

Service Overview: Material Solutions from Start to Finish

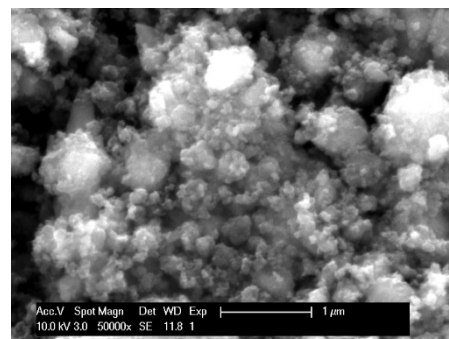
- SEI provides end-to-end anode materials R&D, from custom synthesis and formulation through particle engineering, coating, characterization, validation, and scale-up. Drawing on deep materials science expertise, we partner closely with clients to design anode solutions tailored to the demands of their specific applications.
- SEI expertise spans a wide range of anode chemistries, including graphite (Gr), silicon (Si), silicon monoxide (SiO_x), Si-Gr composite, Li metal, and newer advanced anode materials such as TNO, with solutions tailored for energy density, power density, cycle life, and safety.
- SEI works with battery developers and manufacturers to produce anode materials suited to their applications. We specialize in custom synthesis of hard-to-obtain compositions and in developing new compositions and particle morphologies.

SEI's Capabilities

- Tailored chemistries for specific applications.
- Particle size/shape control and surface engineering.
- New formulations and/or synthesis approaches.
- Process scale-up from lab to pilot/commercial production.
- Performance optimization.
- Materials characterization and analytical support.
- Coating and electrode development.
- Application-tailored solutions.
- Root-cause analysis and resolution.
- Rapid prototyping and delivery.

Why Choose SEI?

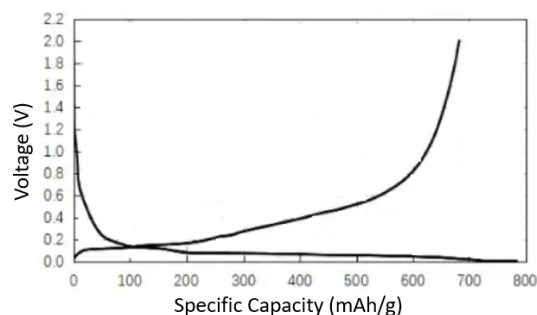
- Ranked #1 in overall proposal score for a California Energy Commission (CEC) grant on solid-state battery manufacturing (2022).
- Advanced Li-ion and Na-ion battery developer with 10+ patents and research funding from the U.S. DoD, DOE, NASA and the CEC.
- Industry-leading R&D lab and pilot production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



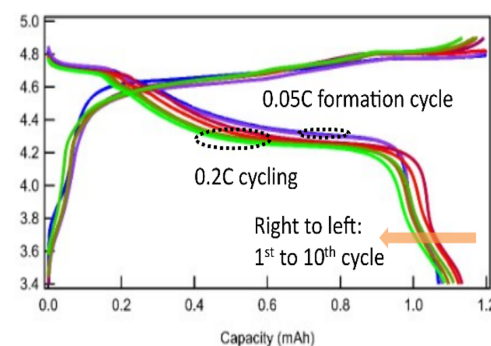
Si-Gr Nanocomposite Anode



Si-Gr Anode Layer



Charge-discharge Curves of Si-Gr



Charge-discharge Curves of LNMO/Si-Gr Chemistry

Materials R&D Service: Anode — Service Details

Turnaround Times and Minimum Order Quantities

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

Key Equipment and Facilities

Area	Equipment
Synthesis	Planetary Ball Milling, Mechanical attritors (5 lbs./batch and 50 lbs/batch), Co-precipitation reactor, Tube/box furnaces, Spray dryer, Warm isostatic processing.
Electrode Coating	Mixer, Doctor-blade coating and Slot-die coating machines, Calender, Slitter, Vacuum dryer.
Characterization	XRD, SEM/EDS, particle-size analyzer, surface area, TGA collaborated with UC Irvine Lab.
Cell Build	R&D lab and Pilot cell production line (2 MWh/yr) starting with cathode/anode powders or cathode/anode coated layers, using liquid electrolyte, semi-solid or all solid-state electrolytes.
Cell Testing	Battery testing stations for coin-cell and prismatic/cylindrical/pouch cells (up to 50 Ah); EIS, Charge-discharge, rate, cycling, and temperature (from -70 °C to +120 °C).

Quality

- Each progress/milestone is well planned, executed, documented, and closely communicated with customers, including testing facilities/procedures/conditions, data package, data presentation/interpretation, and go/no-go criteria.
- Quality management system and internal QA policy is well-established, similar to ISO 9001 that is in implementation.

Case Studies

Solid-state lithium–oxygen cells (DOE ARPA-E PROPEL-1K, contract DE-AR0001913)

Challenge: a full materials set for a rechargeable solid-state Li–O₂ cell. Approach: co-developed a polymer-composite solid electrolyte, a graded porous gas-diffusion cathode and a protected lithium-metal anode, plus a layer-to-layer process. Result: validated at coin- and pouch-cell level. Status: Contract completed Jan. 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 ongoing since June 2026.

Low-cost, wide-operating-temperature solid-state Li-ion battery (SSLiB) and SSLiB-based energy storage systems (California Energy Commission, contract EPC-21-039)

Challenge: low-cost, scalable manufacturing of **solid-state Li-ion battery** for wide-operating-temperature energy storage. Approach: a novel polymer composite electrolyte and cell manufacturing compatible with today's Li-ion infrastructure. Status: Status: commencement -- July 2022; completion -- December 2026.

Solid-state pouch cell engineering prototypes for prime defense companies

Delivered solid-state battery prototypes to (1) Airbus Defense and Space (Feb. 2026); (2) LEONARDO DRS (Aug. 2026)

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