Materials enabling breakthrough battery performance

Ampcera®

Ampcera Quarterly Update — **Q1, 2025**

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What's ahead

Ampcera

Dear reader,

As we step into 2025, Ampcera continues to advance its mission of delivering solid-state electrolytes for safe, scalable, and high-performance solid-state batteries. This quarter's momentum reflects strong execution across technology advances, manufacturing, business development and strategic partnerships.

We've made product development breakthrough on the nano sulfide solid electrolyte powders, expanded larger batch-scale powder manufacturing with increased consistency, advanced ASSB prototype roadmap and validated key safety milestones.

On the business front, we're deepening collaborations with Tier 1 auto OEMs and battery makers establishing relationships with defense partners and expanding our global visibility through major events— including CES, InterBattery, ARPA-E Summit, NREL IGF, IBS, and the DeepTech Showcase—alongside key partner engagements.

All of this reinforces our shared direction: powering towards a sustainable future.

Best regards,

ASSB cell prototype development and strategy

All-solid-state batteries (ASSBs) often rely on demanding conditions to achieve optimal performance, limiting their viability for widespread use in electric vehicles and consumer electronics.

Ampcera is addressing this challenge by engineering high-performance SSBs designed to operate efficiently under practical, real-world conditions—paving the way for scalable commercial adoption.

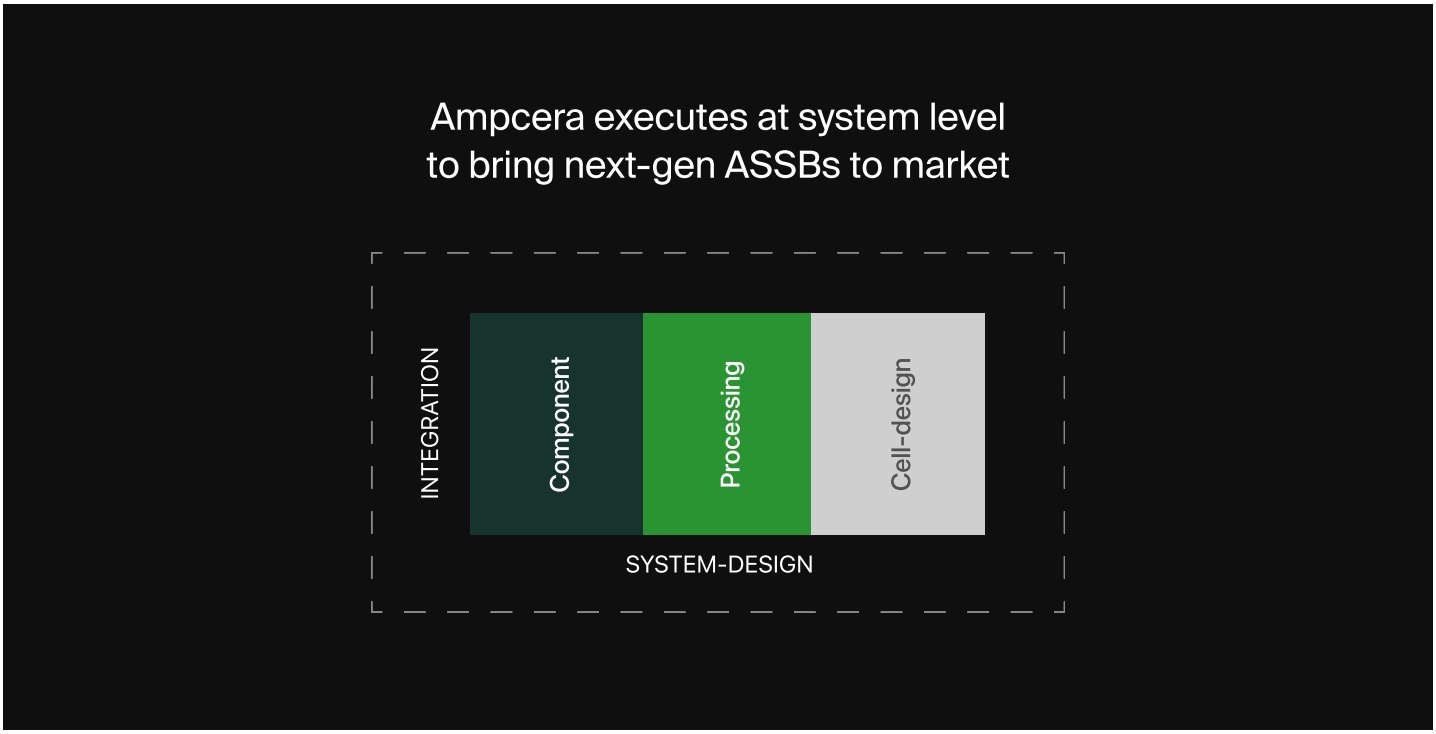
GENERAL PERFORMANCE

SSB generally delivers great performance at high stack pressure **(10-100MPa)** and elevated temperature **(45-90°C)**

