
QuantumScape®
The Future is Solid™

Forward Looking Statements

This presentation contains forward-looking statements within the meaning of the federal securities laws and information based on management's current expectations as of the date of this presentation. All statements other than statements of historical fact contained in this presentation, including statements regarding QuantumScape's future operating results, financial position, business strategy, addressable market, anticipated benefits of its technologies, projected factory economics, pro forma information, and plans and objectives for future operations and products are forward-looking statements. When used in this presentation, the words "may," "will," "estimate," "pro forma," "expect," "plan," "believe," "potential," "predict," "target," "should," "would," "could," "continue," "believe," "project," "intend," "anticipates" the negative of such terms and other similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain such identifying words. These forward-looking statements are based on management's current expectations, assumptions, hopes, beliefs, intentions and strategies regarding future events and are based on currently available information as to the outcome and timing of future events. QuantumScape cautions you that these forward-looking statements are subject to all of the risks and uncertainties, most of which are difficult to predict and many of which are beyond the control of QuantumScape, incident to its business.

These forward-looking statements involve significant risks and uncertainties that could cause the actual results to differ materially from the expected results. Factors that may cause such differences include, but are not limited to ones listed here. QuantumScape faces significant barriers in its attempts to produce a solid-state battery cell and may not be able to successfully develop its solid-state battery cell. Building high volumes of multi-layer cells in the commercial form factor and with higher layer count requires substantial development effort. QuantumScape could encounter significant delays and/or technical challenges in replicating the performance seen in its single-layer cells and early tests of the smaller form factor four-layer cells and in achieving the high yield, reliability, uniformity and performance targets required for commercial production and sale. QuantumScape may encounter delays and other obstacles in acquiring, installing and operating new manufacturing equipment for automated and/or continuous-flow processes, including vendor delays (which we have already experienced) and challenges optimizing complex manufacturing processes. QuantumScape may encounter delays in hiring the engineers it needs to expand its development and production efforts, delays in planning, permitting, building out and commencing operations at its pre-pilot production line facility (QS-0), and delays caused by the COVID-19 pandemic. Delays in increasing production of engineering samples would slow QuantumScape's development efforts. QuantumScape may be unable to adequately control the costs associated with its operations and the components necessary to build its solid-state battery cells at competitive prices. QuantumScape's spending may be higher than currently anticipated. QuantumScape may not be successful in competing in the battery market industry or establishing and maintaining confidence in its long-term business prospectus among current and future partners and customers. QuantumScape may be adversely impacted by litigation and regulatory proceedings. QuantumScape cautions that the foregoing list of factors is not exclusive. QuantumScape cautions readers not to place undue reliance upon any forward-looking statements, which speak only as of the date made. Further information about factors that could materially affect QuantumScape, including its results of operations and financial condition, is set forth under the "Risk Factors" section in the registration statement on Form S-1 filed by QuantumScape with the SEC on May 17, 2021.

Except as otherwise required by applicable law, QuantumScape disclaims any duty to update any forward-looking statements, all of which are expressly qualified by the statements in this section, to reflect events or circumstances after the date of this presentation. QuantumScape cautions you that these forward-looking statements are subject to numerous risks and uncertainties, most of which are difficult to predict and many of which are beyond the control of QuantumScape. Should underlying assumptions prove incorrect, actual results and projections could different materially from those expressed in any forward-looking statements. Additional information concerning these and other factors that may impact the operations and projections discussed herein can be found in QuantumScape's periodic filings with the SEC. QuantumScape's SEC filings are available publicly on the SEC's website at www.sec.gov.

The Solid-State Opportunity

- **Automotive industry on the brink of the biggest transformation in 100 years**
  Internal combustion engines (ICE) converting to electrified powertrains
- **But EV penetration currently limited as batteries not competitive with ICEs**
  EVs today ~3% of total automotive market
- **Step-change in battery performance required for EVs to compete with ICEs**
  Energy density (range), fast charge, life, safety, cost
- **QS Solid-state lithium-metal batteries can deliver this step change**
  50-80% better energy density + 15-minute fast charge + non-flammable separator

QS By The Numbers

~$2B of Capital Investment[1]

Over $300mm spent on development to date

10 Years of R&D Investment

Founded in 2010

400+ Employees

World Class Next-gen Battery Development Team

200+ Patents and Patent Applications

Materials, Use and Process

Deep Partnership with Volkswagen

Strategic Investor, JV Partner, and Board Representation

1) Prior to its merger with Kensington, QuantumScape secured over $800 million in committed funds. In Q4'20, QuantumScape received $730 million of gross proceeds from its merger with Kensington and subsequent PIPE financing. In Q1'21, QuantumScape raised a further $478 million of gross proceeds in a follow-on transaction.

