QuantumScape

NEXT-GENERATION SOLID-STATE BATTERIES

December, 2020

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Agenda

QuantumScape Overview and Results	Jagdeep Singh, CEO
Battery Science Panel	*Dr. David Danielson (Moderator)* • Dr. Stanley Whittingham • Dr. Paul Albertus • Dr. Venkat Viswanathan • Dr. Tim Holme
Commercial Impact on EVs Panel	*Dr. David Danielson (Moderator)* • Dr. Jurgen Leohold • JB Straubel
Questions & Answers	Jagdeep Singh, CEO

QuantumScape

Management Team

Select Management Team Members

JAGDEEP SINGH
Founder / CEO (Chairman)

- Founder / CEO Infinera (NASDAQ: INFN); Lightera, now Ciena (NASDAQ: CIEN); OnFiber, now Qwest; AirSoft
- MS Computer Science, Stanford

Infinera ciena

PROF. FRITZ PRINZ
Founder & Chief Scientific Advisor (Board Member)

- Chair, Mechanical Engineering, Stanford
- Professor, Materials Science, Stanford
- PhD, Physics, University of Vienna

Stanford University · University of Vienna

DR. TIM HOLME
Founder & Chief Technology Officer

- Research Associate, Stanford
- Ph.D. & MS Mechanical Engineering, Stanford
- BS Physics, Stanford

Stanford University

DR. MOHIT SINGH
Chief Development Officer

- CTO and co-founder, SEEO
- Solid-state energy storage world expert
- Ph.D. Chem & Biomol Eng, Tulane
- Postdoc, Polymers, Berkeley

Berkeley UNIVERSITY OF CALIFORNIA · SEEO

KEVIN HETTRICH
Chief Financial Officer

- Bain Capital
- McKinsey & Company
- US Department of Energy
- MBA & MS, Stanford

BainCapital · McKinsey & Company

HOWARD LUKENS
Chief Sales Officer

- VP WW Sales, Infinera (NASDAQ: INFN)
- VP Strategic Sales, Ciena, (NASDAQ: CIEN)
- VP WW Sales, Lightera

Infinera ciena

JAY UNDERWOOD
Vice President, Sales

- Sales Director, Northern Europe, Infinera
- Product Planning, Infinera
- MS Technology

Infinera

MIKE MCCARTHY
Chief Legal Officer & Head of Corp. Dev.

- CLO & CAO, Infinera (NASDAQ: INFN)
- SVP & General Counsel, Ciena (NASDAQ: CIEN)
- J.D. Vanderbilt

Infinera ciena

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Backed by Leading Investors

SELECT BOARD MEMBERS AND INVESTORS

JOHN DOERR

KPCB | KLEINER PERKINS CAUFIELD BYERS

JB STRAUBEL

TESLA

JUSTIN MIRRO

KENSINGTON

DIPENDER SALUJA

CAPRICORN INVESTMENTGROUP

cadence

JÜRGEN LEOHOLD

VOLKSWAGEN

BRAD BUSS

TESLA · CYPRESS · MARVELL · Advance Auto Parts

FRANK BLOME

VOLKSWAGEN

KENSINGTON CAPITAL ACQUISITION CORP

KENSINGTON

- Management and board with extensive public company experience and operating capabilities in the automotive and automotive-related sector
- Relevant automotive experience to optimize program launches and capital deployment while facilitating commercial relationships
- Track record of creating significant shareholder value in automotive businesses

EXISTING INVESTORS

VOLKSWAGEN · Continental · Breakthrough Energy VENTURES · SAIC 上汽集团 SAIC MOTOR · Lightspeed · Bill Gates · khosla ventures · KPCB KLEINER PERKINS CAUFIELD BYERS · CAPRICORN INVESTMENTGROUP

By the Numbers

>$1.5B of Committed Capital[1]

Over $300M spent on development to date

10 Years of R&D Investment

Founded in 2010

250+ Employees

World Class Next-gen Battery Development Team

200+ Patents[2]

Materials, Use and Process

Extensive Trade Secrets

Processes and Intellectual Property

1. Prior to its merger with Kensington, QuantumScape secured over $800 million in committed funds. With the addition of the $700 million from its merger with Kensington and subsequent PIPE financing, QuantumScape will have received more than $1.5 billion in commitments to date
2. Includes patents and patent applications.

Volkswagen Committed to QuantumScape Technology

Volkswagen Group Overview

VOLKSWAGEN AKTIENGESELLSCHAFT

- ~11 million vehicles produced in FY2019
- ~$38 billion investment in electric mobility by 2024
- Plans to launch ~70 electric vehicle models and produce 22 million electric vehicles by 2029

Select Brands

Volkswagen Partners with QuantumScape

1. Corporate funding commitment of $300+ million
2. Strong relationship since 2012, including development collaboration, testing of prototype cells and representation on the QS board of directors
3. Founded a JV to prepare for the mass production of solid-state batteries for Volkswagen

"Volkswagen has become the largest shareholder of QuantumScape. Our US$100 million investment is a key building block in the Group's battery strategy. One of the long-term targets is to establish a production line for solid-state batteries by 2025."

- Herbert Diess, Volkswagen AG CEO

"The Volkswagen Group has established a joint venture with QuantumScape, a manufacturer of solid-state batteries. The shared goal of the companies is large-scale production..."

- Oliver Blume, Porsche CEO

"In June 2020, the Volkswagen Group also announced plans to increase its shareholding in the US battery specialist QuantumScape. The objective is to promote the joint development of solid-state battery technology. In the future, solid-state batteries should result in a significantly increased range and faster charge times. They are regarded as the most promising approach to electric mobility for generations to come. Volkswagen has already been collaborating with QuantumScape since 2012 and is the largest automotive shareholder thus far. Both founded a joint venture in 2018, the aim of which is to prepare the mass production of solid-state batteries for Volkswagen."

- Volkswagen Group Half-Yearly Financial Report, July 2020

Source: Volkswagen AG Half-Yearly Financial Report published July-2020, 2019 Annual Report published Mar-2020, press releases published Mar-2019, Nov-2019 and Jun-2020, Half-year press conference published Aug-2018; Porsche Annual Press Conference published Mar-2019). Page 18 based on Volkswagen AG press release published Sep-2018.