AMPCERA'S CURRENT STATUS

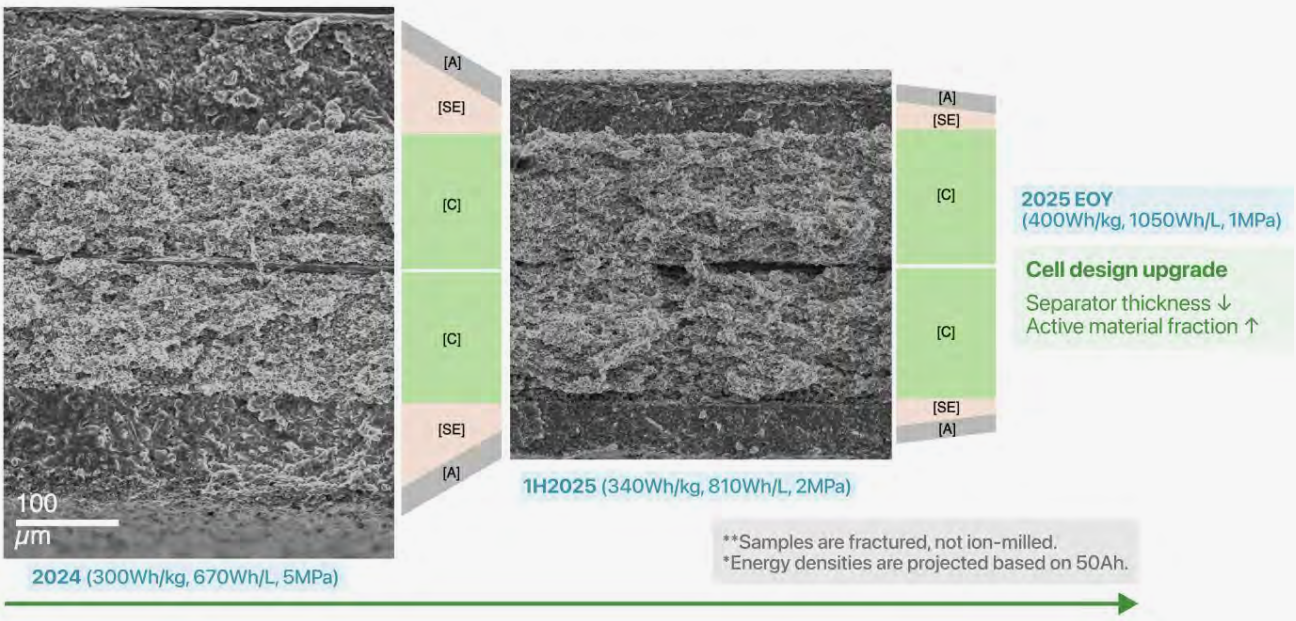
Developed high-performance SSB operating at low pressure **(≤2MPa)** and room temperature **(25-30°C)**

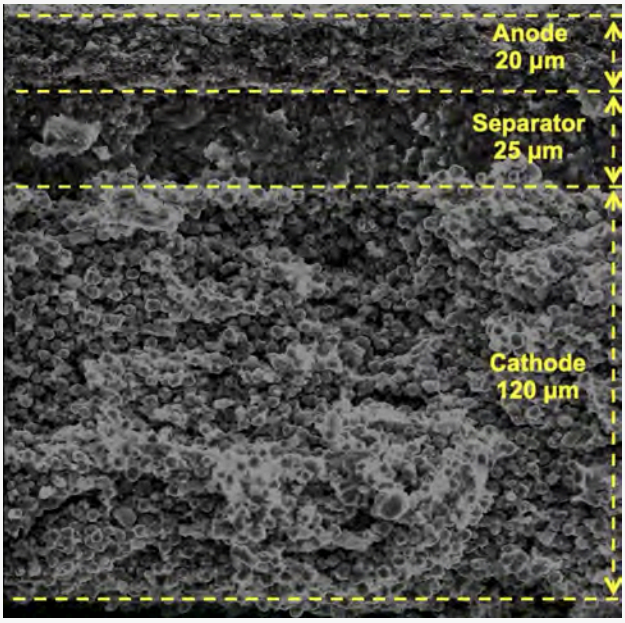
For this, Ampcera takes a system-level execution approach to bring next-generation SSBs to market, as shown in the second diagram, which integrates materials, processing, and cell engineering.

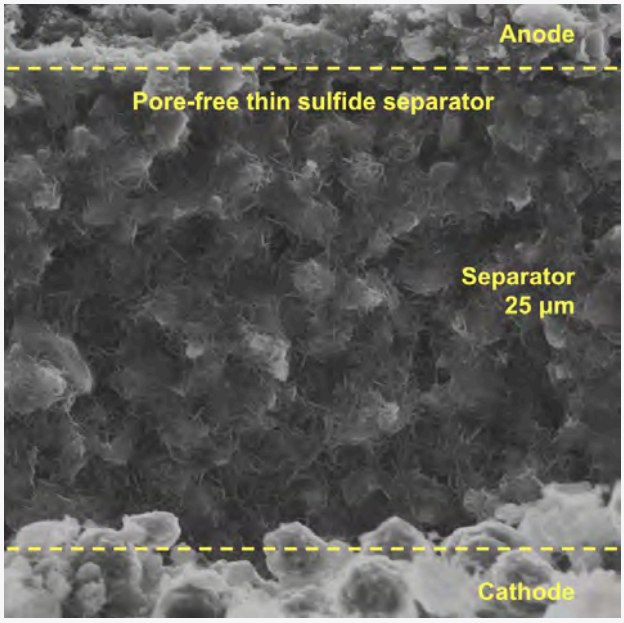


The cross-sectional images below show Ampcera's cell designs, which were built at our in-house facility and delivered to our partners in 2024 and 2025.