Conventional Lithium-Ion Battery Architecture

Hosted Anode: Graphite / Silicon

Conventional Li-ion Battery



Anode Current Collector

Graphite / Silicon Anode

Liquid Electrolyte

Porous Separator

Cathode Active

Liquid Electrolyte

Cathode Current Collector

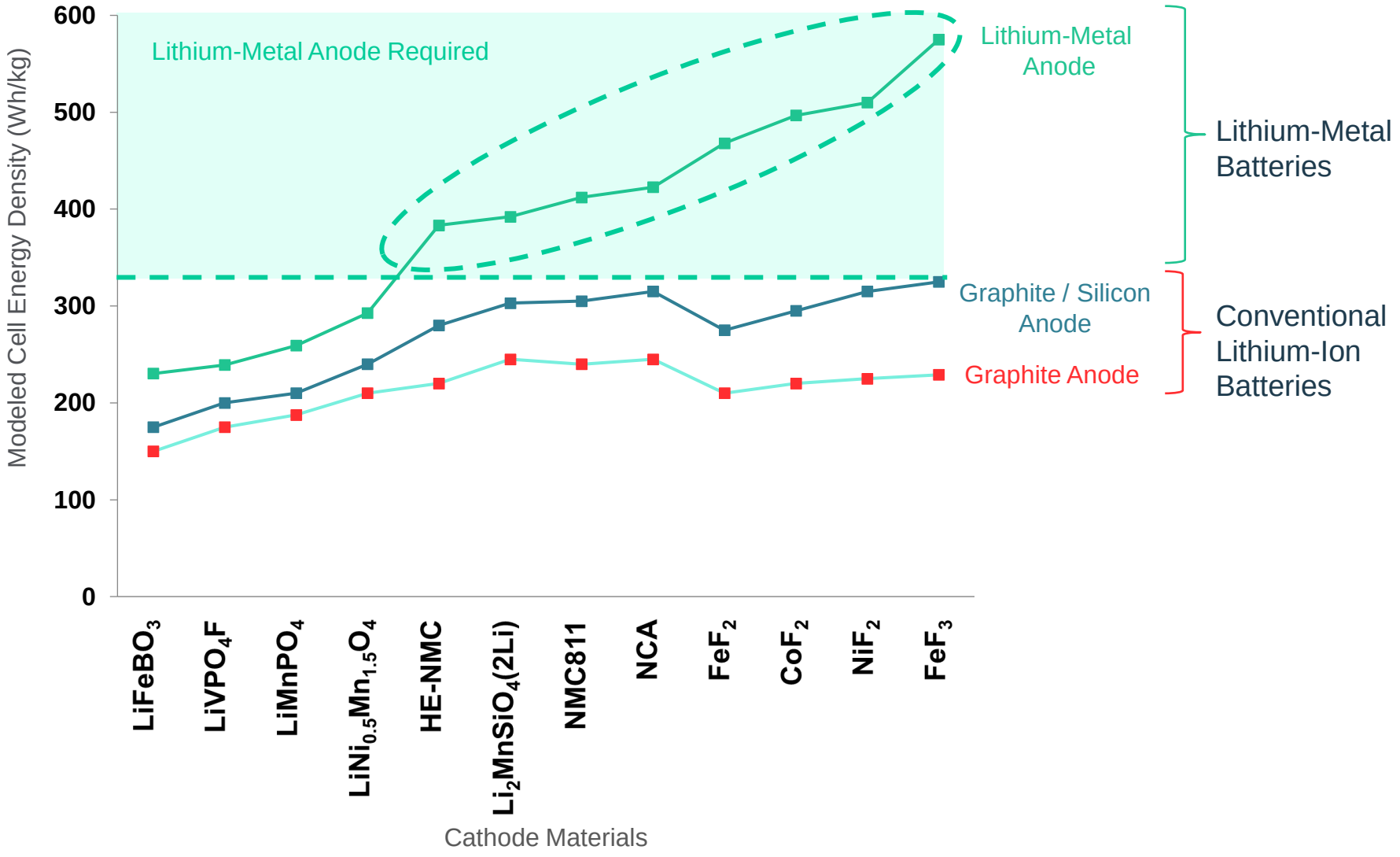
Customer Requirements for Mass Market Adoption