QuantumScape

Need battery breakthrough to enable electrification of remaining 98% of market

2% PHEV + BEV Penetration[2]

Customer Requirements for Mass Market Adoption

Energy / Capacity
>300 mile range

Fast Charging
Charge in <15 min

Cost
< $30K, 300 mile EVs

Battery Lifetime
>12 years, >150k miles

Safety
Solid, non-oxidizable separator

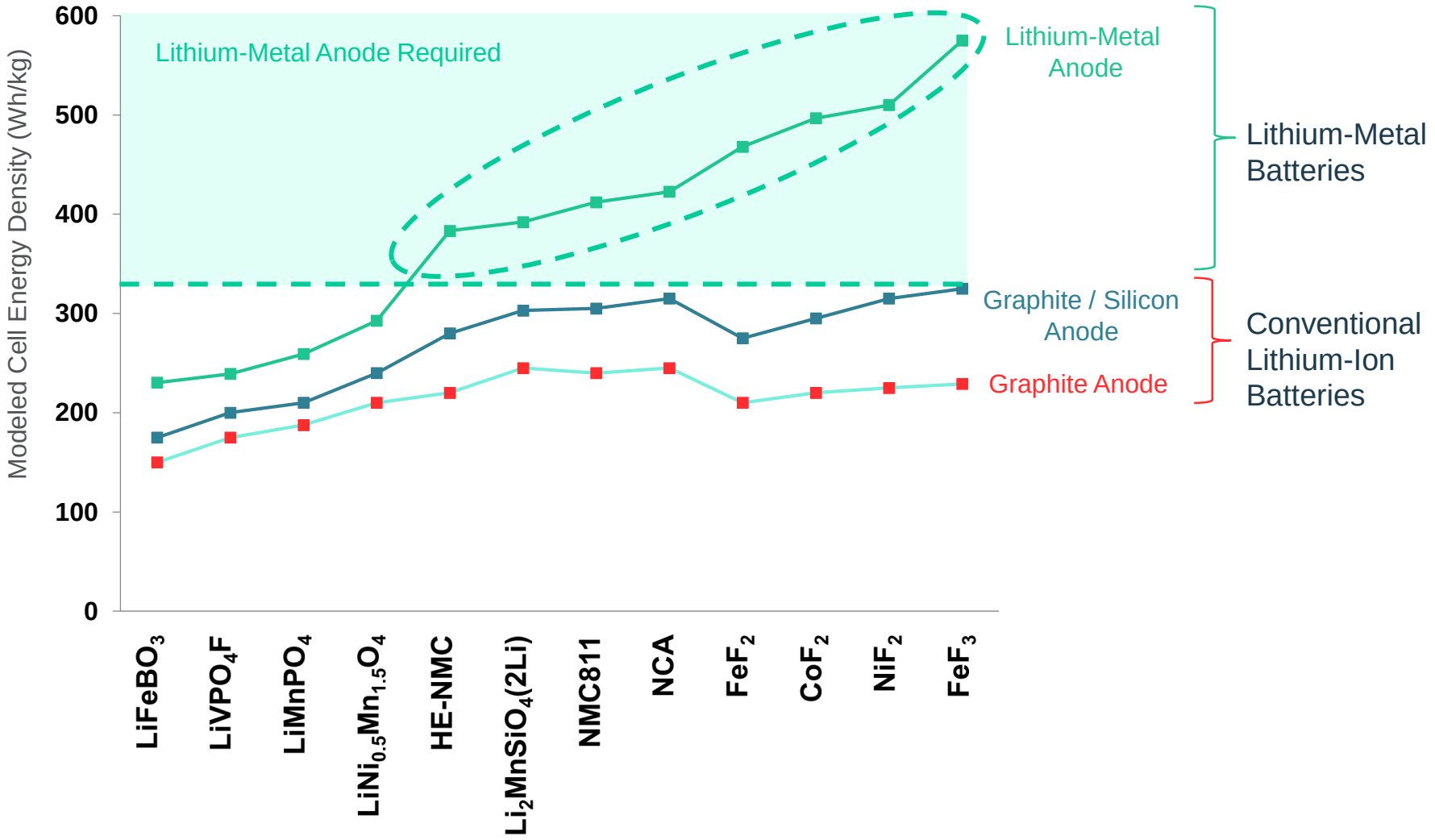
Source: International Organization of Motor Vehicle Manufacturers (OICA); IEA

(1) Based on 2019 global vehicle production; includes passenger vehicles, heavy trucks, buses and coaches (OICA). Battery opportunity assumes $100 / KWh and 50KWh+ battery pack.

(2) % of Global Car Stock in 2019 (IEA).

Lithium-Metal Anode is Required for High Energy Density

And Lithium metal anode requires a solid-state separator



Key Takeaways

Lithium-metal anode necessary to achieve high energy density

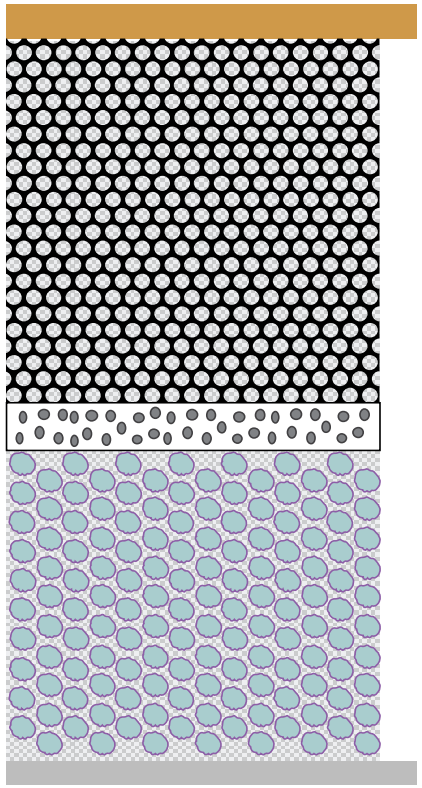
Lithium-metal cannot be used without a solid-state separator

Source: Andre *et al*, *J Mater Chem A*, (2015) 6709

QuantumScape Zero Li Anode-free Architecture

Improved cost, energy density, safety

Conventional Liquid Battery



Anode Current Collector

Graphite / Silicon Anode

Liquid Electrolyte

Porous Separator

Cathode Active

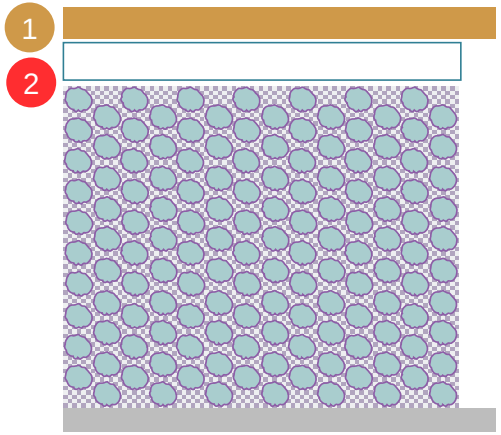
Liquid Electrolyte

Cathode Current Collector

QuantumScape Solid-State Battery

Discharged

(as manufactured)