TECHNOLOGY UPDATES







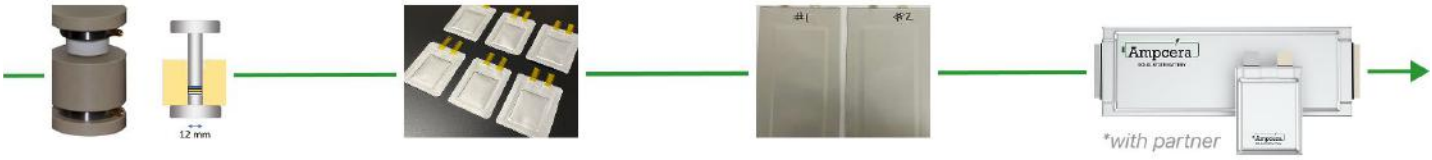
To achieve this, **Ampcera has identified cell chemistries and processing conditions that enable high-energy-density SSBs using its proprietary sulfide solid electrolyte**. This progress is captured in the accompanying diagram, which highlights the critical development levers across the **solid electrolyte, active material, electrode, separator, and fixture**. The Ampcera SSB development roadmap is also illustrated, outlining the steps toward commercial cell formats.

Ampcera has made significant progress in Q1, 2025 toward achieving stack pressure requirements below 2 MPa, which is best-in-class for >1 Ah ASSB (SSB) cells in the industry. Our current cell tests at 1 MPa are showing promising results, with a target of reaching 0.5 MPa by the end of this year, in line with performance benchmarks set by our automotive and consumer electronics partners.

TECHNOLOGY UPDATES

Strategic levers

SOLID ELECTROLYTE	ACTIVE MATERIAL	ELECTRODE	SEPERATOR	FIXTURE
• Particle size • Conductivity • Composition • Crystallinity • (Surface)chemistry	• Chemistry • Particle size • Morphology • Surface coating • Interface engineering	• Mixing method • Mixing sequence • Mixing ratio • Binder selection • Loading control	• Mixing method • Mixing sequence • Mixing ratio • Binder selection • Thickness control	• Fixture design • Pressure pad • Gasket



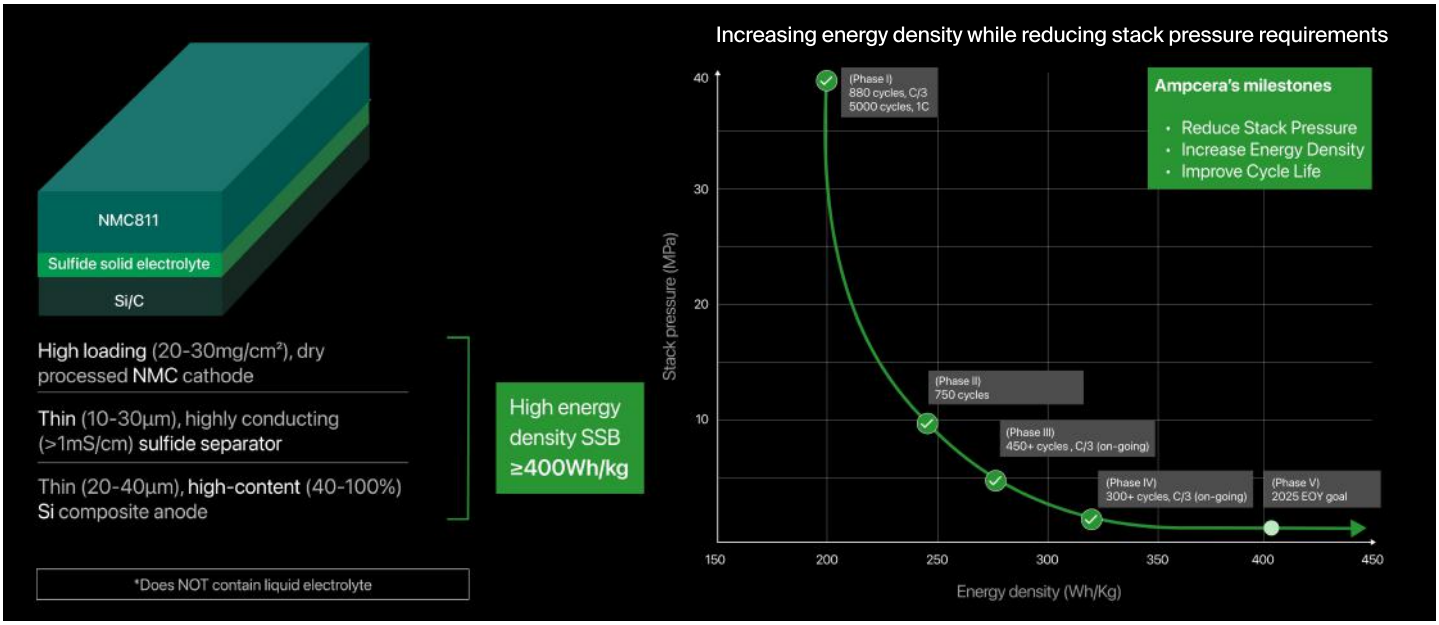
Material/Component

Multi-level optimization (material, electrode, cell, and system) to fine-tune cell performance.