- Energy / Capacity
- Fast Charging
- Cost
- Battery Lifetime
- Safety

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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

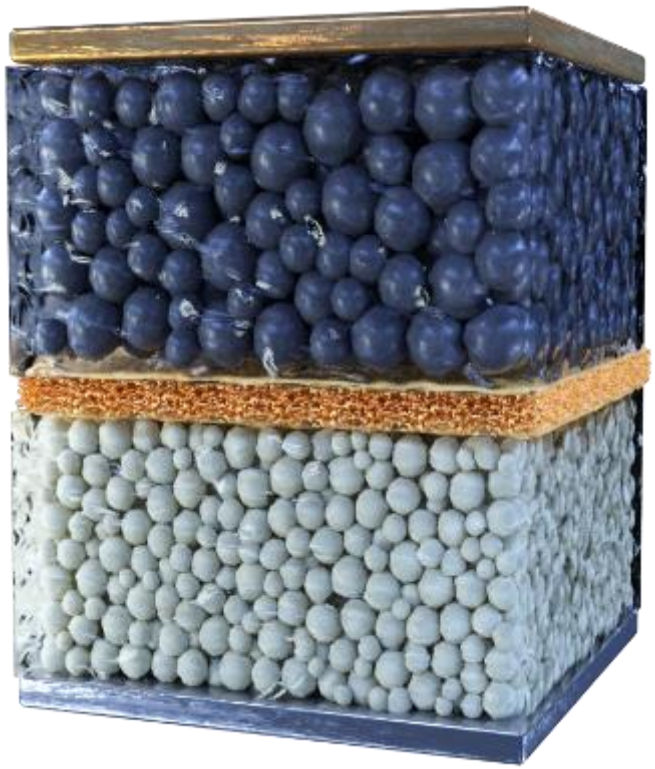
Lithium-metal cannot be used without a solid-state separator

Source: Andre *et al*, *J Mater Chem A*, (2015) 6709
Note: Modeled cell specific energy is based on traditional cell designs and architectures

QuantumScape Zero Li Anode-free Architecture

Improved cost, energy density, safety

Conventional Li-ion Battery



Anode Current Collector

Graphite / Silicon Anode

Liquid Electrolyte

Porous Separator

Cathode Active

Liquid Electrolyte

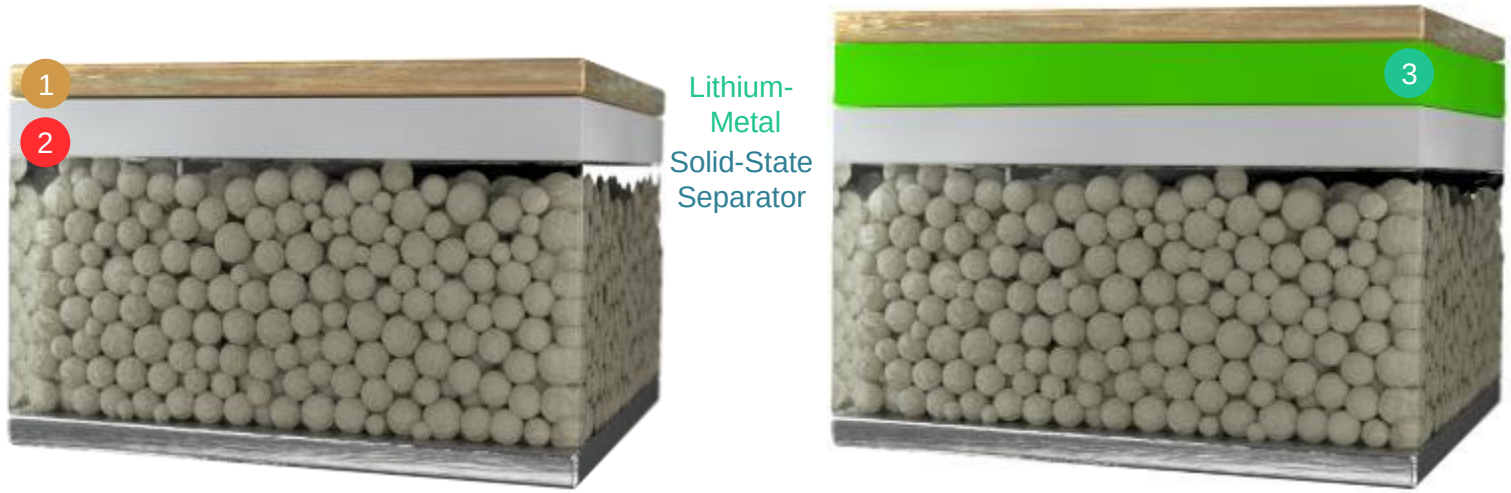
Cathode Current Collector

QuantumScape Solid-State Battery

Discharged

(as manufactured)

