SES | 10th ANNIVERSARY

10 YEARS OF LI-METAL BATTERIES
Technology, Supply Chain, and New Business Model



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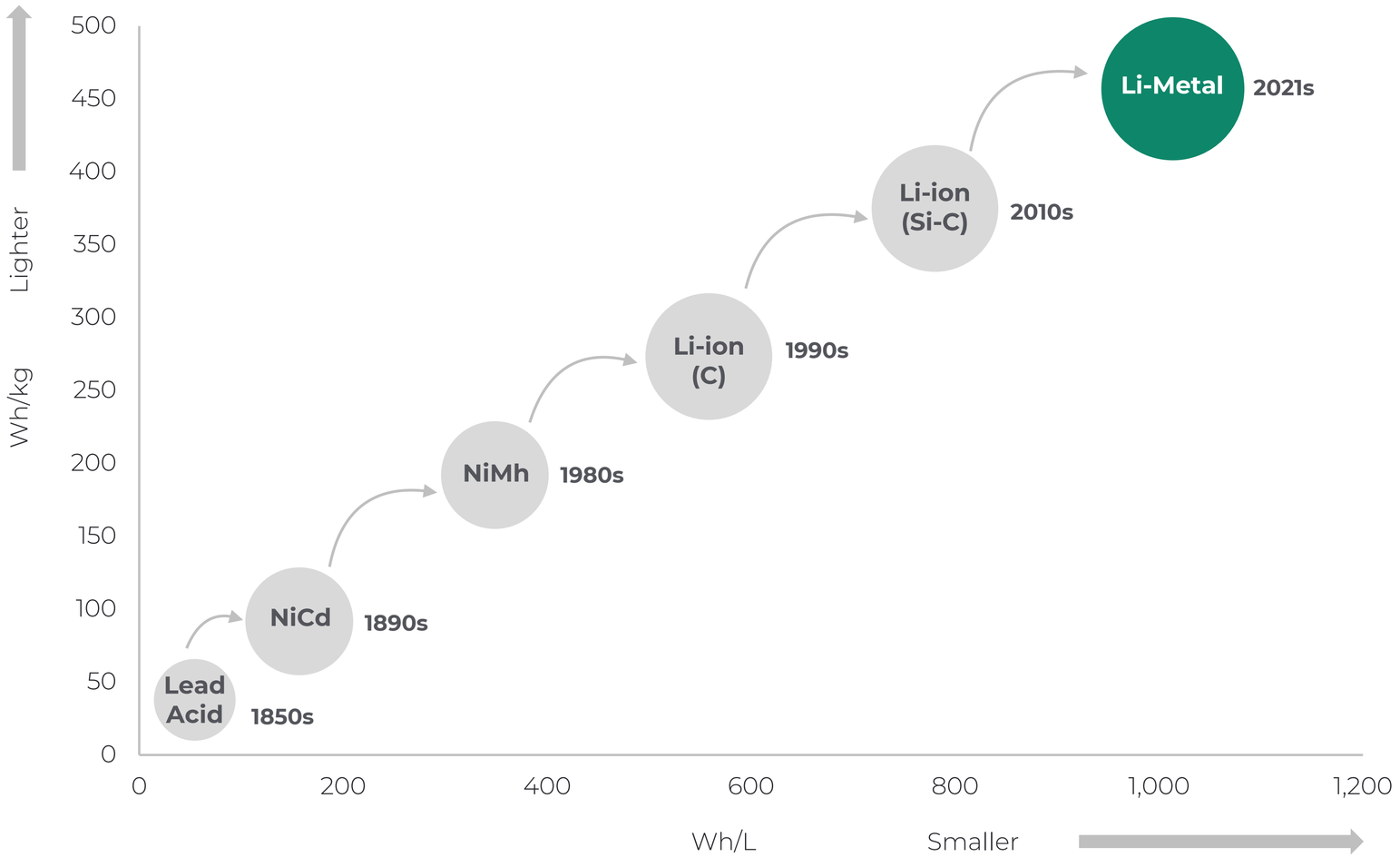
SES INVESTMENT HIGHLIGHTS

- Li-Metal Batteries with Leading Energy Density and Comprehensive Supply Chain Partners
- Manufacturing Approach Takes Advantage of Cost-effective Conventional Industry Processes
- A-Sample Joint Development Agreements in Place with General Motors, Hyundai, and Honda
- Collecting Data and Building AI Algorithms to Monitor Battery Health and Enhance Safety -- BaaS Opportunities
- Experienced Management Team with Decades of Battery Development
- Funded to Commercialization with $357MM of Cash on Balance Sheet as of 6/30/23

HISTORY OF BATTERIES



Winning Technologies Are Significantly Smaller and Lighter Than Their Precedents.

The future is not solid. It will be Li-Metal.

SES LI-METAL BATTERIES ARE



DENSER

Projected 400 Wh/kg and 1,000 Wh/L, leading to significantly longer driving range

SCALABLE

Designed to be manufacturable at scale using existing infrastructure and processes

LIGHTER

Ultra-thin Li-Metal anode reduces battery weight and production cost

SAFER

Proprietary electrolyte and AI algorithm greatly enhance safety

FASTER

Capable of 80% charge in less than 15 minutes

SMARTER

AI-powered algorithm optimizes performance

Superior Technology, Safety and Manufacturability

BACKED BY STRATEGIC INVESTORS & OPERATORS



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OUR TEAM



DR. QICHAO HU
Founder, Chairman & CEO

- Forbes 30 Under 30
- MIT Technology Review Innovators Under 35
- PhD in Applied Physics from Harvard and BS in Physics from MIT



ROHIT MAKHARIA
President
Chief Strategy Officer

- 19 years with General Motors
- 12 years in fuel cell and battery EV. Led battery cell development for Chevy Bolt
- 7 years at GM Ventures. Previously, Board Director of SES



JING NEALIS
Chief Financial Officer

- 18 years of finance experience, including at public companies
- Previously worked at View, SunPower, Shunfeng, Suntech Power and Deloitte



DR. HONG GAN
Chief Science Officer

- 25 years of battery R&D experience
- Key contribution in silicon-based Li-ion and Li-S technologies
- PhD in Chemistry from Uni. of Chicago and PostDoc from Uni. of Rochester



YONGKYU SON
Chief Technology Officer

- 20 years of cell and process development experience
- Responsible for Apple's LV battery, SKI's PHEV 20Ah and SDI's first 18650 cell launch



HANS KIM
Head Of Korea

- 30 years of experience in cross border corporate finance and capital markets in Seoul, Asia, US and UK
- Advised Korean blue-chip companies such as Samsung Electronics, LG, Hyundai, SK, Posco and Korean sovereign institutions



DR. WINSTON WANG
Head of China

- Managed battery R&D at DJI. Responsible for DJI's key drone smart battery and power systems launch.
- PhD in Mechanical Engineering from the University of Hong Kong.



KYLE PILKINGTON
Chief Legal Officer

- 16 years of international legal experience, including in capital markets, securities law, corporate governance and M&A
- Previously worked at International Game Technology, Sullivan & Cromwell, Gibson Dunn and Baker McKenzie



ERIC GOLDSTEIN
VP of Investor Relations

- Over 25 years of Wall Street experience analyzing the automotive industry as a sell-side research analyst and a professional investor while working at Bear Stearns, Salomon Brothers, and Shay Capital.
- Also served as VP of Investor Relations for auto supplier Magna International. .