System

Cell chemistries and processing conditions that enable high-energy-density SSB using Ampcera sulfide solid electrolyte has been identified.

Roadmap



All of this work leads to industry-leading performance: cycle life exceeding 1000 cycles at room temperature, energy density above 350 Wh/kg, and fast charging to 80% SOC in under 15 minutes, all while maintaining robust safety proven through nail penetration and scissors cutting tests.

Ampcera aims to achieve an energy density of 400 Wh/kg in its all-solid-state batteries.

TECHNOLOGY UPDATES

ASSB safety

Ampcera's ASSB cells have successfully passed critical safety evaluations, including the **nail penetration test** [1] and the **scissors cutting test** [2].

In both tests, **no severe flames or explosions were observed**, demonstrating the intrinsic safety advantages of Ampcera's solid-state cell design. These results are a strong validation of the thermal and mechanical robustness of Ampcera's solid electrolyte and full cell architecture.

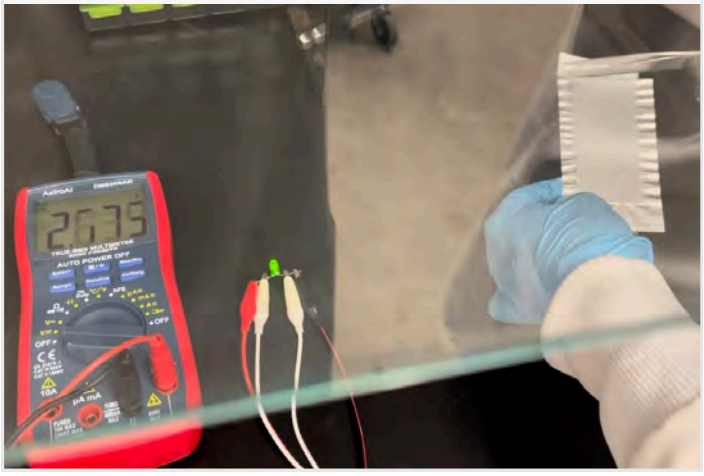
The **nail penetration test** simulates an internal short circuit by driving a conductive nail through a fully charged cell, assessing the risk of thermal runaway—a key safety concern for conventional lithium-ion batteries. The **scissors cutting test**, on the other hand, mimics mechanical abuse scenarios such as accidental damage or collisions that can crush or tear a cell. Passing both tests without violent reactions confirms that Ampcera's ASSBs offer significantly enhanced safety performance under extreme conditions.

These safety results are highly relevant for real-world applications and transferrable to larger-format cells. Ampcera is applying the same material systems and stack architectures to scale up its pouch cell designs beyond 1 Ah, while maintaining the same safety benchmarks.

The team is using a **modular development and validation approach**, ensuring that safety characteristics observed in smaller cells remain consistent as cell size increases. **This positions Ampcera's technology as a strong candidate for next-generation EV, aerospace, and consumer electronics applications where safety is paramount.**

[1] Safety demonstration test: **Nail penetration**

[2] Safety demonstration test: Scissors cutting



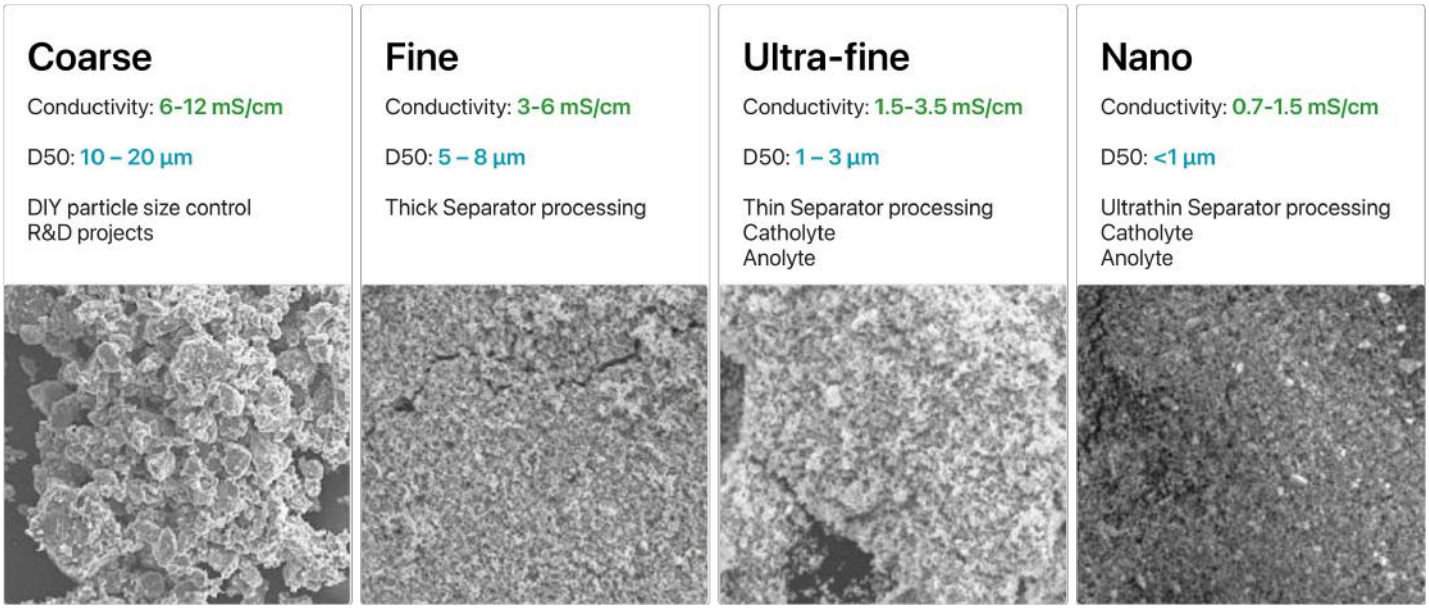
MANUFACTURING UPDATES

Delivering at Scale: Ampcera's solid electrolyte products and manufacturing expansion

