“Deployment is a key consideration for energy storage. ORNL is focused on the spectrum of battery development from basic science to benchtop prototypes to working with industry to develop manufacturing capability for the next generation of energy storage.”

Ilias Belharouak, Electrification Section Head
Comprehensive Capabilities

**Raw materials discovery and evaluation**—Exploring advanced materials such as high-voltage ceramic oxides and silicon nanoparticles to improve solid-state battery energy density

**Characterization and testing**—Enabling in-depth materials investigation with neutron science, high-performance computing, high-resolution microscopy, microstructural and magnetic characterization, high-resolution chemical mapping, 3D surface profiling, and mechanical pinch testing

**Advanced simulation and modeling**—Speeding cell design prototyping by using advanced computational modeling and simulation to screen new battery materials, determine the effects of electrode-coating defects on cell performance, and develop accurate lifetime predictions

**Complete battery manufacturing and evaluation**—Integrating any component into a complete battery and analyzing how well it works and can be improved

**Scaled prototypes for market decisions**—Producing pouch cells up to 66x99x12 mm and 7Ah, large enough to make market decisions yet small enough to affordably demonstrate innovations

### Unique Facilities

**DOE Battery Manufacturing Facility**—Optimizing new materials and processes with scalable results at the nation’s largest open-access battery research facility

**ORNL Grid Research Integration and Deployment Center**—Simulating every aspect of the US power grid, from generation to energy storage to transmission and end use, including energy storage for vehicles and the grid

**DOE Spallation Neutron Source and High-Flux Isotope Reactor**—Hosting two of the world’s most powerful neutron sources for nondestructive, atomic-level investigation of new materials

**DOE Center for Nanophase Materials Science**—Providing leading-edge tools and expertise for interdisciplinary research at the nanoscale

**DOE Oak Ridge Leadership Computing Facility**—Hosting the nation’s fastest supercomputer, Summit, and the world-leading, upcoming exascale system, Frontier

**DOE National Transportation Research Center**—Accelerating development and deployment of advanced, efficient and secure transportation technologies for a decarbonized energy future

**DOE Manufacturing Demonstration Facility**—Driving the development of new materials, software, and systems for advanced manufacturing technologies for clean energy products