RICHARD CHANG
VP of Business Development

- Previously held senior sales positions at prominent battery technology companies
- At CATL, held account management responsibility for BMW and VW

OUR FOOTPRINT

Boston HQ + Shanghai Giga + South Korea Positions SES to Realize Scale in Multiple High-Growth Markets

BOSTON HQ

- Chemistry, materials, algorithm R&D, deep learning
- Headquarters
- Finance
- Legal

SHANGHAI GIGA

- Manufacturing process development
- Cell, module, BMS R&D
- Pilot plant
- 1 OEM JDA

SOUTH KOREA

- Supply chain
- Customer relations
- 2 OEM JDAs
- Pilot plant





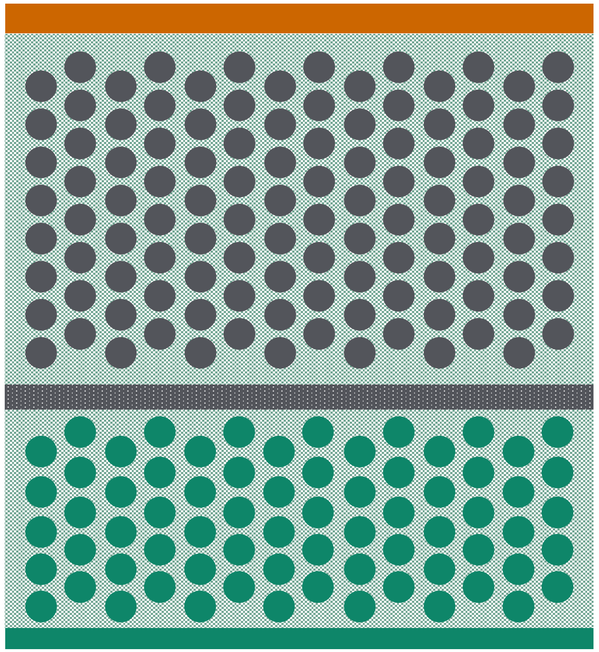
SES VS OTHER APPROACHES

Conventional Li-ion

Anode

Separator

Cathode



✗ Energy Density

✓ Manufacturability

All-Solid-State Li-Metal

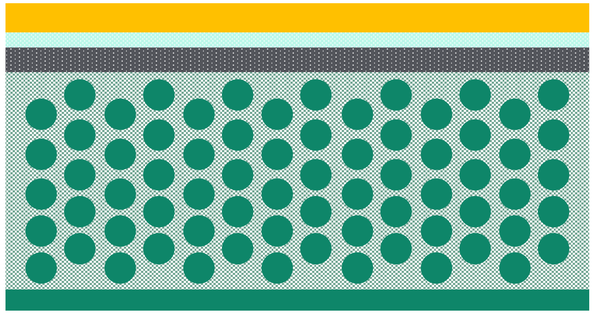
Solid-State Separator
Never Demonstrated at Scale

Solid-State Cathode
Never Demonstrated at Scale

✓ Energy Density

✗ Manufacturability

SES Li-Metal



✓ Energy Density

✓ Manufacturability

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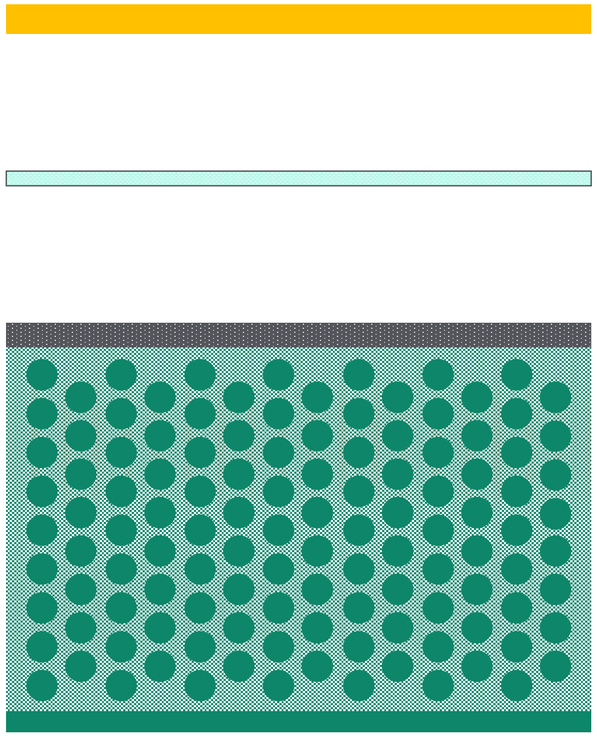
SES LI-METAL BATTERY TECHNOLOGY





Wide Format Li-Metal Anode

- Ultra-thin Li-Metal anode manufactured through a proprietary process

Composite Anode Coating

- Mechanical barrier to enhance safety

Polymer-Based Separator

- Highly manufacturable state-of-the-art separator

Solvent-in-Salt Liquid Electrolyte Formula

- Low-volatility and self-extinguishing

High-Capacity Cathode

- Highly manufacturable state-of-the-art cathode technology

Combined in a Proprietary Cell Design for Optimized Performance and Safety

INNOVATIVE AND PROPRIETARY ELECTROLYTE COMPOSITION

SES electrolyte uses a high concentration solvent-in-salt approach. A conventional liquid electrolyte is low concentration, where the salt is coordinated by solvent and there are free solvent molecules that are volatile and flammable. In SES's high concentration electrolyte, the solvent is coordinated by the salt and there are no free solvent molecules, and the solvent molecules are non-volatile and non-flammable.

Electrolyte Composition:

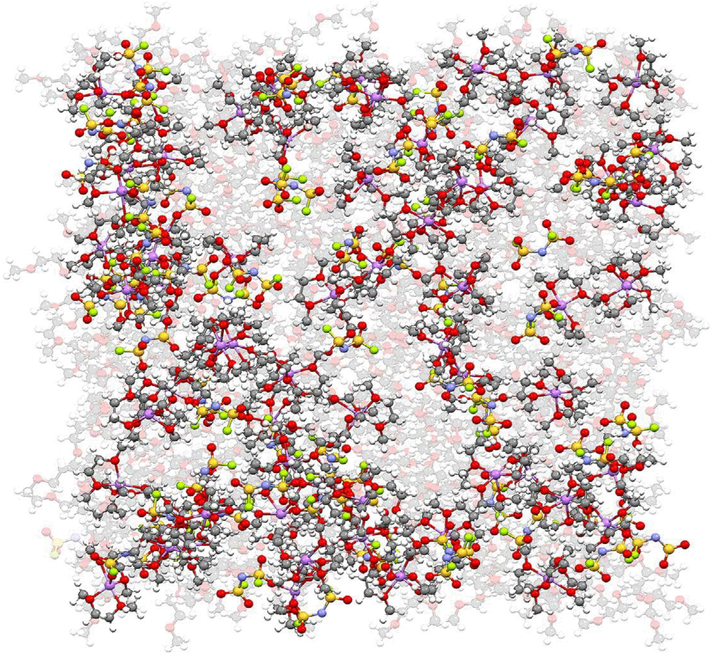
Salt: The main salt is LiFSI, with a proprietary purity profile and trade secret purification process

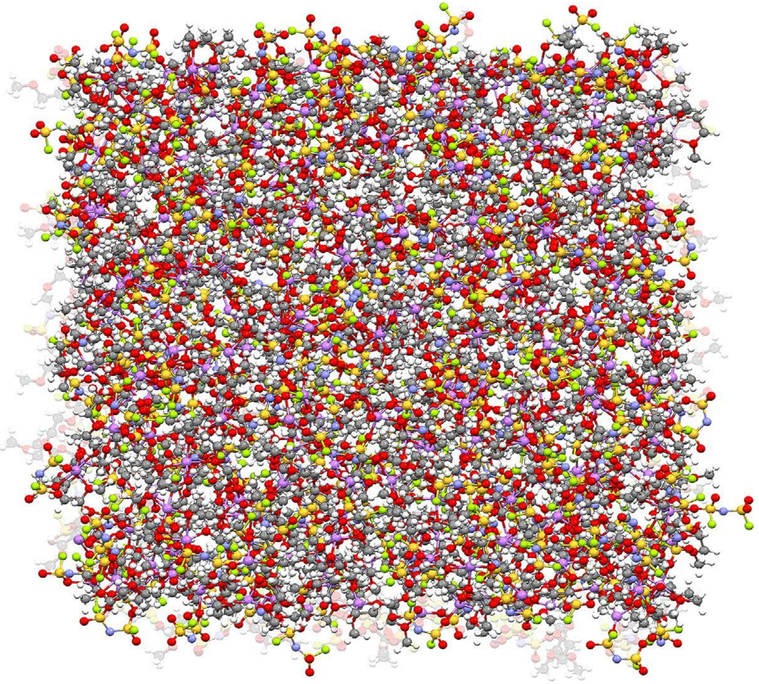
Solvent: Proprietary and patented solvent that SES designed and synthesized, not commercially available, and non-volatile and non-flammable