Anode Current Collector

Lithium-Metal

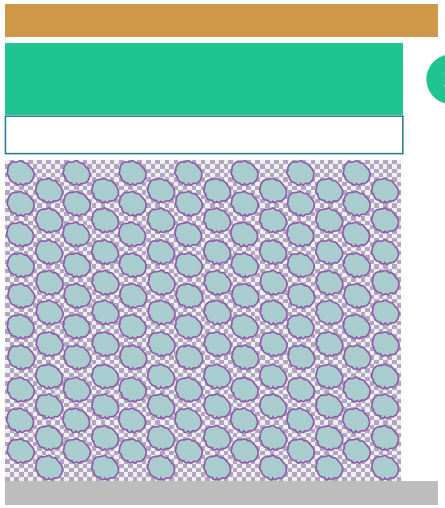
Solid-State Separator

Cathode Active

Catholyte

Cathode Current Collector

Charged



1 **Anode-free Manufacturing**

Anode-free cell design with lithium plated during charge cycles

2 **Solid-State Separator**

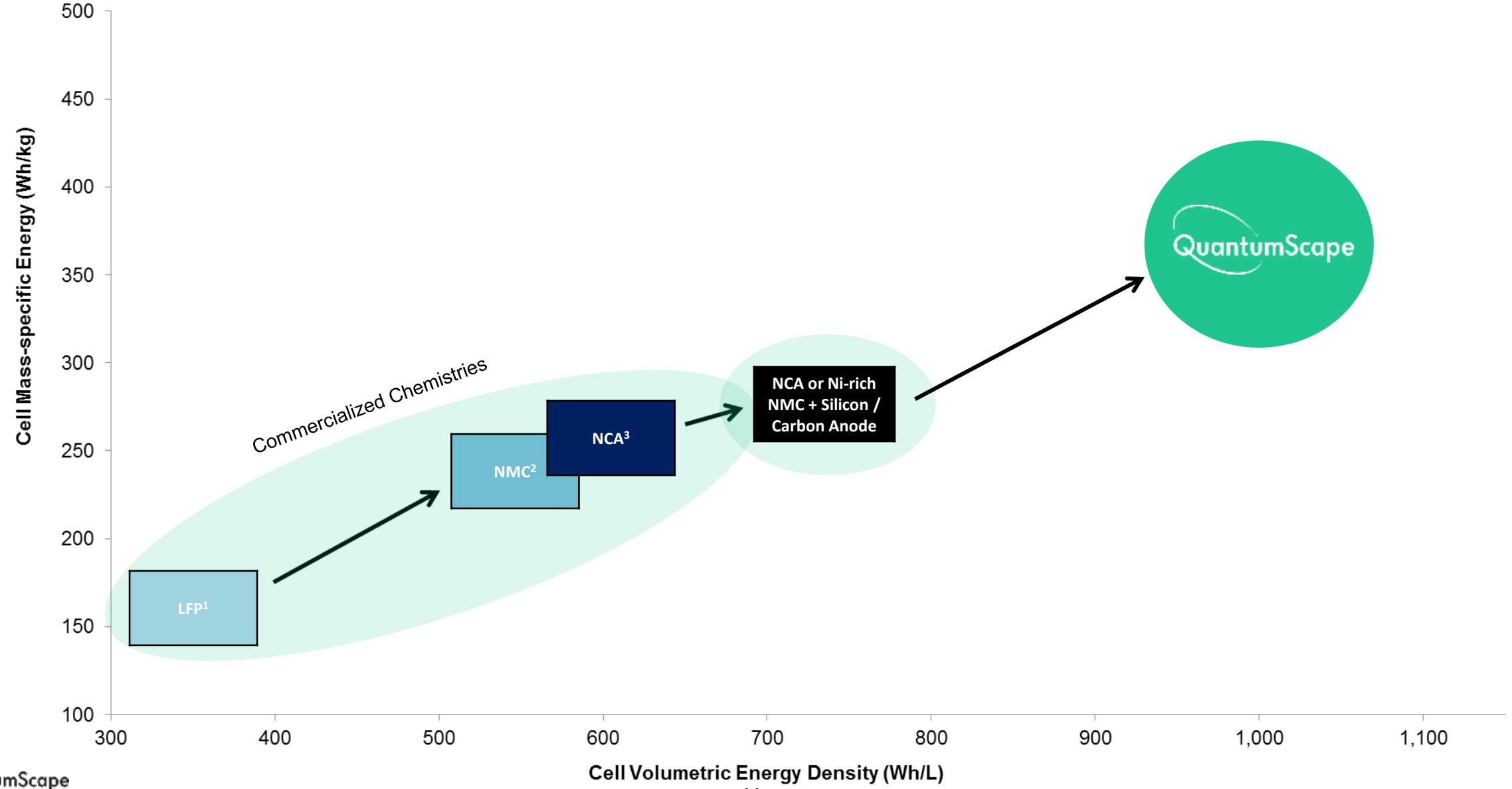
Ceramic electrolyte with high dendrite resistance

3 **Lithium-Metal Anode**

High-rate cycling of a lithium-metal anode

QuantumScape Energy Density

Energy-optimized Cell Designs



Source: Argonne National Laboratory; Management estimates

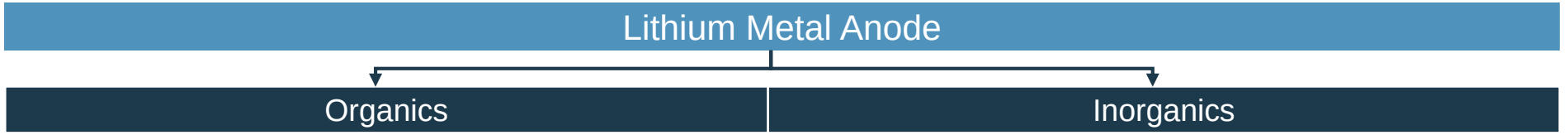
[1] Lithium, iron, and phosphate [2] Nickel, manganese, and cobalt [3] Nickel, cobalt, and aluminum

Lithium metal architecture addresses multiple requirements simultaneously

Energy	Significantly increases volumetric and gravimetric energy density by eliminating graphite/silicon anode host material.
Fast Charge	Enables <15-minute fast charge (0 to 80%) by eliminating lithium diffusion bottleneck in anode host material.
Life	Increased life by eliminating capacity loss at anode interface.
Safety	Eliminates organic separator. Solid-state separator is nonflammable and noncombustible.
Cost	Lower cost by eliminating anode host material and manufacturing costs.

Previous Attempts Have Been Unsuccessful

X = challenge



Separator Requirements	Ionic liquids	Additives / Protected Layer	Gel	Polymer	Sulfides	Phosphates & Perovskites	Garnets	LiPON, borohydrides
1 Conductivity	X			X				X
2 Separator-Anode ASR		X	X	X		X	X	
3 Lithium metal stability	X		X			X		
4 Dendrite resistance	X	X	X	X	X	X	X	X

