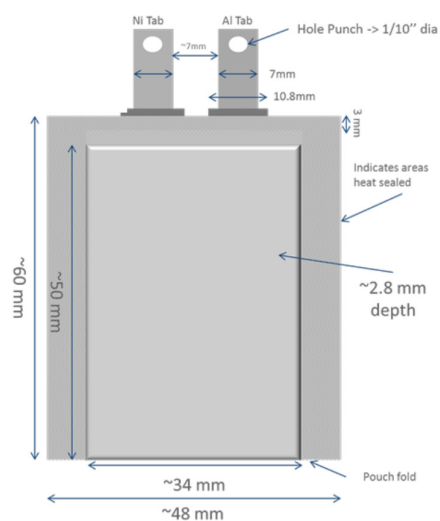
Within a climate-controlled dry room, the CAMP Facility's high tech equipment includes a planetary mixer with a high speed disperser, a high precision electrode coater with two drying zones, and a hot roll press, which enables the fabrication of high-quality electrodes. These electrodes are used to make pouch (in an xx3450 format) and 18650 cells using the CAMP Facility's semi-automated industrial cell assembly equipment.

## RESEARCH

The CAMP Facility's combination of diagnostic analysis, modeling, and characterization has led to significant improvements in capacity retention and lower resistance for cell builds based on Argonne's patented lithium metal oxide cathode materials.

## COORDINATION WITH ARGONNE'S BATTERY PROGRAM

The CAMP Facility is an integrated team effort designed to support production of prototype cells using Argonne's semi-automated cell fabrication equipment, and includes activities in materials validation, modeling, and diagnostics. It coordinates its efforts with other Argonne battery facilities: the Battery Test Facility, Materials Engineering Research Facility, and Battery Post-test Facility.



Prototype pouch cell using xx3450 format



18650 cells

### ACADEMIC AND INDUSTRY PARTNERS

The CAMP Facility has numerous interactions with other national labs, universities, materials suppliers, and battery developers. Collaborations with the facility can be public or private (through Work-For-Others contracts), depending on the nature of the work and needs of the parties involved.

### WORK WITH CAMP

The CAMP Facility is ideally suited to demonstrate the viability of novel electrochemical systems using a minimum of materials and resources. Scientists and industries can study the results from prototype cells made in the facility to decide if they should invest their resources to carry the technology further.

In addition, often battery researchers have great ideas for an electrolyte, anode, cathode, or separator, but do not have the capabilities to develop the innovation.

For example, a researcher who creates a new type of cathode may not be able to make slurries, coat electrodes, assemble cells, and perform electrochemical testing to validate it—these needs can be provided by the CAMP Facility. The facility fills the gap that an individual organization may have to test their new battery idea.

The CAMP Facility provides test results and advanced battery materials to researchers around the world. Approximately 1000 sample electrode sheets from its Electrode Library and 100 prototype cells have been shared with battery researchers to aid in their studies. This service saves valuable resources for researchers that they can better direct to their specific studies.

Consider working with the CAMP Facility to explore your ideas, validate your findings, and share in the growing body of knowledge in advanced battery development. Contact [partners@anl.gov](mailto:partners@anl.gov) to find out more.

### FUNDING

This work is supported by the U.S. Department of Energy's Energy Efficiency and Renewable Energy, Vehicle Technologies Program under Peter Faguy and David Howell.

### CONTACT

**Andrew Jansen**  
CAMP Facility Project Lead  
Phone: 630-252-4956  
Email: [jansen@anl.gov](mailto:jansen@anl.gov)