Additives: Proprietary/trade secret

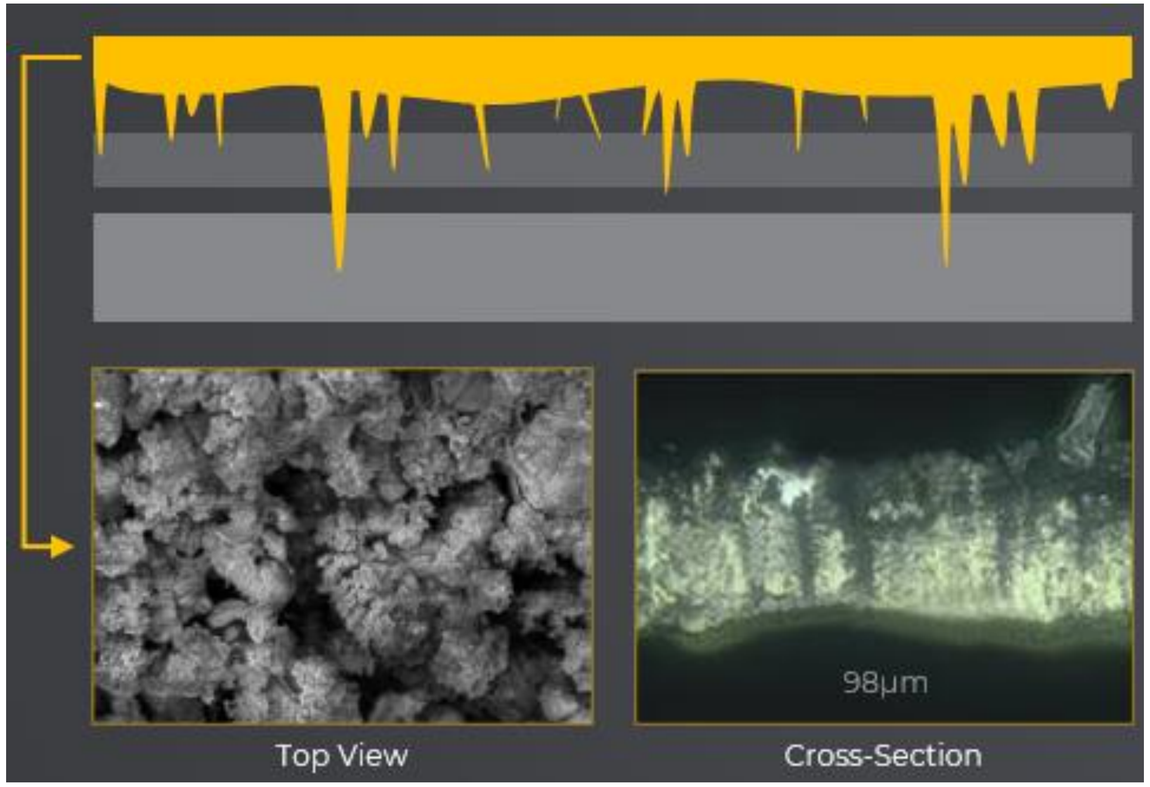
Low Concentration
Most solvent molecules are uncoordinated