Also must be thin and continuously processed at low cost over large area

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Video

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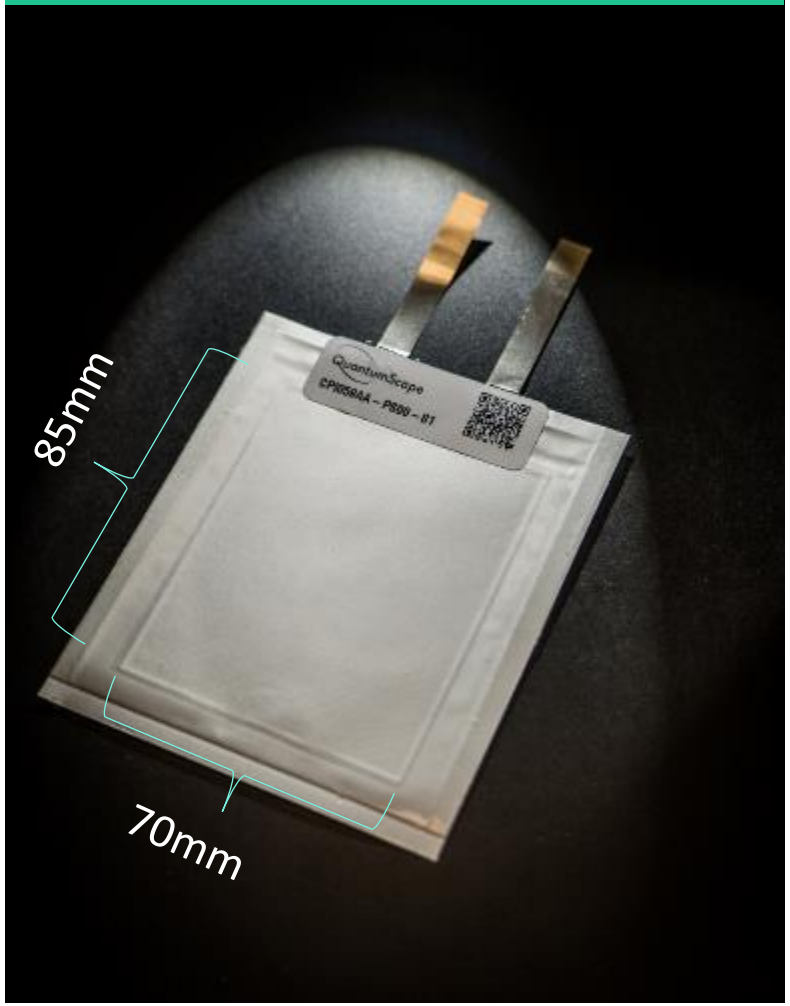
Existing separators only work under severely compromised conditions

Low Current Density while Charging • Low Cathode Loading or Low C-rate	Slow Charge
Low Cycle Life • < 800 cycles	Life
Limited Temperature Range • Elevated only	Cost Complexity
Requires Excess Lithium	Low Energy

QuantumScape Material & Cell

CERAMIC SOLID-STATE SEPARATOR

SINGLE LAYER POUCH CELL

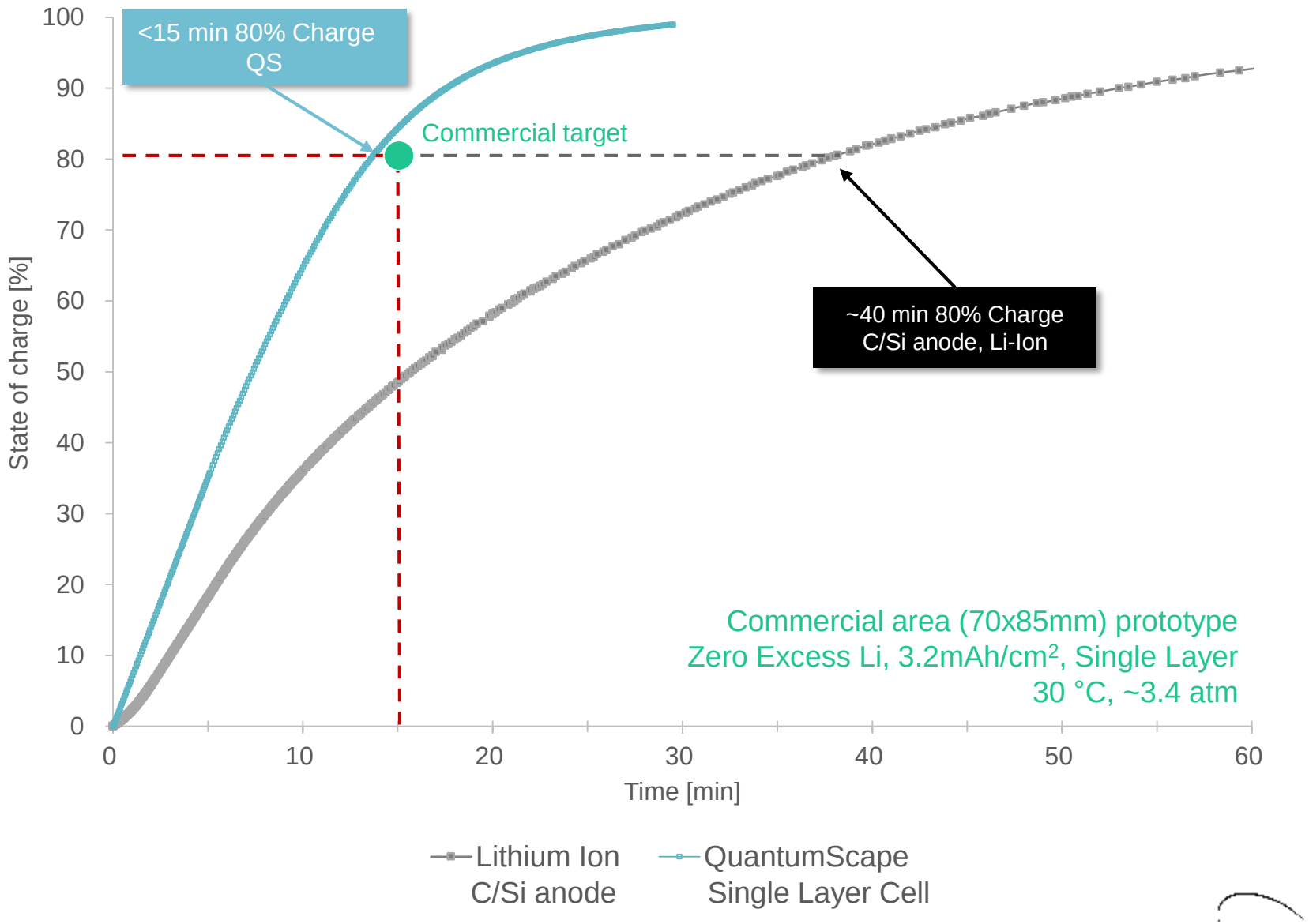


Fast Charging

Fast charge capability exceeds commercial targets with commercial area single layer prototype

80% Charge in 15 minutes. Lithium Ion batteries currently only get to <50% in 15 minutes

