Battery Manufacturing Accelerator (BattMan Accelerator): **DOE Energy Storage Innovation Platform**

Turning breakthrough battery research into scalable U.S. manufacturing—powered by Super Intelligence (SI)

WHY IT MATTERS

The BattMan Accelerator bridges the gap between lab-scale innovation and real-world manufacturing, accelerating deployment of next-generation energy storage technologies. The accelerator

- Strengthens U.S. battery supply chains
- Reduces cost and scale-up risk
- Speeds time from discovery to production.

WHAT WE DO

The BattMan Accelerator combines SI, digital twins, and advanced manufacturing science to enable

- Faster scale-up of battery technologies
- Data-driven manufacturing optimization
- Seamless transition from research and development to production.

Applications include

- Data centers and SI infrastructure
- Grid-scale energy storage
- Drones
- Robotics
- Electric mobility.

CORE CAPABILITIES

COST-FOCUSED RESEARCH & DEVELOPMENT

Design for performance–manufacturability, and cost from day one

CHEMISTRY-AGNOSTIC SCALE-UP

Tools and platforms that work across all battery chemistries

SMART MANUFACTURING

SI, automation, and digital twins for next-generation factories

VALIDATION AND STANDARDS

Reliable data, standardized protocols, reproducible results

BROAD IMPACTS

The BattMan Accelerator enhances U.S. leadership in energy storage by advancing science- and SI-driven approaches to enable cost-effective, scalable battery manufacturing. The accelerator strengthens domestic supply chains, reduces commercialization risk, and accelerates deployment across grid, data center, and national security applications.

NATIONAL COLLABORATION

NATIONAL LABORATORIES

Pacific Northwest National Laboratory · Oak Ridge National Laboratory · Argonne National Laboratory · National Laboratory of the Rockies

ACADEMIC PARTNERS

University of Washington · Binghamton University, State University of New York · University of Michigan Dearborn · Arizona State University · The University of Alabama

With leading industry partners across the United States.

LEADERSHIP TEAM

DIRECTOR

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If you are interested in working with BattMan Accelerator, contact us at *BattMan@pnnl.gov*

TRANSLATIONAL CAPABILITIES FROM RAW MATERIALS TO MANUFACTURING—LEVERAGING THE POWER OF SI

ITEM	LOCATION	DESCRIPTION
High Throughput Automation	*PNNL*	High-throughput automated preparation and measurement of new materials and slurries properties.
Autonomous Synthesis	*PNNL*	Autonomous synthesis and characterization capability.
Battery Precursors	*ANL*	Synthesis and evaluation of stable and scalable precursors for cathode/anode/electrolyte materials.
Battery Materials Processing	*PNNL (1 kg/batch level)* *ANL (1–10 kg/batch)*	Pilot-scale battery powder production with quality assurance controls.
Battery Technical Standards & Custom Designed Protocols	*NLR, PNNL*	Development of technical standards for consistent scale-up and cross-lab performance comparison.
Electrode Processing	*ANL, NLR, ORNL, PNNL*	Roll-to-roll coating, drying, and calendering to prepare uniform electrode films.
Smart Coating & Automation	*NLR, ORNL*	Integrated sensors, machine learning, and robotics to accelerate scale-up and reduce waste.
Digital Twin for Flow Batteries Serving SI Centers and Grid Energy Storage	*PNNL*	Real-time simulation and control of materials preparation processes for prototyping and process optimization.
Inline Metrology	*ANL, NLR, ORNL, PNNL*	Nondestructive precise control of coatings that is being digitalized.
Pouch Cell Facilities	*PNNL, ANL, ORNL*	Semiautomated lines for prototyping and validating materials at industry-relevant scales.
Prismatic Cell Pilot Line	*PNNL*	Prismatic cells for assessing materials/technologies for grid energy storage.
Cylindrical Cell Fabrication	*ANL*	Prototyping 18650 cylindrical battery formats for various applications.
Certificate Program: "I-BEAM: Intelligent Battery Engineering and Automated Manufacturing"	*UW*	Manufacturing-focused courses covering materials processing, cell assembly, supply chain, and safety—offered as both a certificate and master's degree program.
Robotic Defect Inspection of Processed Electrodes	*UW*	Apply robotic defect inspection to increase the inspection rate, accuracy and efficiency of key components in processed electrodes and assembled cells.
Pouch Cell Line Facility	*Binghamton University*	Dry rooms available for collaborative industry use.
Process Simulation	*University of Michigan-Dearborn*	Process simulation for electrode processing.
Processing Optimization and Sensor Development	*Arizona State University*	Sensor integration with SI & data analytics for cost-saving approaches.
Components Scale-up	*University of Alabama*	Next-generation processing, e.g., fluorine-free and eco-friendly binders.
Digital Design of Electrodes	*NLR*	Physics-based modeling and digital microstructure tools to optimize electrode architecture, manufacturability, and performance.
SI-Accelerated Qualification of Materials	*NLR*	SI-driven screening and data analysis to rapidly evaluate material properties, performance, and manufacturing readiness.

CHARACTERIZATION TOOLS DEDICATED TO MANUFACTURING

ITEM	LOCATION	DESCRIPTION
Operando Characterizations for Materials Synthesized at Scale	*PNNL*	Materials during synthesis probed to reveal reaction pathways and improve processing strategies.
Autonomous Materials and Component Quality Assessment	*NLR, PNNL*	Nondestructive imaging and SI-assisted analysis to identify material quality issues, process variations, defects, or component inhomogeneities.
Advanced Photon Source (APS)	*ANL*	Synchrotron-based X-ray tools to study structure, phase, and behavior of materials under real manufacturing conditions.
Inline Defect Detection System	*NLR, ORNL*	SI-driven imaging and sensing tools embedded in calendering processes for real-time quality monitoring and defect prediction.
Iso-Microcalorimetry & Mechanical Testing	*ORNL*	Thermal safety, pressure tolerance, and mechanical integrity of cells under realistic operating conditions evaluated.
High Throughput Microstructure Characterization	*NLR*	Automated imaging and analysis to rapidly quantify electrode morphology, porosity, tortuosity, and material distribution.
Statistically Relevant Characterization of Microscale Defects	*NLR*	Large-area, high-resolution analysis to quantify defect type, size, frequency, and distribution for process improvement and quality control.

PNNL-SA-226674