High Concentration
Solvent almost fully coordinated
No free solvent





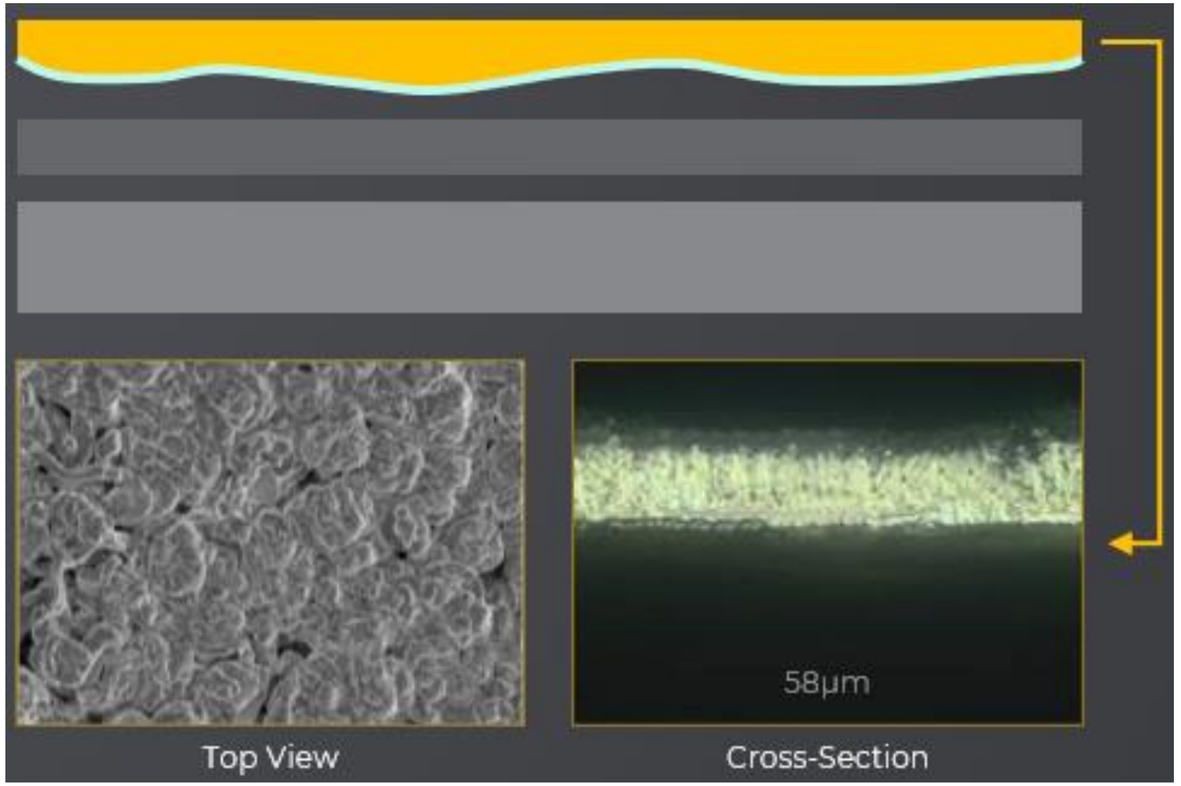
MOSSY LITHIUM NOT DENDRITES



Anode

Separator

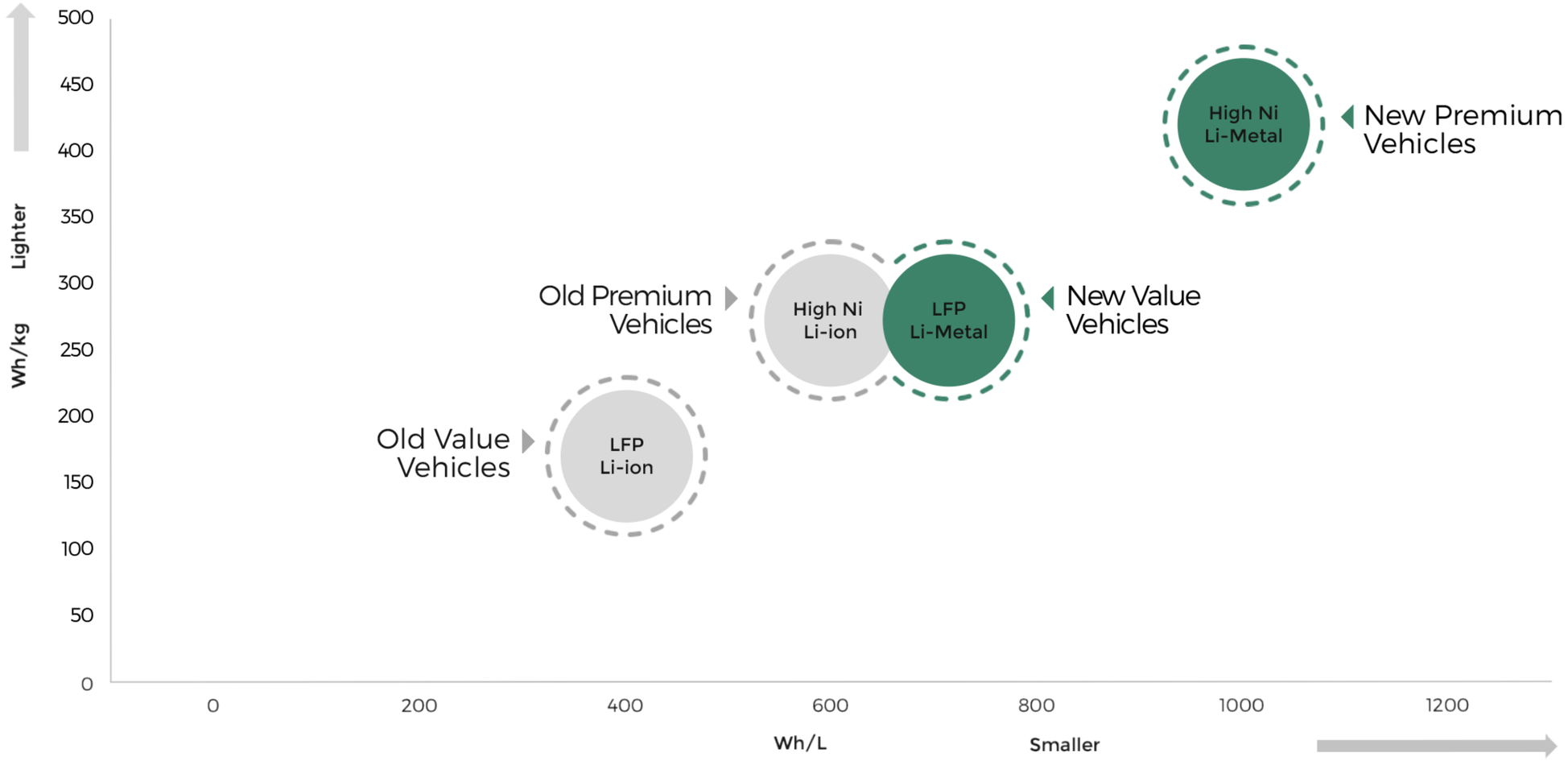
Cathode



CELL DATA COMPARISON FOR OUR LI-METAL CELLS

	Cell Type	*4.2Ah (25+ layer) at 25ºC*	*50.7Ah (16+ layer) at 25ºC*	*102.8Ah (32+ layer) at 25ºC*
Room Temperature (25℃) Energy Density	Low power C/20	>375 Wh/Kg	-	-
	Low power C/10	375 Wh/Kg (= 700 Wh/L at SOC 30%)	357 Wh/Kg (= 773 Wh/L at SOC 30%)	383 Wh/Kg (= 853 Wh/L at SOC 30%)
	Medium power C/3	-	342 Wh/Kg (=743 Wh/L)	Ongoing
	Medium power 1C	339 Wh/Kg	-	Ongoing
	High power 3C	-	303 Wh/Kg	Ongoing
	High power 5C	321 Wh/Kg	-	Ongoing
Low Temperature (0℃) Energy Density	Low power C/10	324 Wh/Kg	-	Ongoing
	Medium power 1C	298 Wh/Kg	-	Ongoing
	High power 5C	282 Wh/Kg	-	Ongoing
Lifetime (Ch-Dch)	C/10 – C/3	600 cycles (80% retention)	>200 cycles (Ongoing)	Ongoing
	C/6 – C/3	-	Ongoing	Ongoing
	C/5 - 1C	700 cycles (80% retention)	Ongoing	Ongoing
Fast Charging	Charge at 4C	80% in <15min	Ongoing	Ongoing
Safety	Thermal	Electrolyte is stable with Li above Li melting point	PASS TEST	Ongoing
	Nail Penetration	PASS TEST	PASS TEST	Ongoing
	Overcharge	PASS TEST	PASS TEST	Ongoing
	External Short Circuit	PASS TEST	PASS TEST	Ongoing
Certification		UN38.3	UN38.3, IATF16949	Ongoing
Manufacturability		Highly similar to Li-ion	Highly similar to Li-ion	Highly similar to Li-ion
Tested Operating Temperature		-30 ºC to 60 ºC	-10 ºC to 45 ºC	-10 ºC to 45 ºC

LI-METAL MAKES NICKEL FREE CHEMISTRIES COMPETITIVE



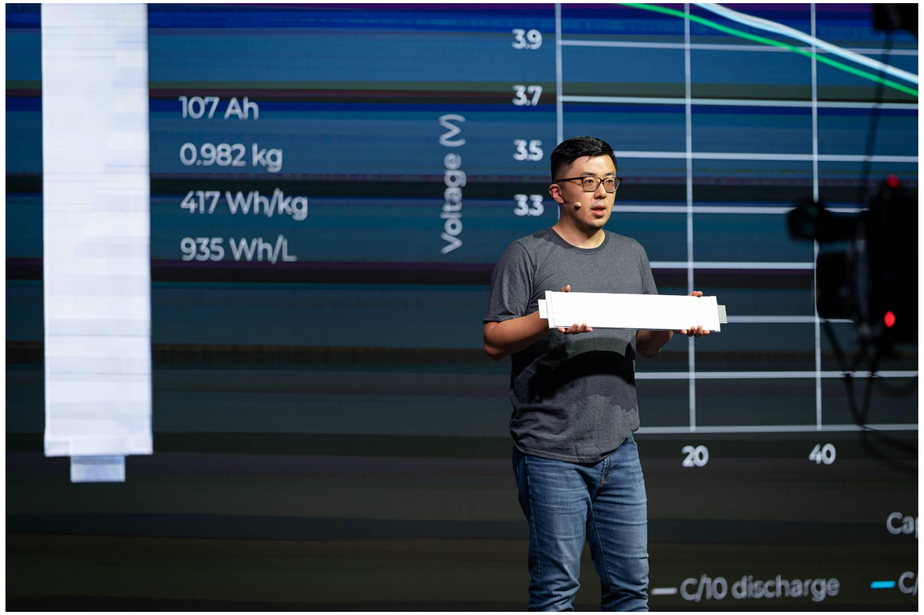
A-SAMPLE JDA WITH 3 WORLD-LEADING OEMS

- **$50MM+ JDA** (March 2021)
- **$60MM equity investment** (since 2015)
- **Joint pre-production facility** (going forward)
- **GM's CTO serves as a director on our Board**

- **JDA** (May 2021)
- **$50MM equity investment** (May 2021)
- **$50MM PIPE commitment** (June 2021)
- **Joint pre-production facility** (going forward)

- **JDA** (January 2022)
- **Largest single investor** in PIPE financing -- $75 million
- **6th major global car manufacturer** to invest in SES