Since 2021, Ampcera has been manufacturing and delivering a portfolio of over 30 solid electrolyte products to paying customers worldwide. These products serve a range of global clients advancing solid-state battery technologies. For more information about the full product portfolio, please contact us directly.

Among these offerings, Ampcera has four strategic sulfide solid electrolyte material sizes—Coarse, Fine, Ultra-Fine and Nano—that are gaining significant global traction. **Demand for these two materials is ramping rapidly from tens of kilograms to hundreds of kilograms in Q1 2025**, with multiple Tier 1 companies already confirming their demand volumes to be multiple metric tons per year. These materials are seeing increased interest from automotive OEMs, battery cell manufacturers, and consumer electronics companies.

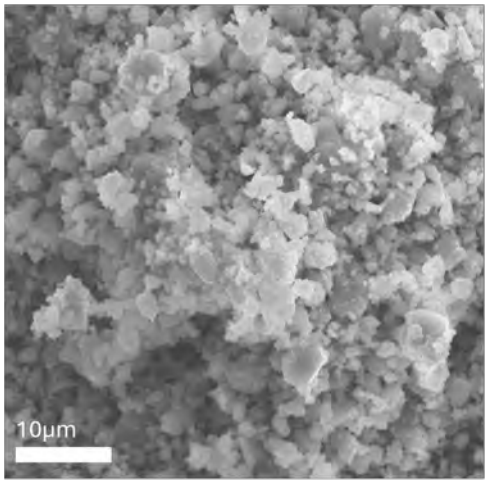
To meet this accelerating demand, **Ampcera is scaling its production capacity to 1 ton per annum from its existing line and 10-20 tons per annum from a new pilot line**, which is scheduled to be commissioned in the second half of 2025.



Ampcera's proprietary sulfide solid electrolyte is IP-protected

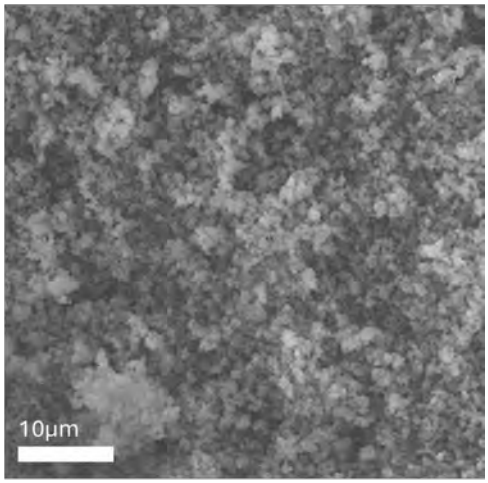
MANUFACTURING UPDATES

Ultra-Fine



D50	1-3 μm
Cond.	1.5-3.5 mS/cm

Nano



D50	<1 μm
Cond.	0.7-1.5 mS/cm

*Conductivity varies per composition and/or processing condition.

Fine-tuned sulfide electrolytes for high performance SSB

- Size
- Size distribution
- Conductivity
- Composition
- Crystallinity
- (Surface)chemistry

MANUFACTURING UPDATES

Advancing electrolyte manufacturing through Tier 1 partnerships and process precision

Manufacturing batch size: As we have reported before, Ampcera has scaled solid-state electrolyte production to 100+ kg batch size with 1-3% batch variation. Collaboration with Tier 1 partners has enabled Ampcera to achieve larger batch size, high-quality powder, and consistent production.

Newly acquired processing equipment for scale-up: 10-20 tons pilot production

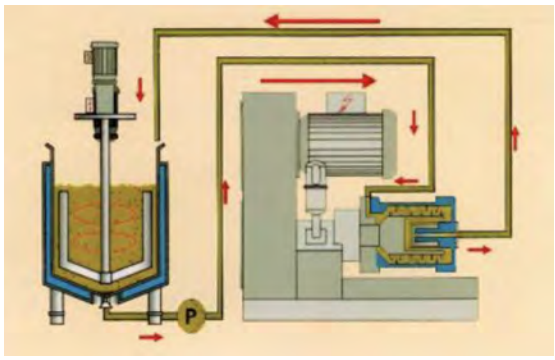
Equipment is installed and ready for operation

The large kiln will enable batch sizes of 100-200 kg to be processed depending on the electrolyte variant

The large milling system will allow 10-20 kg of material to be processed into ultra-fine (D50 of 0.8 – 1.0 µm) per hour

Kiln-Stage #3

Milling System-Stage #4



STAGE 1

Precursor procurement & quality validation

STAGE 2

Material preparation and homogenization

STAGE 3

Material processing

STAGE 4

Post-processing and particle size classification

STAGE 5

Material packaging and distribution

MANUFACTURING UPDATES

IPs and trade secrets driving Ampcera's commercial edge in solid electrolytes and ASSB technology

Ampcera has built a strong intellectual property portfolio with **over 50 patents (filed and granted) and more than 90 trade secrets** spanning critical aspects of ASSB (SSB) innovation—including materials, manufacturing, and cell design.