Charged



Lithium-Metal Solid-State Separator

1 **Anode-free Manufacturing**

Anode-free cell design with lithium plated during charge cycles

2 **Solid-State Separator**

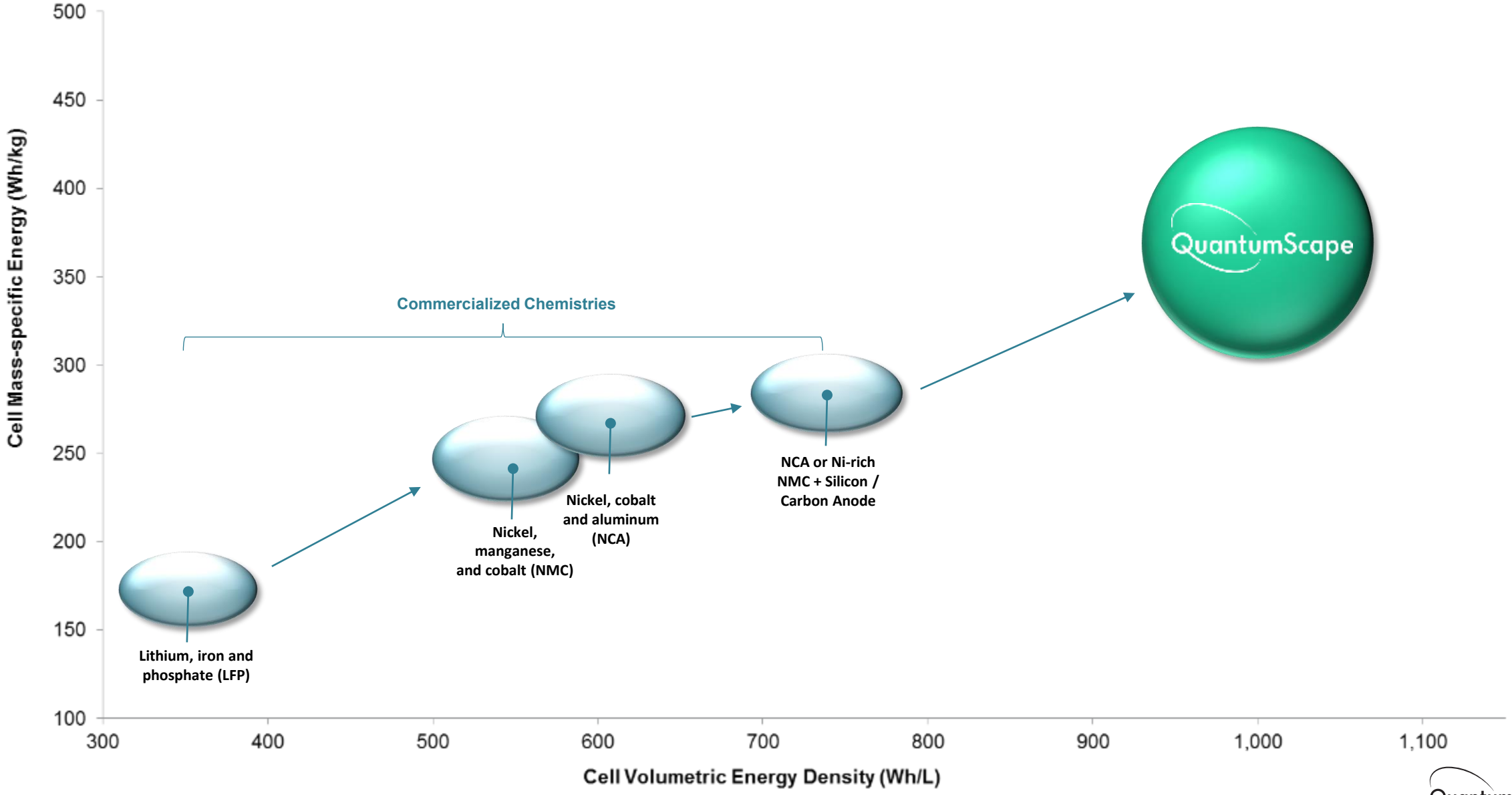
Ceramic electrolyte with high dendrite resistance

3 **Lithium-Metal Anode**

High-rate cycling of a lithium-metal anode

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QuantumScape Energy Density



Source: Ding, Y., Cano, Z.P., Yu, A. et al., Electrochemical Energy Reviews, Automotive Li-Ion Batteries: Current Status and Future Perspectives (2019); Management estimates

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Lithium metal architecture addresses multiple requirements

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	Lowers cost by eliminating anode host material and manufacturing costs.