Fast Charging



Updated: 12/14/2020

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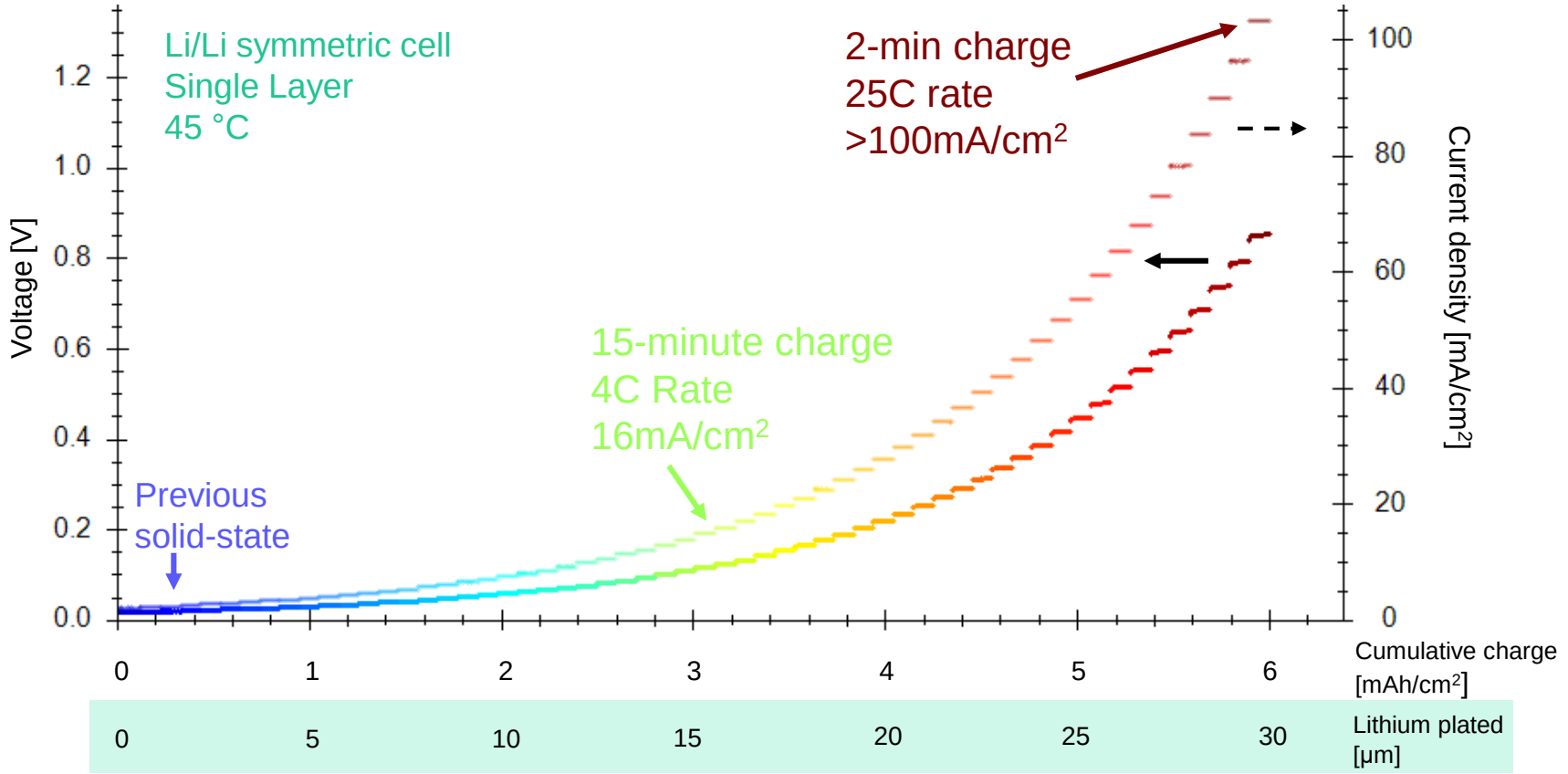
Material Performance: Dendrite Resistance

Material entitlement exists for full charge in <5 min

Solid-state separator resists dendrites even at very high current density

Based on solid-state separator material testing

Extreme high rate lithium plating



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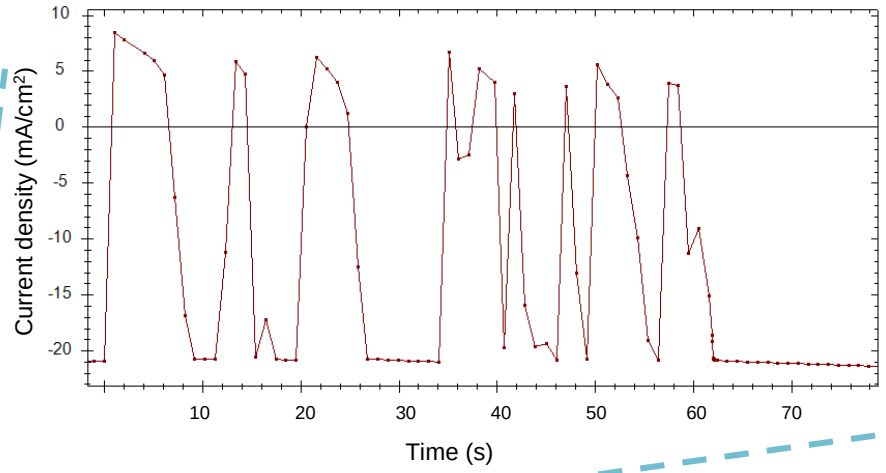
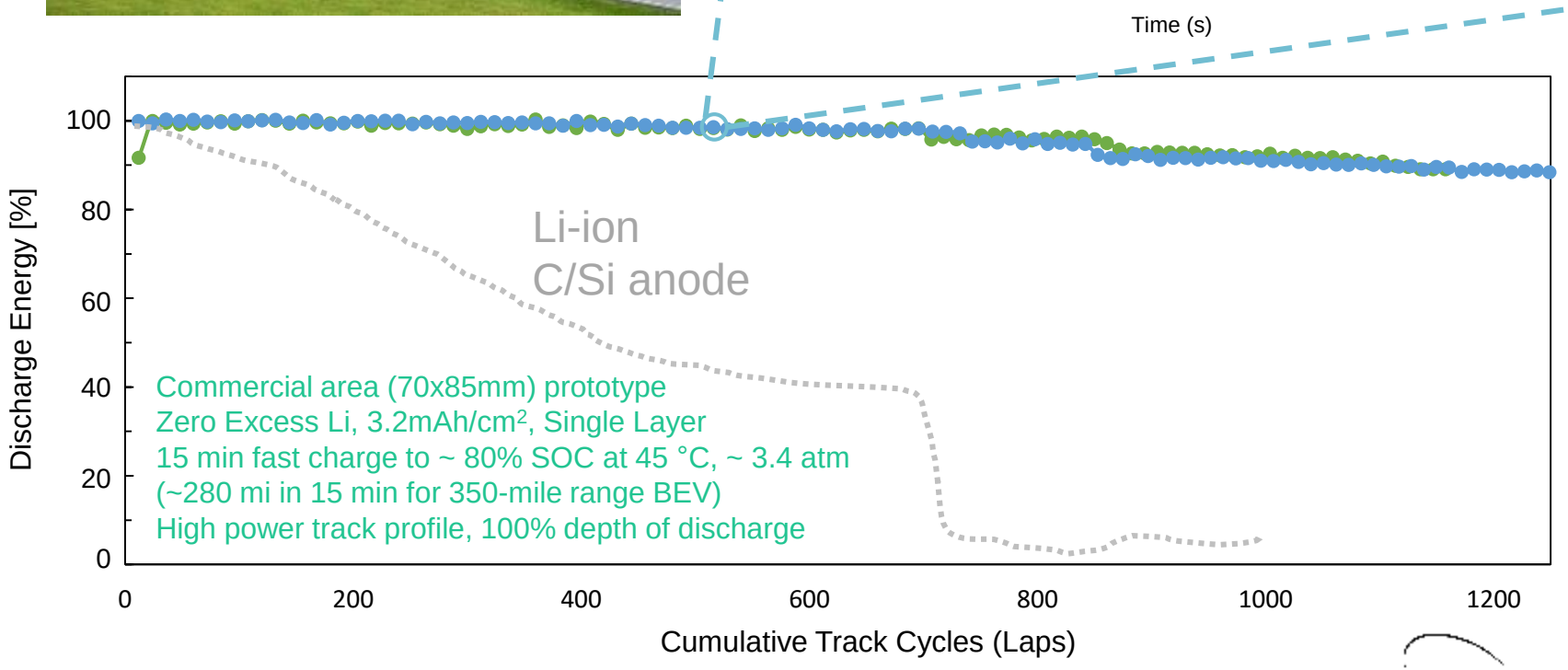
Power