These patents are strategically classified into four major categories: **solid electrolytes, battery structure, battery processing, and battery performance.** In addition, Ampcera has secured rights of first refusal for 12 additional patent applications through Cooperative Research and Development Agreements (CRADAs) with leading U.S. national labs—nine with Pacific Northwest National Laboratory (PNNL) and three with Lawrence Livermore National Laboratory (LLNL).

Solid electrolytes

Solid Electrolyte Formulations [12]
Solid Electrolyte Design [7]
Upstream Applications for Solid Electrolytes [4]
Flow Battery Separator [1]
Shipping and Transporting Solid Electrolytes [1]

Battery structure

Separating Membrane [7]
Gradient Cathode [1]
Gradient Solid-State Battery Structure [1]
Hosting Layer for Lithium Dendrite Regulation [1]
Packaging Design for Heatable Battery [1]
Lithiated Anodes [1]

Battery processing

Solid Electrolyte Membrane Processing [7]
Solvent-Free Battery Processing [1]
Core-Shell Processing [2]
Additive Manufacturing for Structured Electrode [3]
Solid Electrolyte and Precursor

Performance

Integrated Heating for Fast EV Charging and Cold Weather Performance [3]
Non-Contact Heating [3]
Heatable Pressure Uniforming Layer [1]
Charging Station Technology in Combination with Fast Charging Solid-

The company's 90+ trade secrets are focused on two high-impact areas: **electrolyte production techniques and advanced battery manufacturing processes.**

This robust IP and trade secret portfolio is a key enabler for Ampcera to accelerate the commercialization of next-generation solid-state battery materials within the next two years. It not only protects core innovations but also provides Ampcera with a competitive edge in scaling technologies that meet industry demands for safety, energy density, and fast charging.

Together, these IP assets and proprietary know-how form the foundation for strategic partnerships, licensing opportunities, and long-term market leadership in the solid-state battery space.

Electrolyte Production Trade Secrets [57 and counting]

Ampcera's pilot-scale solid-state electrolyte production line has **57 trade secrets spanning its 5-stage manufacturing approach.**

Battery Manufacturing Trade Secrets [33 and counting]

Ampcera's pre-pilot solid-state battery manufacturing line has **33 trade secrets spanning five general areas.**

BUSINESS DEVELOPMENT UPDATES

Partnerships and joint technology development

Ampcera is actively collaborating with leading **EV OEMs, cell manufacturers, and consumer electronics companies** to qualify and commercialize its solid electrolyte technology for next-generation solid-state battery cells. These partnerships spanned early-stage evaluations to advanced prototyping, with the current focus on **co-developing high-performance, scalable cell designs** tailored to specific end-use applications. By aligning with customer requirements on performance, safety, and manufacturability, Ampcera is accelerating the path to market adoption and enabling the industrial transition toward safer, more energy-dense SSB solutions.

BD engagements with EV/CE OEMs and cell manufacturers

WE ARE HERE — Multiple rounds of sample testing ongoing

BUSINESS DEVELOPMENT PROCESS (JDAs scheduled for 2025)

* EVs4ALL ARPA-E program
** DOE Grant, VTO in collaboration with Shirley Meng

S. No.	Company name	Category	1 INTRODUCTION AND NDA	2 DEEP-DIVE DUE DILIGENCE	3 TEST AGREEMENT SIGN-OFF	4 SAMPLE TESTING ROUNDS	5 PURCHASE ORDER FOR ENGINEERING CELLS	6 COMMERCIAL JDA	7 COMMERCIAL OFFTAKE
1	OEM	EV					Planned	est. 2025	
2	Tier 2 Asian	Cell					Planned	est. 2025	
3	Tier 2 Asian	Cell					✅		
4	Big Tech North America	CE					✅		
5	Tier 1 North American	EV					✅		
6	OEM	EV		On-going					
7	Tier 1 Japanese	Materials		On-going					
8	Tier 1 North American **	EV				On-going			
9	OEM *	EV				On-going			
10	Tier 1 Japanese	EV		On-going					
11	Tier 2 Asian	Cell		On-going					
12	Tier 2 Asian	Cell		On-going					
13	OEM	EV		On-going					

The above partners have given us the following criteria when it comes to commercial offtake and JV

S.NO.	CRITERIA	DESCRIPTION
1	Cell technology and design know how	Innovativeness and technical performance of current and future SSE offerings
2	Fulfilment of technical requirements	• Meeting technical specifications and desired time-to-market agreements • Industrialization competence and knowledge of sourcing/quality standards
3	Delivery reliability and capacity	Access to secured capacity with flexible adjustments and the capability to supply specified volumes at designated times with consistent, high-quality output
4	Secured raw material supply	• Ensuring a resilient supply chain against shortages or price spikes. • Maintaining a transparent sub-supplier structure for responsible and sustainable sourcing.
5	Cost competitiveness	Efficient, optimal-cost development and production achieved through scale and streamlined processes
6	Production presence in EV production regions	Global footprint / extend of geographical coverage of major sales regions with OEM production proximity
7	Collaboration mode and differentiating services	Willingness to share knowledge and IP with joint efforts to enhance competitiveness and cost structures or fostering differentiating services, e.g., ecosystem offering

BUSINESS DEVELOPMENT UPDATES

Government grants

In Q1 2025, Ampcera secured two additional U.S. Department of Energy (DOE) grants and one Arizona state grant, further strengthening its public-sector support. Notably, the company received $1.8 million in second-phase funding from ARPA-E's EVs4ALL program, following successful 2024 reviews.