Previous Attempts Have Been Unsuccessful

		Lithium-Metal Anode				
		Organics			Inorganics	
Separator / Electrolyte Requirements		Liquids	Gel	Polymer	Sulfides	Oxides
1	Conductivity *Fast charge*	✓	✓	X	✓	✓
2	Separator-Anode ASR *Power, temperature*	X	X	X	✓	X
3	Low (lithium metal) and high-voltage stability *Power, temperature, cycle life*	X	X	X	X	✓
4	Dendrite resistance *Power, temperature, cycle life*	X	X	X	X	X

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

Alternative Separators Force One of Two Choices

	Compromise	Impact
Revert to Hosted Anode	Reversion to Carbon / Silicon Anode or Excess Lithium	Low Energy
Compromise Test 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

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Solid-State Battery Technology Efforts

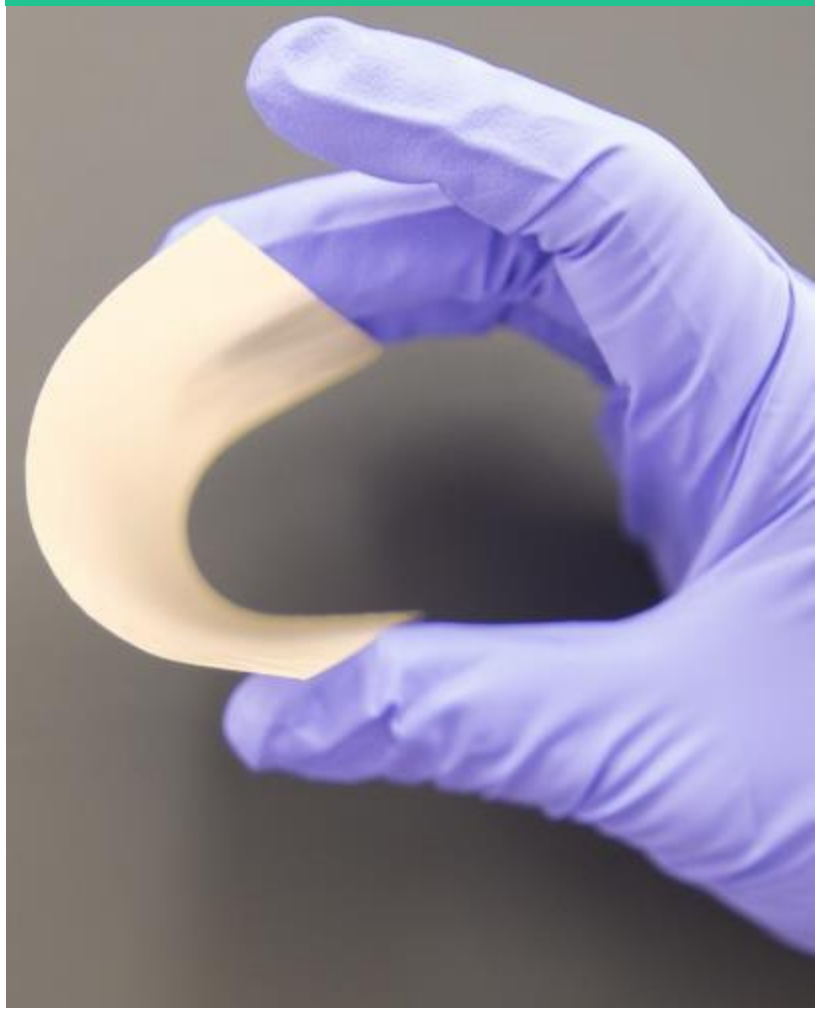
	Separator	Anode: Carbon or Lithium	Number of Layers	Test Conditions: Cycles to 80%	Current density / mA cm^{-2}	Temp / °C	Pressure / atm	Source
Automotive Requirement			Dozens	>800	> 3	≤ 30 °C	<1 applied	
Toyota	Sulfide	Carbon/Silicon	Not Published	Not Published	Not Published	Not Published	Not Published	NEDO 2018 presentation
ProLogium	90% ceramic / liquid		Not Published	1300	Not Published	Not Published	Not Published	Disclosed at De-Leon Conference 2021 ProLogium Brochure
Solid Power	Sulfide		Not Published	Not Published	Not Published	Not Published	Not Published	2021 Press release
Ionic Materials	Polymer	Lithium Metal	1	20	0.5	30	Not Published	Disclosed at 2020 AABC
Samsung	Sulfide		2	1000	3.4	60	20	2020 paper
SES	Polymer + Liquid		Not Published	60	1.7	Not Published	Not Published	Disclosed at 2020 AABC
			3/4	750	0.2C	25 °C		2021 SPAC Presentation
			25 (4Ah)	550	0.2C	25 °C		
QuantumScape	100% Ceramic		4	>800	3.1	30	3.4	QS Shareholder Letter
			1	>1000	3.2	30	3.4	