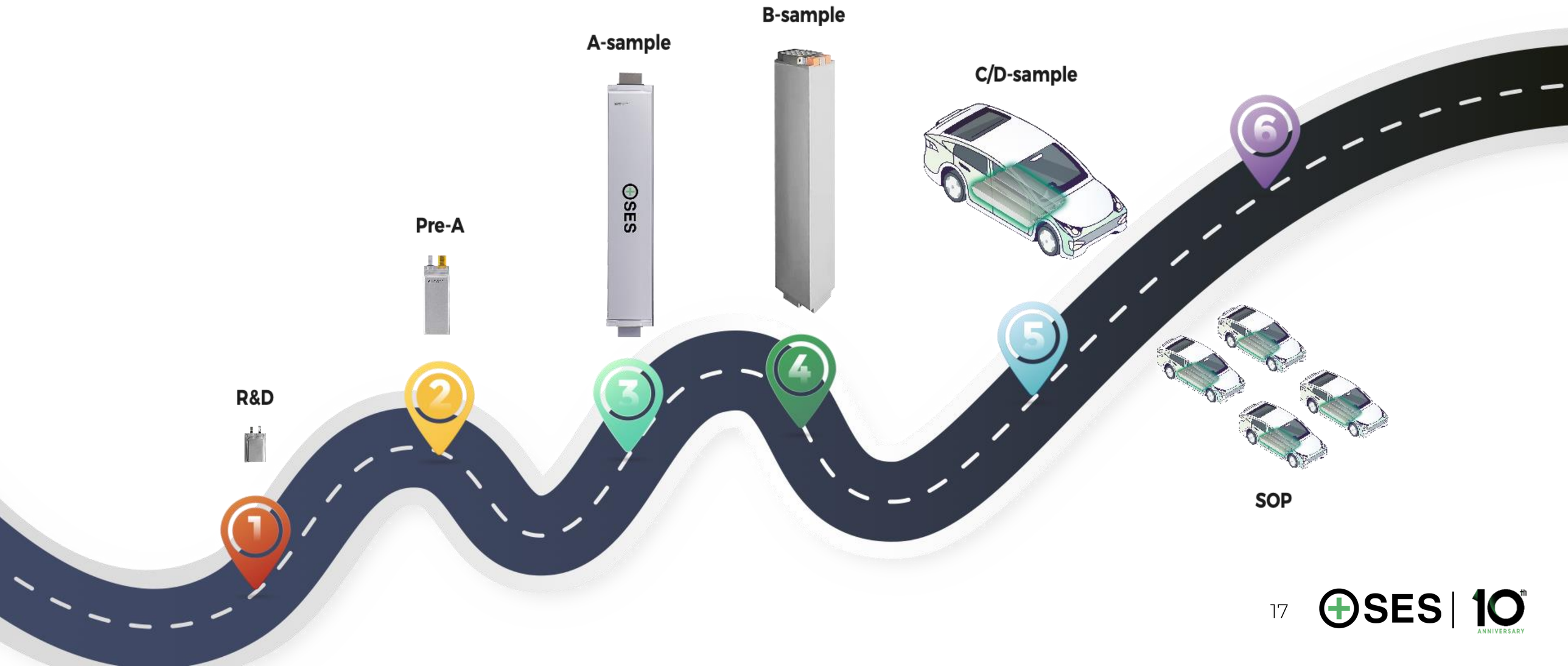
BATTERY WORLD 2021 – APOLLO™ INTRODUCED



a 107 Ah Li-Metal battery that is the largest in the world and a breakthrough for the automotive industry

107Ah	0.982 kg	417 Wh/kg	935 Wh/L

DEVELOPMENT OF AN OEM-READY BATTERY



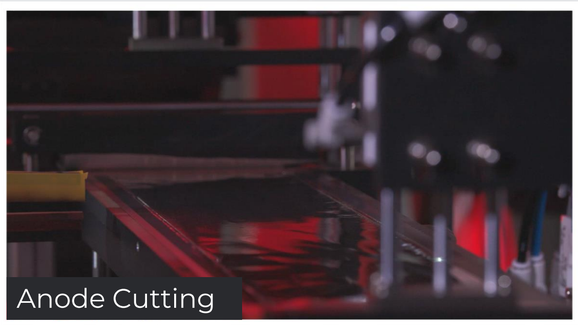
SES SHANGHAI GIGA

Line 1

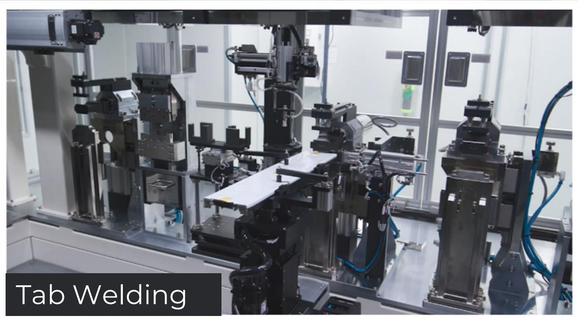
- Completion: **March 2022**
- Capacity: **1000 cells/month by year-end 2023**
- Production: **A-sample prototypes (from 50Ah to >100Ah)**

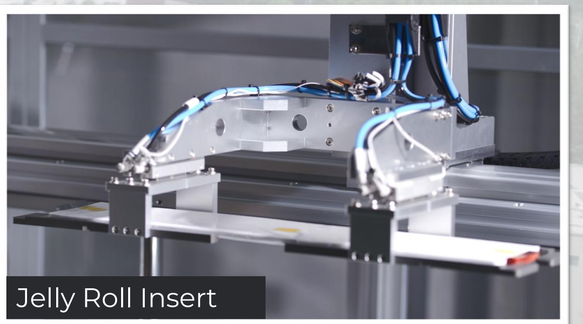
Line 4 and 5

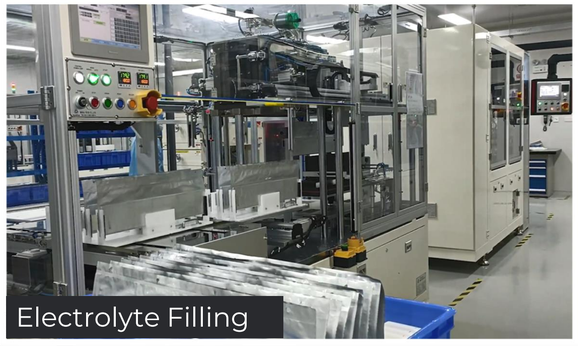
- Expected Completion: **1H24**
- Markets: **B-samples for EV & UAM**
- Capacity: **1000 cells/month/line**
- Size: **300,000 square feet**