These awards underscore Ampcera's pivotal role in advancing next-generation solid-state battery materials and technologies and scaling domestic manufacturing capabilities.

MARKETING DEVELOPMENT

Ampcera's participation at six key industry events

In Q1 2025, Ampcera participated in six key events: CES, InterBattery, the ARPA-E Summit, the NREL Industry Growth Forum, the International Battery Seminar (IBS), and the DeepTech Showcase. These events allowed us to connect with industry leaders, deepen strategic collaborations, and highlight our continued progress in solid-state battery innovation and advanced manufacturing.

CES

January 7-10, 2025 | Las Vegas, NV

At CES 2025, a clear theme emerged: technology licensing is becoming a defining force in the EV battery landscape.

As battery systems grow increasingly complex, the strategic value of trade secrets, proprietary processes, and technical know-how is rising—mirroring trends seen in the semiconductor industry and reinforcing the importance of IP-led business models. This year's innovation spotlight shifted from EV form factors to the systems powering them. Companies like ProLogium, Lyten, and SES AI presented new chemistries, while Redwood Materials and Panasonic emphasized recyclability and domestic supply chains. Performance, manufacturability, and sustainability were core themes—closely aligned with Ampcera's approach to low-pressure, high-density SSBs.

Ampcera also held targeted discussions with ISU, E-Magy, and Tulip Tech, and began early dialogue with KPMG regarding Series B fundraising and future public market strategy—underscoring growing investor interest in the company's trajectory. **In light of this, Ampcera continues to focus on building full-stack cell solutions that involve heavy emphasis on not only technology development, but also building manufacturing solutions and establishing a robust supply chain**

Read more ↗

MARKETING DEVELOPMENT

ARPA-E Summit

March 17-19, 2025 | Washington, DC

One inference is that the Western approach to industrial innovation often focuses on leapfrogging Asian manufacturing dominance through “next-gen” solutions. However, achieving large-scale industrial innovation without a strong manufacturing foundation remains a fundamental challenge. Also, the U.S. and EU have largely moved away from low-value production, which historically supported high-value manufacturing. While AI-driven automation is a promising solution, widespread adoption still has a long way to go before fully addressing this gap. In light of this, Ampcera continues to focus on building full-stack cell solutions that involve heavy emphasis on not only technology development, but also building manufacturing solutions and establishing a robust supply chain.

Read more ↗

NREL IGF

March 26-28, 2025 | Denver, CO

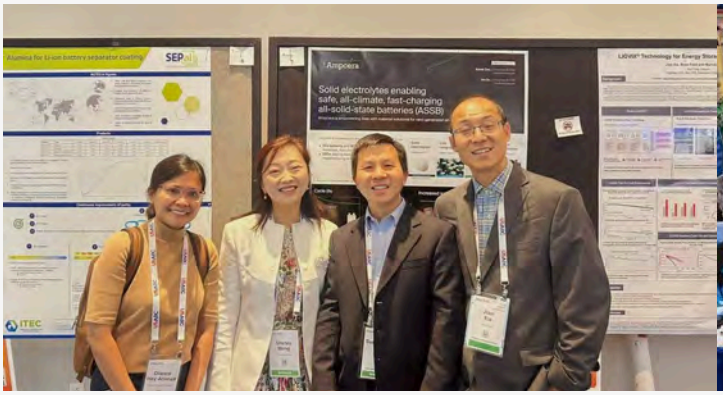
Some VCs claim U.S. start-ups are building over 100 domestic manufacturing facilities. Ampcera firmly believes that economies of scale cannot be achieved when numerous players are operating independently, each at a small output. There is still no Western counterpart to the Asian model represented by CATL, SVOLT, BYK, as well as Samsung, Panasonic, LG, and so forth. What's needed are a few companies producing on a massive scale, not hundreds of individual companies with varying sizes and business goals. **This is the reason the nation should focus on building the next-gen battery technology at scale within a defined timeframe and not reinventing the wheel by building techologies from scratch when its already a solved problem in the rest of the world.**

Read more ↗

MARKETING DEVELOPMENT

IBS Orlando

March 19, 2025 | Orlando, FL



Over the last decade, there has been a noticeable shift in how business is conducted in the West. Perception-driven valuation and quarterly financial speculation often take precedence over long-term value creation through great products and cost reductions. The lack of highly profitable U.S. tech companies (combining software with exclusive hardware ecosystems) beyond Apple and Tesla could be a reflection of this shift.

One problem we have repeatedly seen is the premature scaling of manufacturing before core technologies are fully validated. Battery start-ups are all investing heavily in CAPEX while still addressing fundamental science challenges. Most of these startups present an inflated view (very) of their TRL (& also ARL). Even after 10-15 years, most still lack conclusive validation that their technology is truly scalable and commercially viable. Misaligned early-stage metrics, while useful for attracting investors, can be self-deceptive in the long run.

