SOLID ENERGIES

Battery Materials R&D Service

Advanced Li-ion battery materials, developed in America for aerospace and defense applications.

Service Overview: Material Solutions from Start to Finish

- Customized battery materials R&D (cathode, anode and electrolyte): tailored to your application and performance requirements, using standard or customized synthesis and controlled material modification. We combine materials science expertise and battery development capabilities in a structured, milestone-driven program, from initial concept and R&D through pilot production and large-scale manufacturing.
- Comprehensive development and testing: cost-effective materials development, microstructure analysis and electrochemical testing. We connect material properties with electrochemical behavior and cell-level performance to guide optimization for your application.
- Optimization and scale-up: we improve process cost, reproducibility and scalability, then scale synthesis from laboratory to pilot production, with a path to commercial manufacturing.
- High-throughput, AI-enabled materials discovery and optimization: SEI's proprietary platform combines parallel experimentation with AI/ML to accelerate battery materials development. Our scientists screen tens to hundreds of materials and formulations in parallel to identify promising candidates for your performance requirements.
- Collaboration and intellectual property: we align development plans and milestones with client objectives and provide regular progress updates. We support IP protection and patent filing, and adhere to NDAs to safeguard proprietary information.

Integrated Cell-Level Optimization

- A systems-level approach: SEI evaluates cathode, anode and electrolyte combinations to identify the pairing that best meets your KPIs:

  Energy Density | Power Density | Cycle Life | Safety | Fast Charging | Temperature Performance

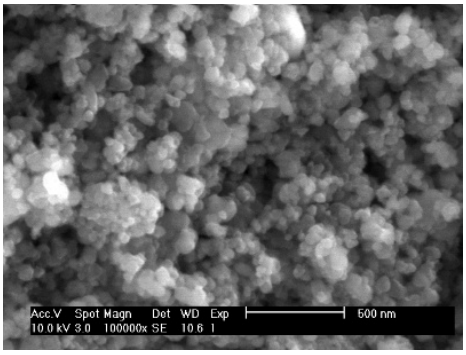
From Materials Innovation to Commercialization

- Our goal is to deliver a qualified, manufacturable materials solution with a clear path to commercial scale:

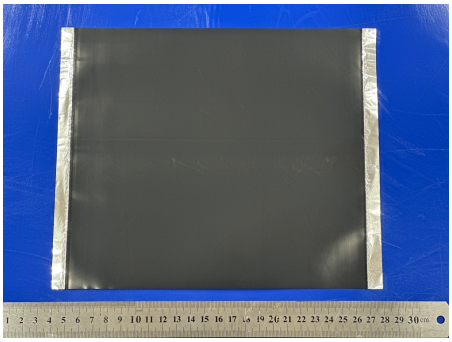
  Discovery → Formulation → Characterization → Electrochemical validation → Cell-level optimization → Pilot production → Scale-up → Mass manufacturing

Why Choose SEI?

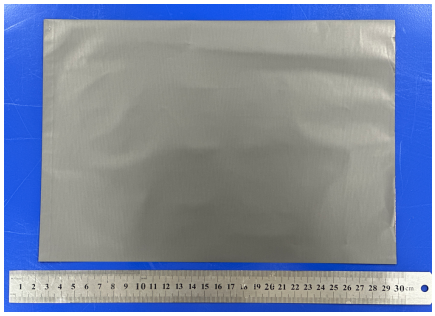
- Ranked #1 in overall proposal score for a California Energy Commission (CEC) grant on solid-state battery manufacturing (2022).
- Advanced Li-ion and Na-ion battery developer with 10+ patents and research funding from the U.S. DoD, DOE, NASA and CEC.
- R&D lab and pilot production line geared toward commercial manufacturing.
- Integrated battery solutions for military and civilian applications.



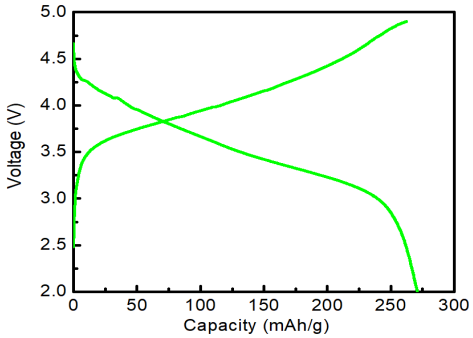
LMFP Cathode Materials



NCM 811 Cathode Layer



Gr–Si Anode Layer



Charge–Discharge Curves of LMR

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Materials R&D Service: Battery Materials — Service Details

Turnaround Times and Minimum Order Quantities

Service	Typical lead time	Minimum order	Notes
Custom cathode synthesis (lab scale)	4–6 weeks	100 g	Includes characterization
Synthesis scale-up (pilot scale)	6–8 weeks	10+ kg	After lab-scale qualification
Electrode coating sheets and rolls	4–6 weeks	1 pack (10 sheets) or 1 roll (5 m per run)	Single- or double-sided; specified loading
Characterization package	4–8 weeks	4 samples	Structure, morphology, electrochemistry
Coin/pouch cell samples and validation	4–8 weeks	4 cells	Rate, cycle life, temperature

Key Equipment and Facilities

Area	Equipment
Synthesis	Planetary ball mill; mechanical attritors (5 lb and 50 lb per batch); co-precipitation reactor; tube/box furnaces; spray dryer; warm isostatic processing.
Electrode coating	Mixer, doctor-blade and slot-die coaters, calender, slitter and vacuum dryer.
Characterization	XRD, SEM/EDS, particle-size and surface-area analysis, and TGA, with support from UC Irvine labs.
Cell build	R&D lab and pilot cell production line (2 MWh/year), using cathode/anode powders or coated electrodes with liquid, semi-solid or all-solid-state electrolytes.
Cell testing	Test stations for coin, prismatic, cylindrical and pouch cells (up to 50 Ah); EIS, charge/discharge, rate and cycle-life testing; temperature capability from −70 °C to 120 °C.

Quality

- Each milestone is planned, executed, documented and reviewed with clients. Deliverables include test methods and conditions, data packages, interpretation and agreed go/no-go criteria.
- Quality management: internal QA policies are being implemented with reference to ISO 9001 principles.

Case Studies

Solid-state lithium–oxygen cells (DOE ARPA-E PROPEL-1K, contract DE-AR0001913)
Challenge: a complete materials set for a rechargeable solid-state Li–O_2 cell. Approach: co-developed a polymer-composite solid electrolyte, graded porous gas-diffusion cathode, protected lithium-metal anode and layer-to-layer process. Result: validated in coin and pouch cells. Status: contract completed January 2026.

Low-temperature semi-solid-state battery (NASA STTR Phase II, contract 80NSSC26C0046)
Challenge: battery materials for extreme-temperature space applications. Approach: an advanced low-temperature polymer-composite electrolyte in a semi-solid-state cell. Status: Phase II contract awarded June 2026.

Low-cost solid-state Li-ion batteries (SSLiB) and energy storage systems for wide-temperature operation (California Energy Commission, contract EPC-21-039)
Challenge: low-cost, scalable manufacturing of **solid-state Li-ion batteries** for energy storage over a wide temperature range. Approach: a polymer-composite electrolyte and cell manufacturing compatible with existing Li-ion infrastructure. Status: commencement -- July 2022; completion -- December 2026.

Solid-state pouch-cell engineering **prototypes for defense companies**
Delivered solid-state battery prototypes to Airbus Defense and Space (February 2026) and Leonardo DRS (August 2026).

Contact for R&D Service Inquiries

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