Anode Cutting


Zig-Zag Stacking


Tab Welding


Jelly Roll Insert


Electrolyte Filling


Dry room

SES SOUTH KOREA

Line 2 and 3

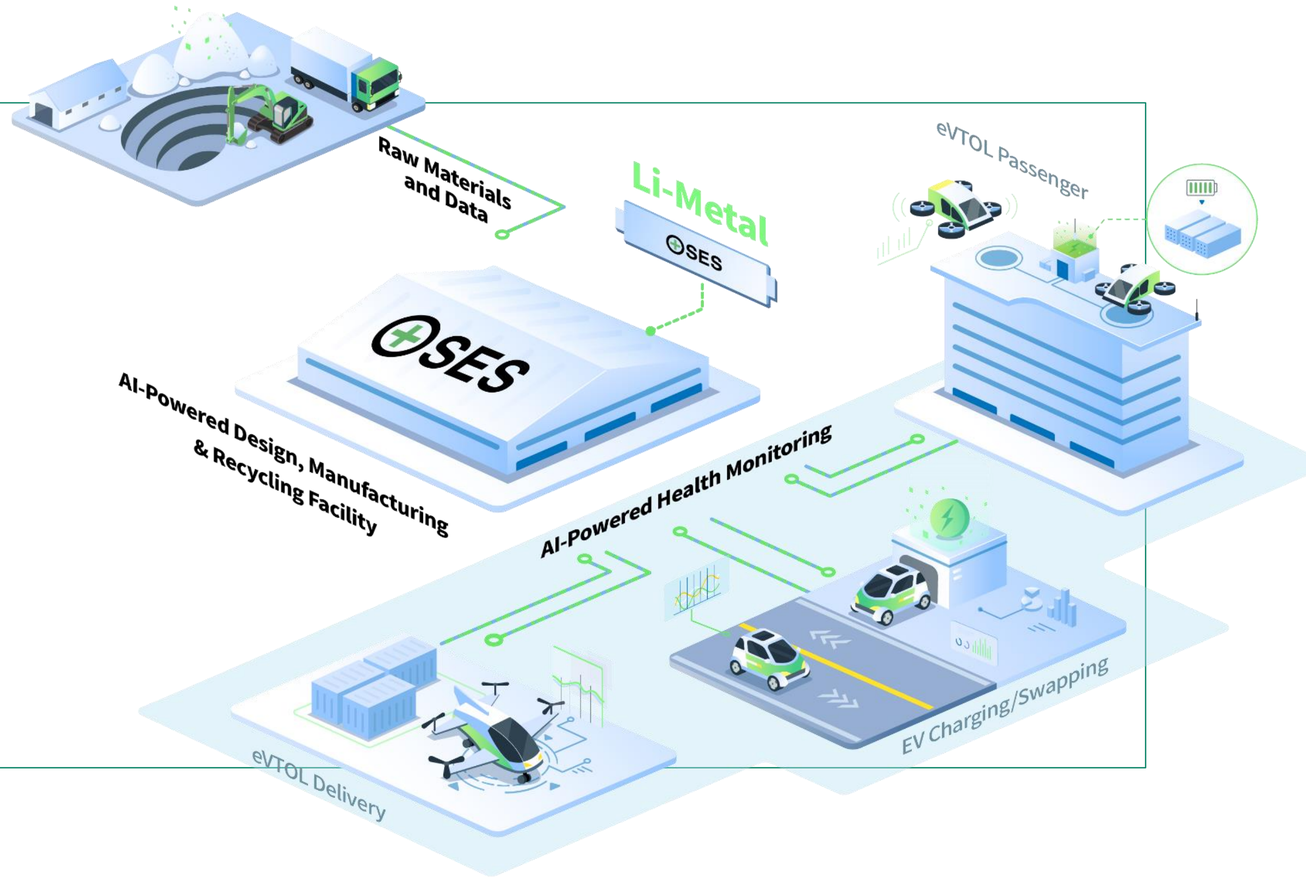
- Completion: **September 2022**
- Capacity: **1000 cells/month/line by year-end 2023**
- Production: **A-sample prototypes (from 50Ah to >100Ah)**
- Customer**: Supports 2 JDAs**



PLATFORMS FOR BATTERY DEVELOPMENT - AVATAR

AVATAR – Mine-to-Men AI Software

- From mine to manufacturing to in-vehicle use and recycling
- Integral to monitoring battery health & end of life use
- Data will support new Battery as a Service (BaaS) models



PLATFORMS FOR BATTERY DEVELOPMENT - AVATAR

Avatar accuracy:

>99%

(Hermes training since 2019)



Avatar accuracy:

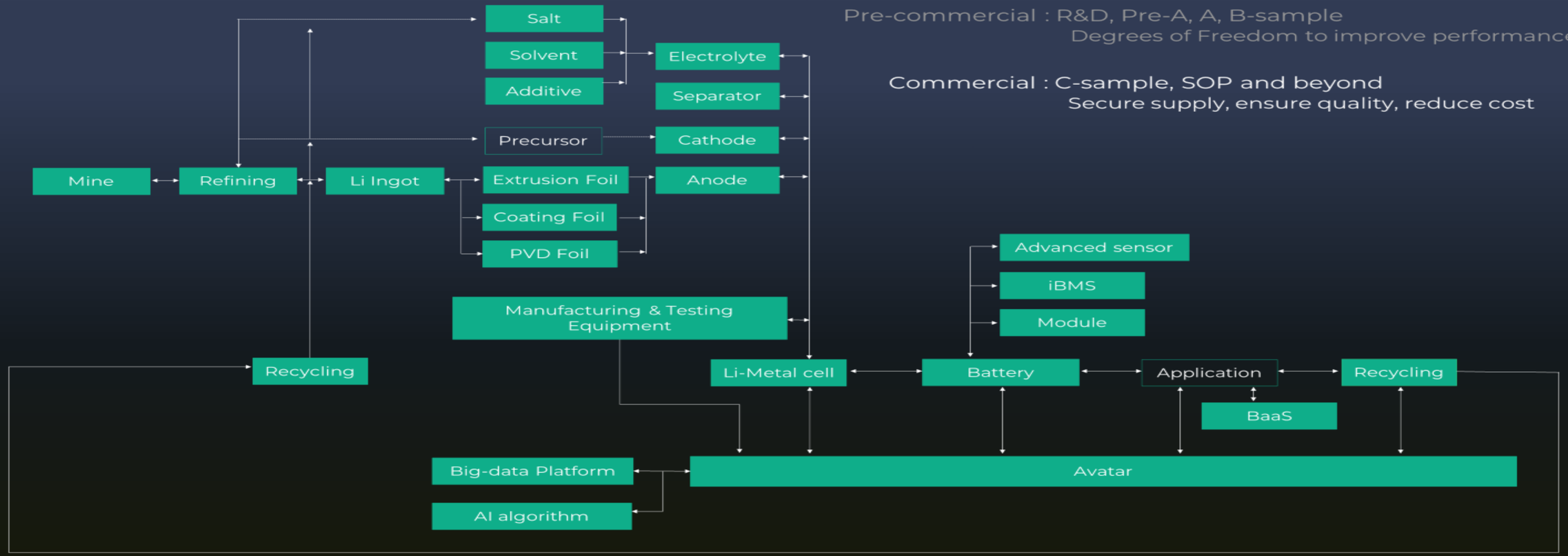
~60%

(Apollo training since 2022)



SUPPLY CHAIN – THE FUTURE OF LI-METAL / LI-ION

next



Pre-commercial : R&D, Pre-A, A, B-sample
Degrees of Freedom to improve performance

Commercial : C-sample, SOP and beyond
Secure supply, ensure quality, reduce cost

MILESTONES & 2023 FINANCIAL GUIDANCE

- **Targeted Milestones by Mid-2024**
    - Transition to B-samples
    - Establish a robust cell engineering, manufacturing, and quality platform
    - Improve Avatar safety prediction algorithm

- **2023 Financial Guidance**
    - Capital expenditures in the range of $50 - $70 million
    - Cash used in operations in the range of $80 - $100 million
    - Total cash used in the range of $130 - $170 million