In light of this, Ampcera takes a highly deliberate approach, choosing to work with Tier 1 companies and consistently incorporating their feedback to guide our development from lab to deployment. Ampcera's R&D is being tightly aligned with production and scale-up, and will be enabled by short IP cycles and fast iteration

Read more ↗

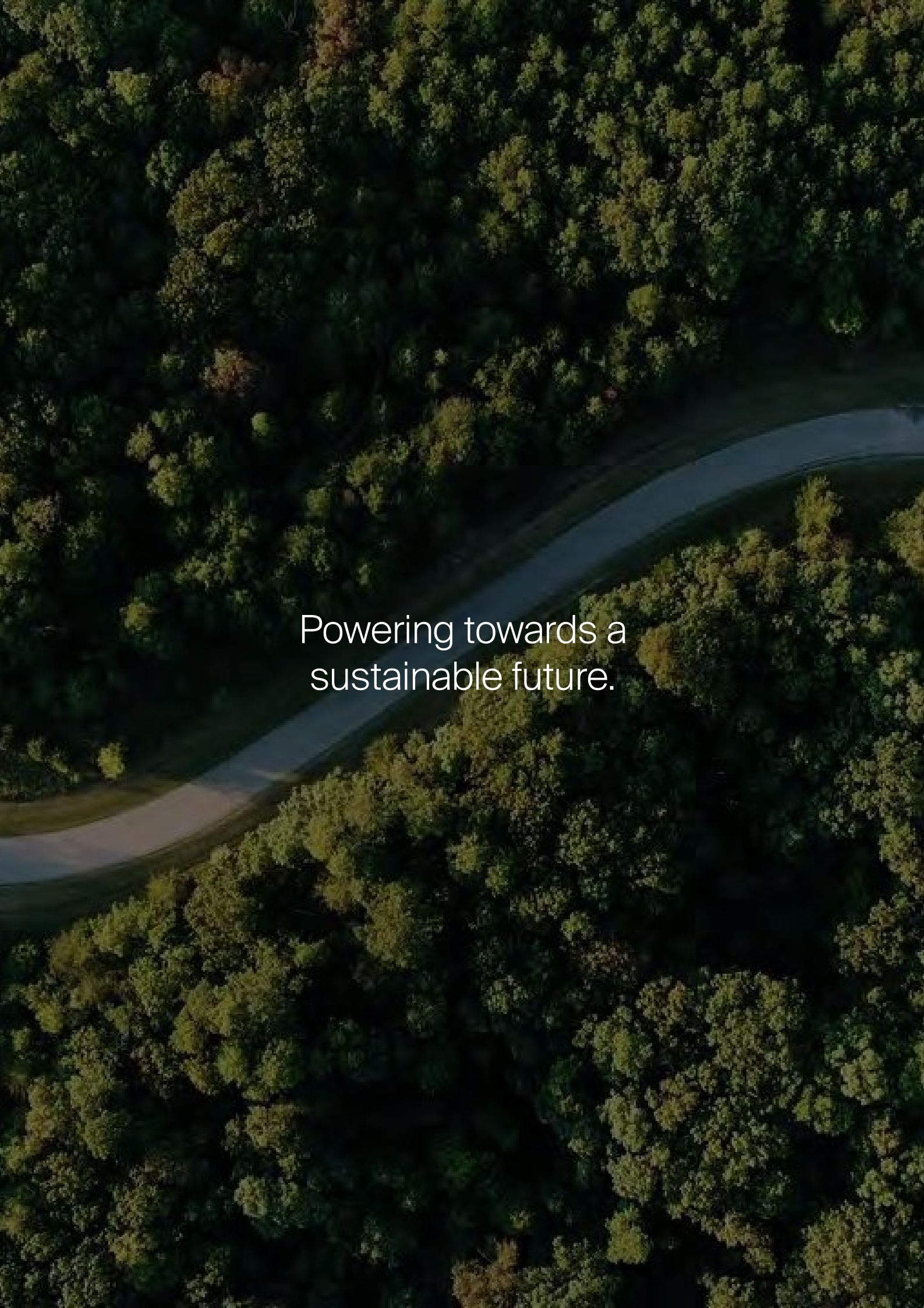
MARKETING DEVELOPMENT

Strengthening global partnerships for strategic growth

The Ampcera team recently traveled to Asia and Europe to engage with key customers and prospective partners, including major battery manufacturers, automotive OEMs and raw materials and equipment suppliers, with the goal of deepening strategic relationships across the battery value chain.

Extensive discussions with these industry leaders covered a wide range of topics - from technology development and product innovation to manufacturing scale-up, supply chain collaboration, and potential strategic partnerships such as purchasing agreements, MOUs, JDAs, JVs and investments.

The conversations also explored broader themes such as geopolitics, tariffs, policy trends, and risk management. Ampcera's unique position as a U.S.-based next-gen battery materials developer and manufacturer offers great opportunities for international companies to invest in the U.S. and collaborate with Ampcera to establish and expand their business and manufacturing footprints in the U.S. market.


Powering towards a
sustainable future.

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Empowering lives with material solutions for next-generation energy storage

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