Passed simulated OEM-specified track cycle with commercial area prototype

QS solid state cells can deliver aggressive automotive power profiles

OEM Track Cycle





Updated: 12/14/2020 QuantumScape

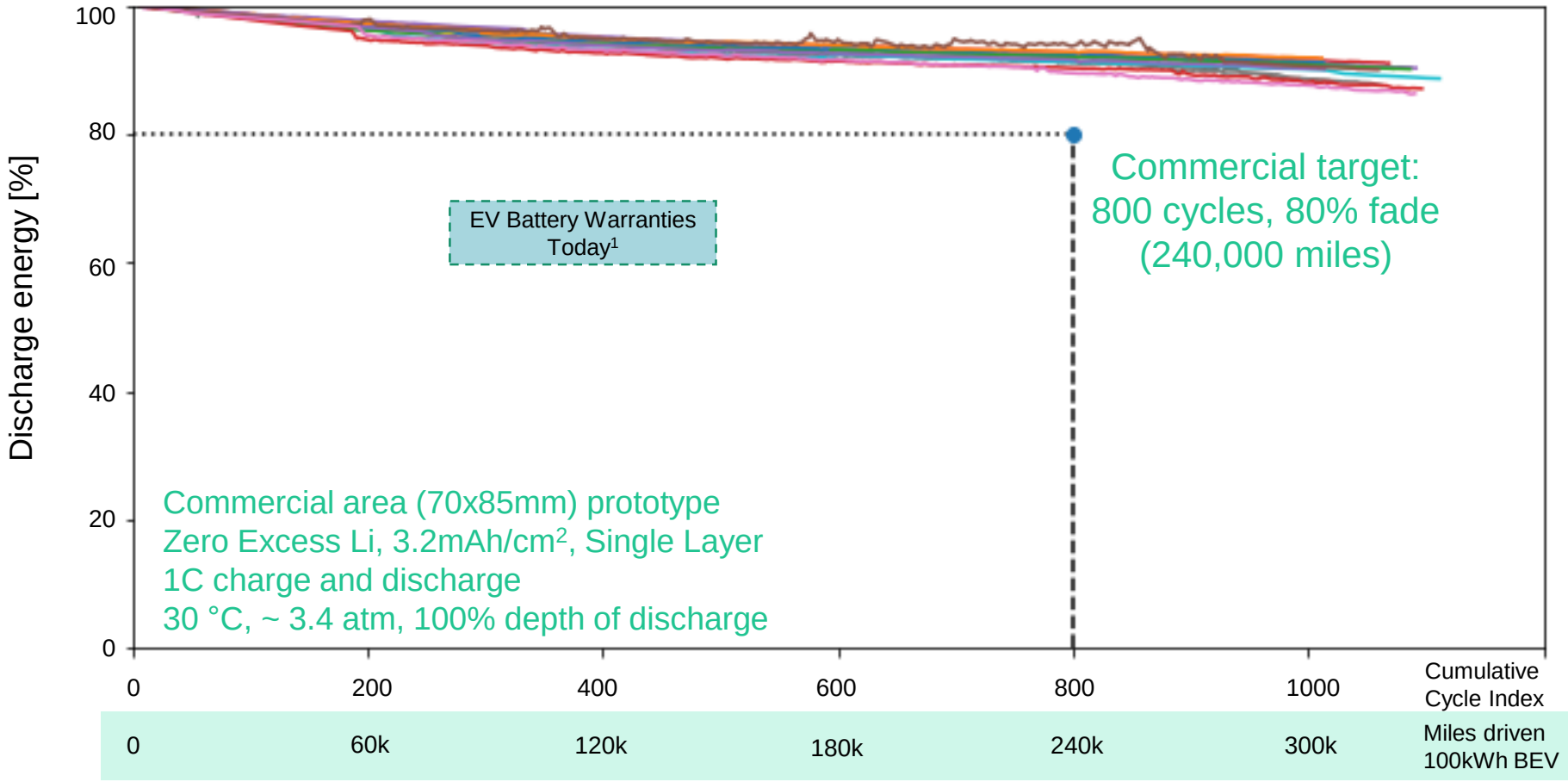
Battery Life

Exceeds commercial target with commercial area single layer prototype

Cycling with >80% energy retention in 1000+ cycles

Chart based on accelerated testing (3x automotive rates)