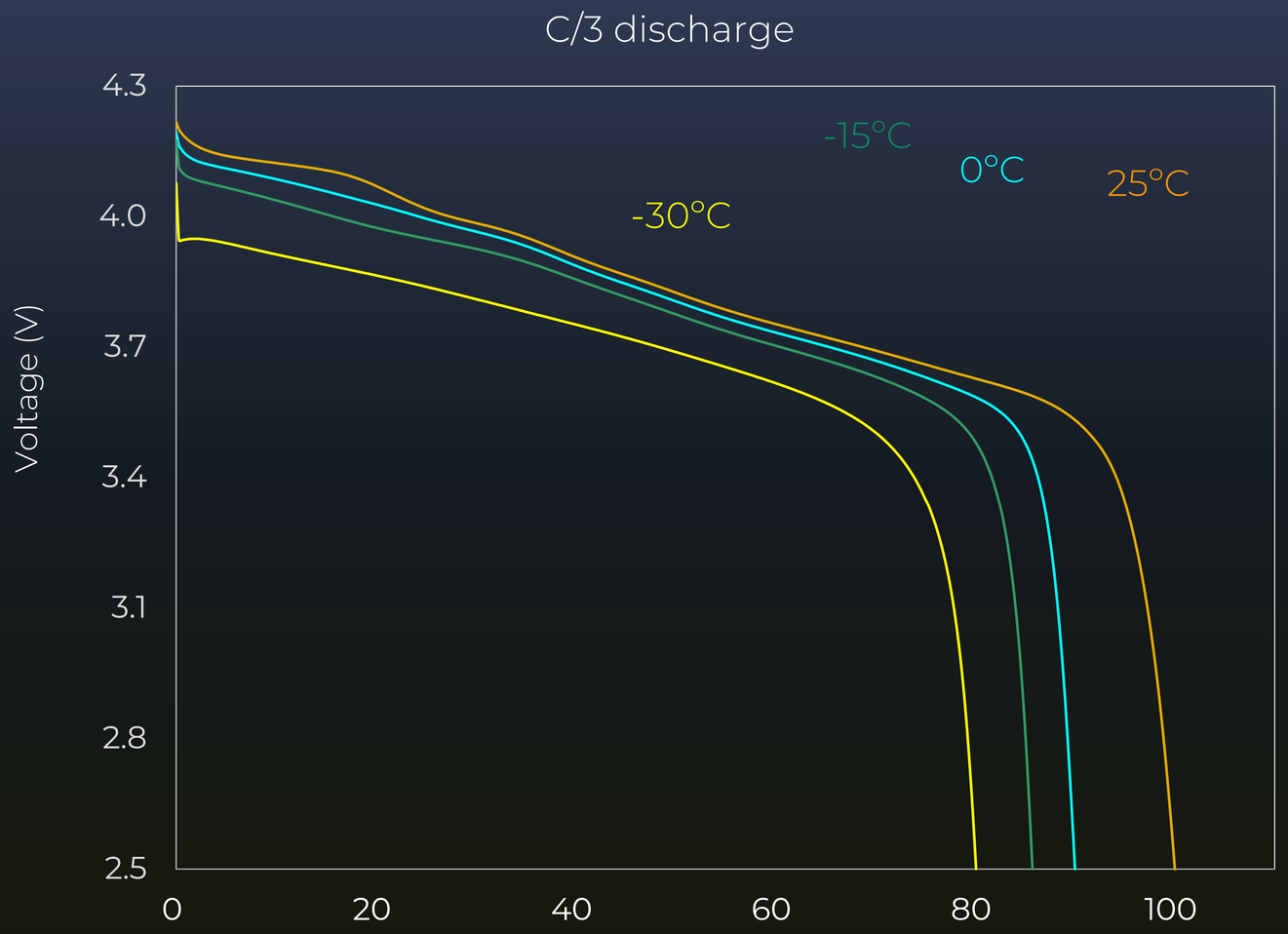
Note: Milestones and financial guidance provided on August 8, 2023

APPENDIX:

PERFORMANCE – 50 AH CELL



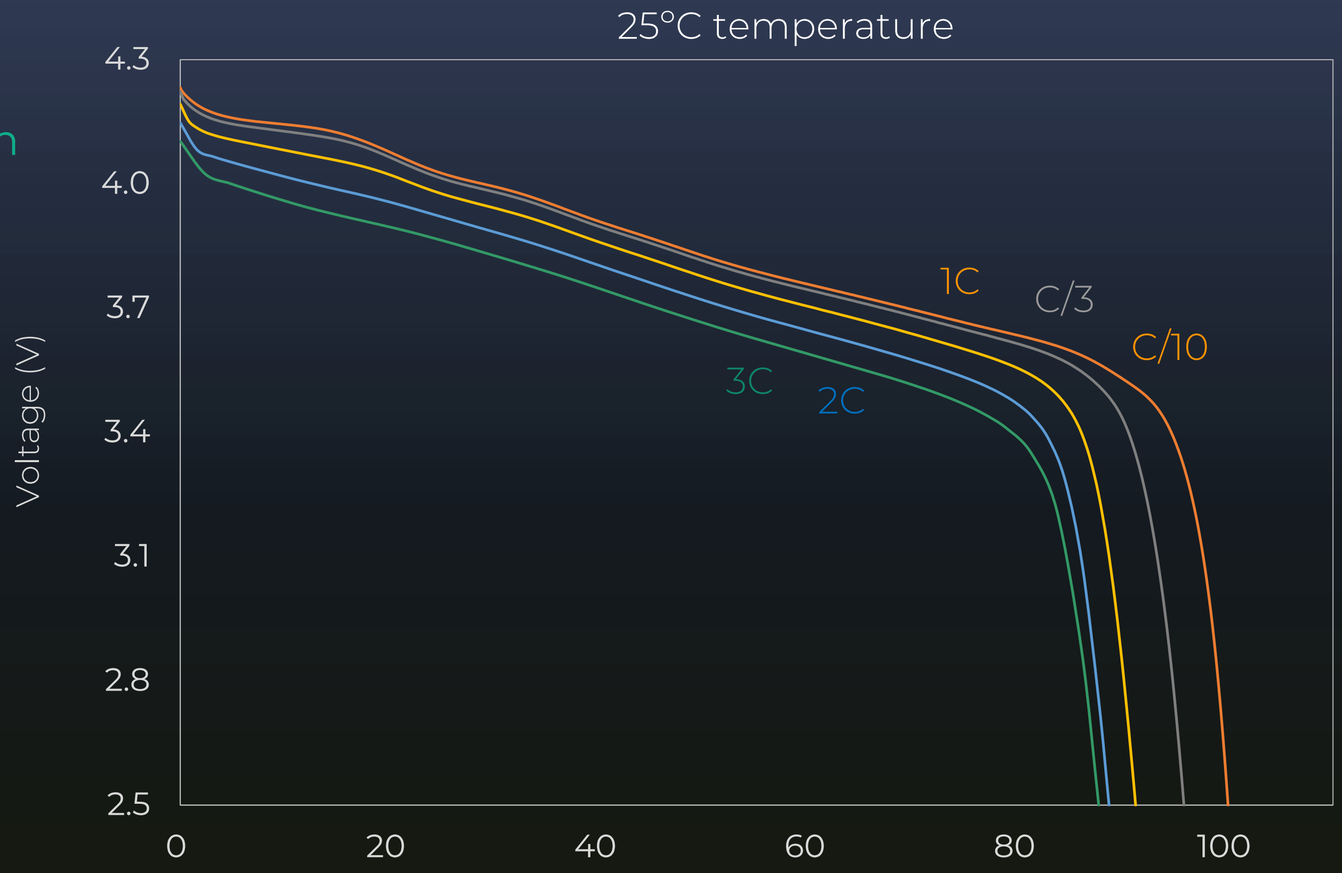
Excellent performance in cold weather climates



PERFORMANCE – 50 AH CELL



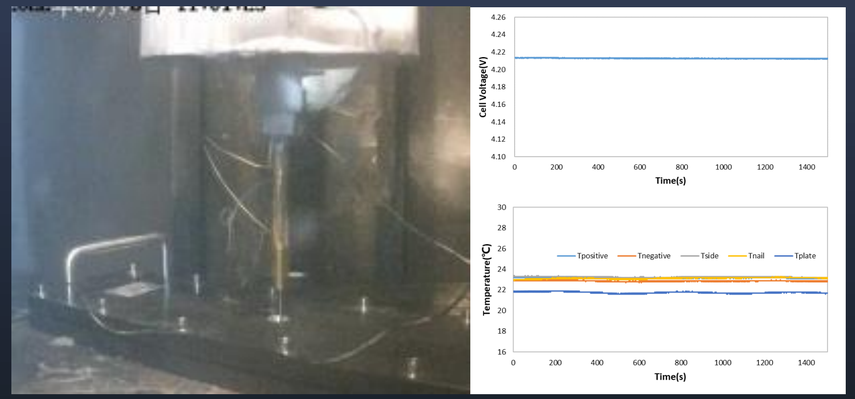
Excellent performance in high power discharge