Cycle Life



1) Source: MyEV.com and Tesla.com

Updated: 1/7/2021

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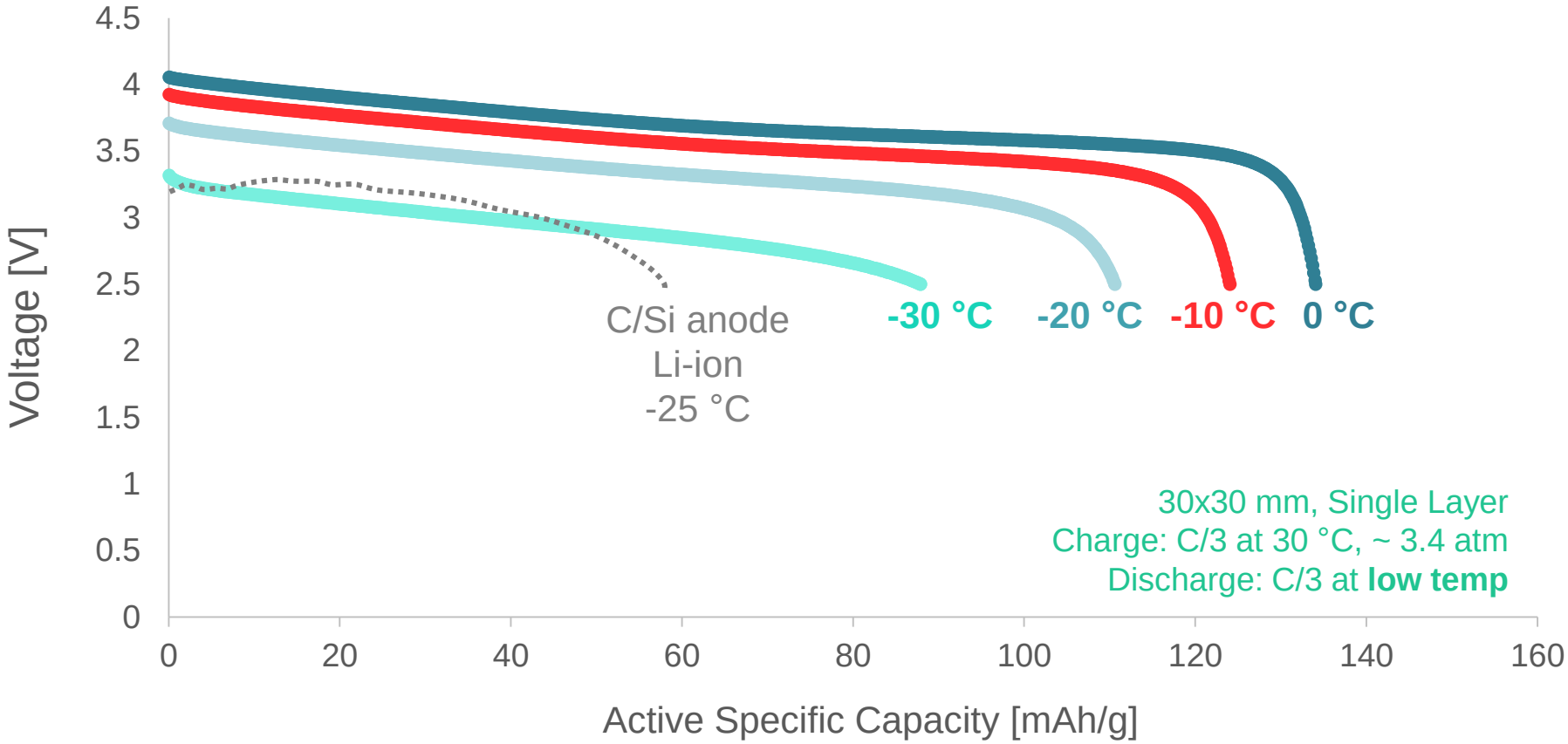
Material Performance: Low Temp

Operability shown at lower end of automotive temperature range with single layer prototype (30 x 30 mm)

Significant capacity is accessible even at -30° Celsius

Extreme low temperature operation



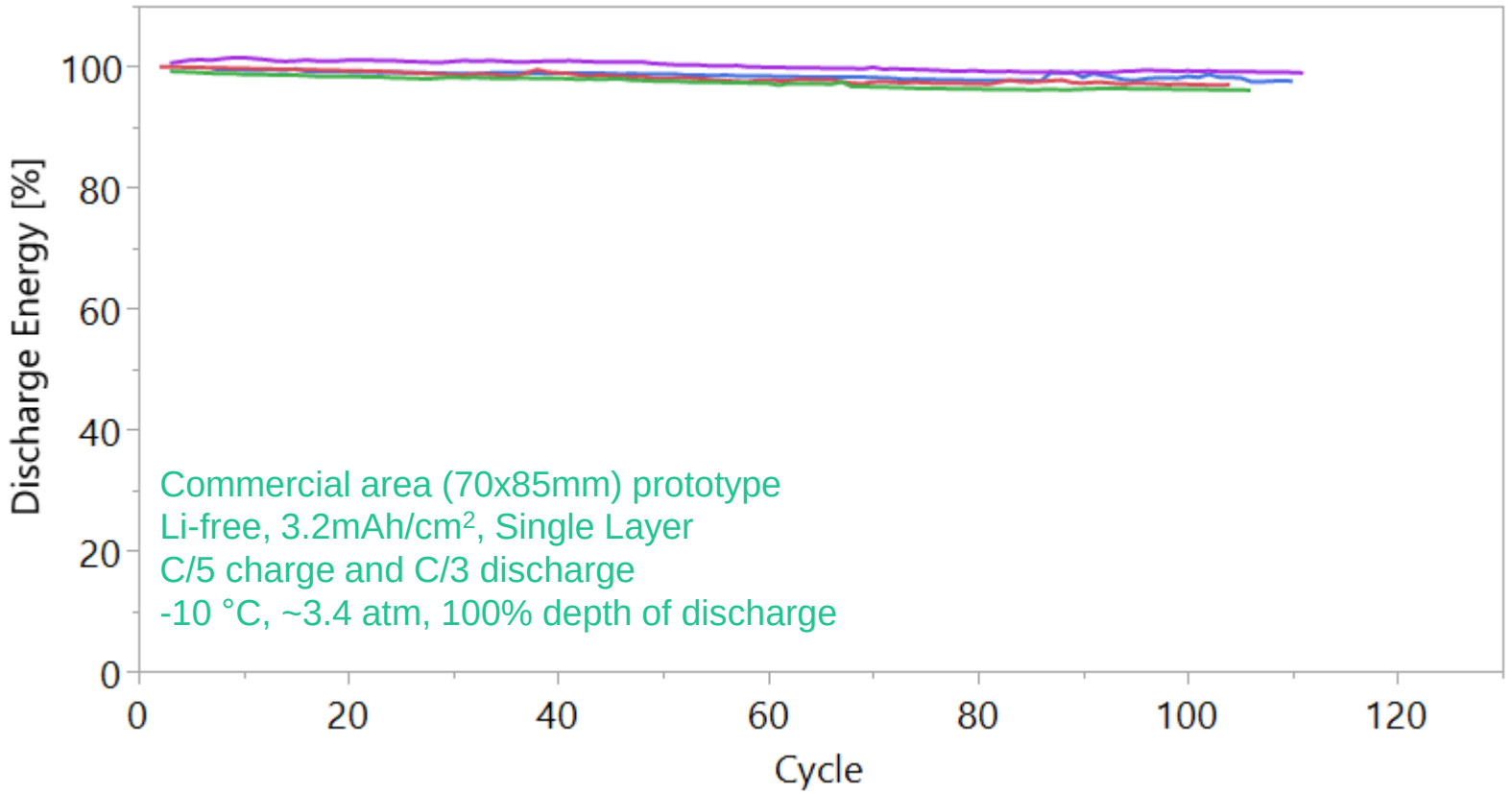
Updated: 12/14/2020 QuantumScape

Cell Performance: Low Temp

Cycling with commercial area single layer prototype at low temperature (-10° Celsius)