SAFETY DATA – 50 AH CELL FROM 3RD PARTY TESTING

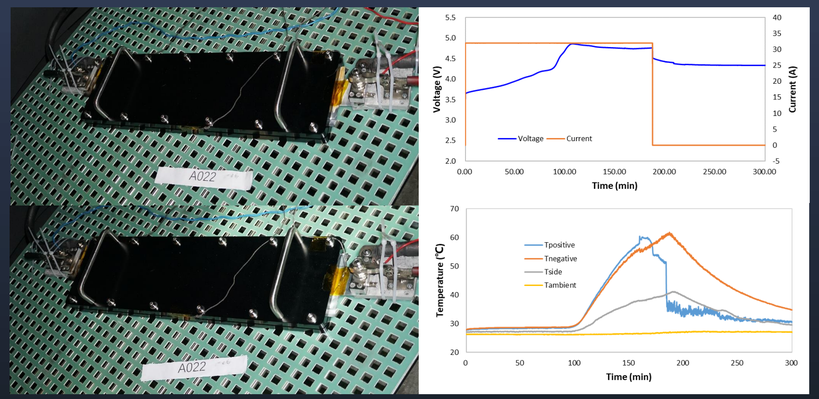


Nail Penetration: ✓PASSED



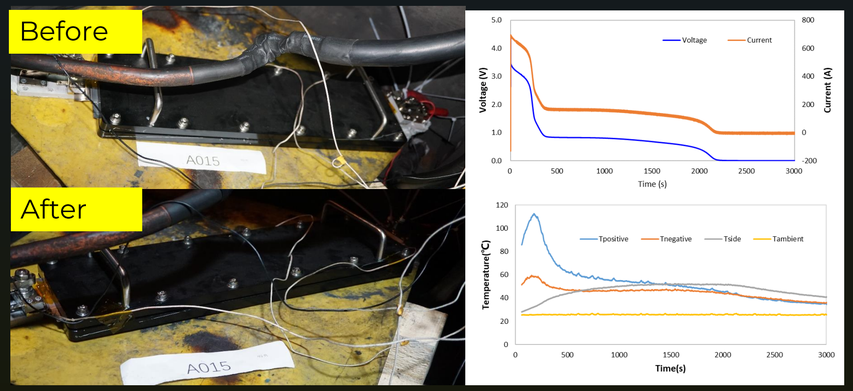
No thermal runaway even with complete nail penetration

Overcharge: ✓PASSED



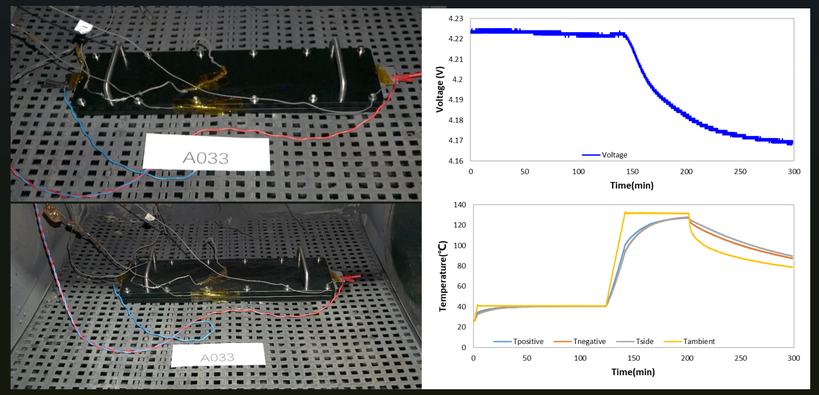
No thermal runaway

External Short Circuit: ✓PASSED



No thermal runaway even when cell is short circuited

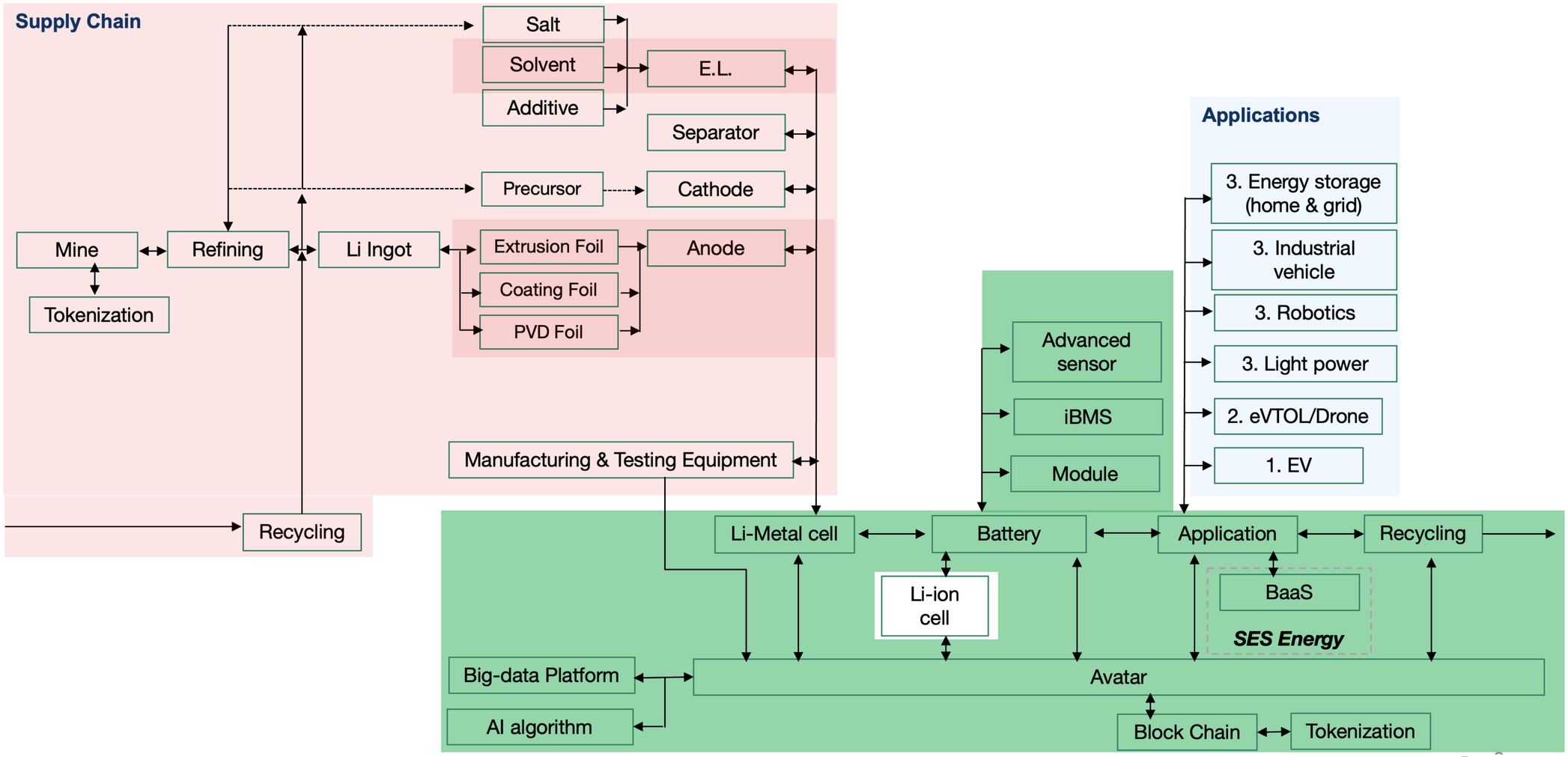
Thermal Stability: ✓PASSED



No thermal runaway

Note: all data from 3rd party testing

SUPPLY CHAIN – THE FUTURE OF LI-METAL / LI-ION



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Li-Metal Batteries