Note: cells still on test

Low temperature life



Updated: 12/14/2020 QuantumScape

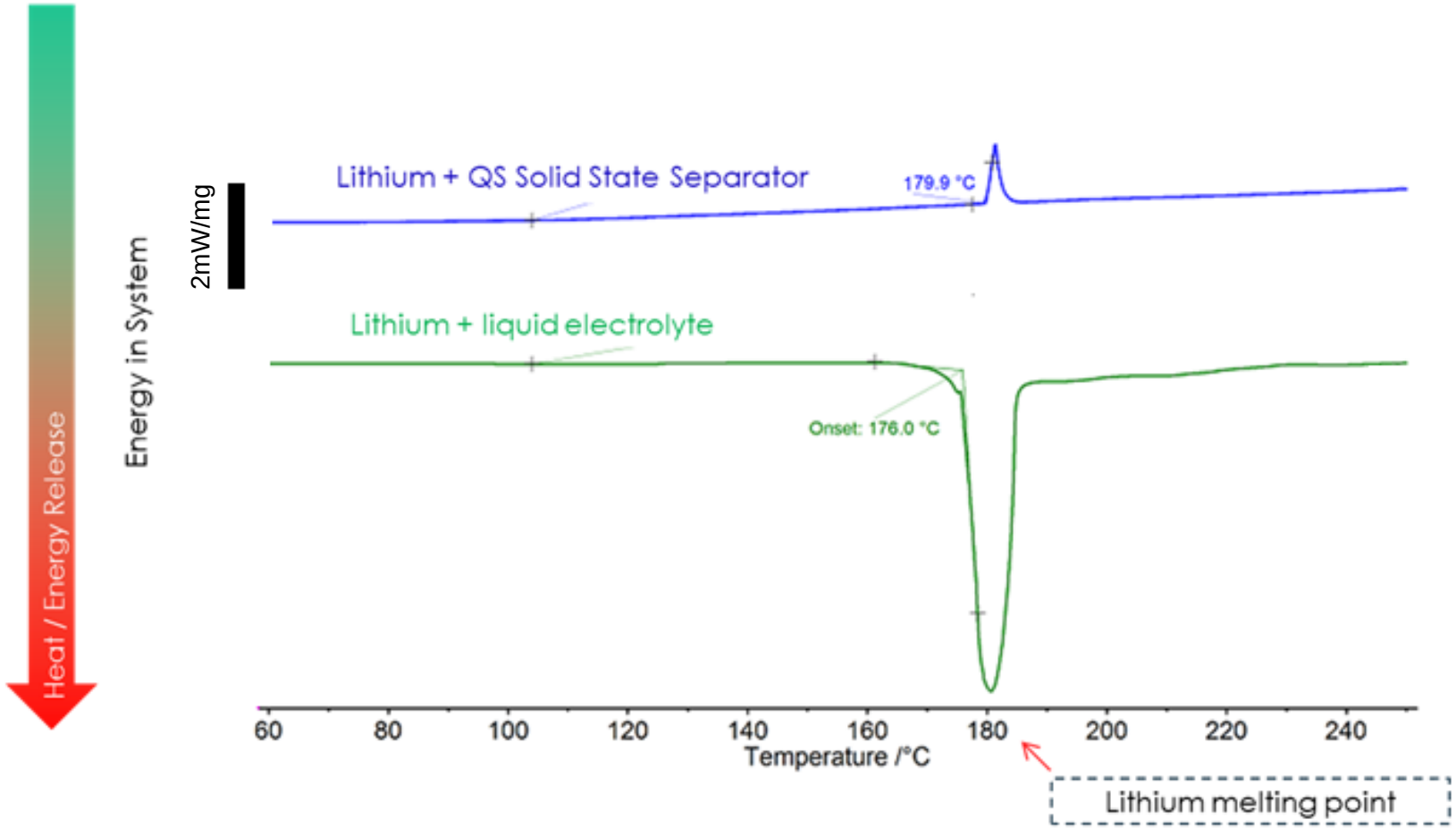
Material Performance: Thermal Stability

Solid state separator is not combustible and has high thermal stability

Lithium anode is chemically stable with separator and foil, even when molten

Based on solid-state separator material testing

Inherent stability with metallic lithium



Unlike a liquid electrolyte, QS solid-state separator has no appreciable reaction with molten lithium metal

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A message from Volkswagen

Dr. Frank Blome

Head of the Battery Center of Excellence of Volkswagen AG

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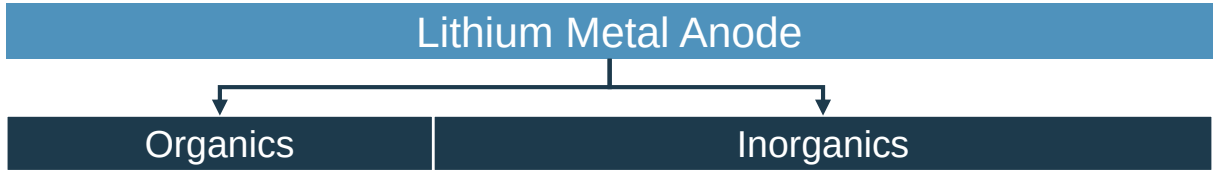
Previous Lithium Metal Cells Have Been Commercially Unsuccessful



Performance Requirements		Liquids	Polymers	Sulfides I	Sulfides II	Oxides	QuantumScape	Performance Implication
1	Charge rate	X	X		X	X	✓ 4C fast charge	Fast charge
2	Cycle life	X			X	X	✓ >800 cycles	Vehicle life & cost of ownership
3	30 °C operation		X	X	X		✓ 30 °C cycling	Cold temperature driving
4	Anode-free	X	X	X	X	X	✓ Li-free	Energy density (excess lithium required)

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Today's Panel Discussions

Moderator

Dr. David Danielson
- Managing Director, Breakthrough Energy Ventures
- Precourt Energy Scholar, Stanford
- Former Head of US DOE EERE Program

Battery Science Panel

Dr. Stanley Whittingham
- Co-Inventor of the Lithium-Ion Battery
- 2019 Chemistry Nobel Prize Winner
- Distinguished Professor of Chemistry, Binghamton University (SUNY)
- Member QuantumScape Science Advisory Committee

Dr. Paul Albertus
- Former head, US DOE ARPA-E IONCS Solid-State Battery program
- Assistant Professor of Chemistry, University of Maryland

Dr. Venkat Viswanathan
- Battery expert, former lithium-air researcher
- Assistant Professor of Mechanical Engineering, Carnegie-Mellon University
- Member QuantumScape Science Advisory Committee

Dr. Tim Holme
- Founder and Chief Technology Officer, QuantumScape
- Research Associate, Stanford
- Ph.D. & MS Mechanical Engineering, Stanford

Commercial Impact on the EV Market

JB Straubel
- Co-founder and CEO of Redwood Materials
- Co-founder and Former Chief Technology Officer, Tesla
- Board Member, QuantumScape

Dr. Jürgen Leohold
- Board Member, QuantumScape
- Former Head Group Research, Volkswagen
- Former Professor Vehicle Systems and Electrical Engineering, University of Kassel
- Board Member, QuantumScape

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