PLEASE NOTE: The data presented above is made as of July 24, 2021 and is based on information that we have been able to obtain, infer or derive from publicly disclosed materials and presentations. This information likely will change over time and QuantumScape does not make any representations as to the accuracy and completeness of the competitive data presented, nor does it make any claims about the actual performance of the cells being developed by other companies. By presenting this information, we are do not undertake any obligation to update this chart to reflect events or circumstances after the date they were made, whether as a result of new information, future events or otherwise, except as may be required under applicable laws.

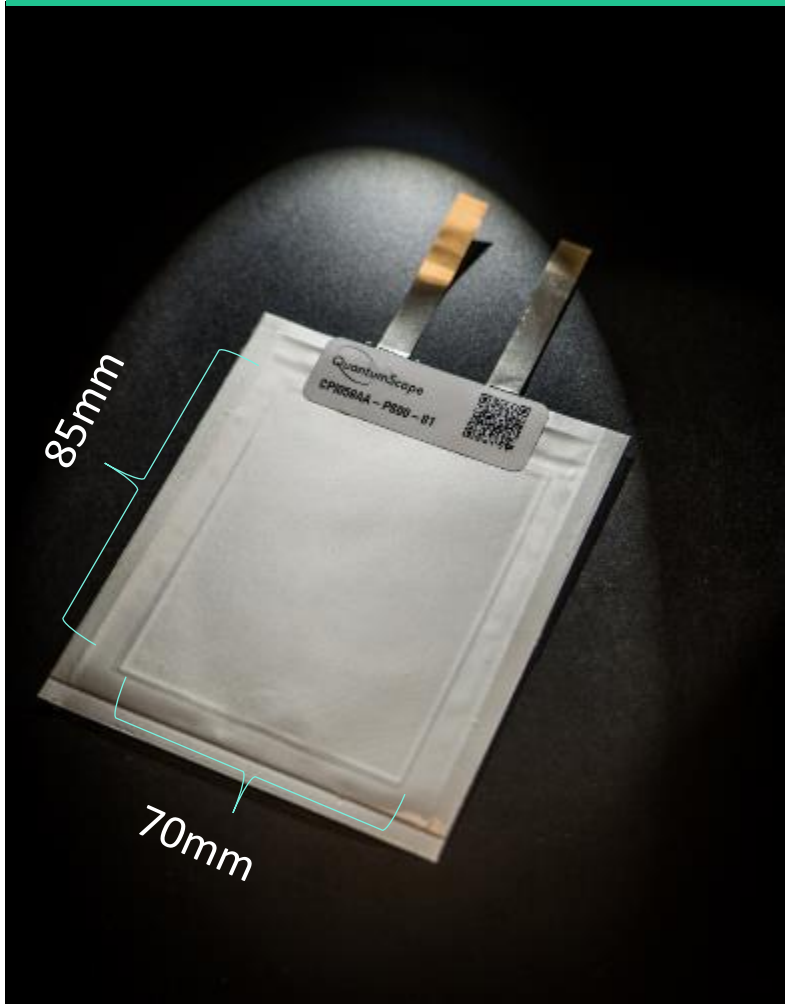
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QuantumScape Material & Cell

CERAMIC SOLID-STATE SEPARATOR



SINGLE LAYER CELL



MULTI LAYER CELL PROTOTYPE



Battery Life/ Dendrite Resistance

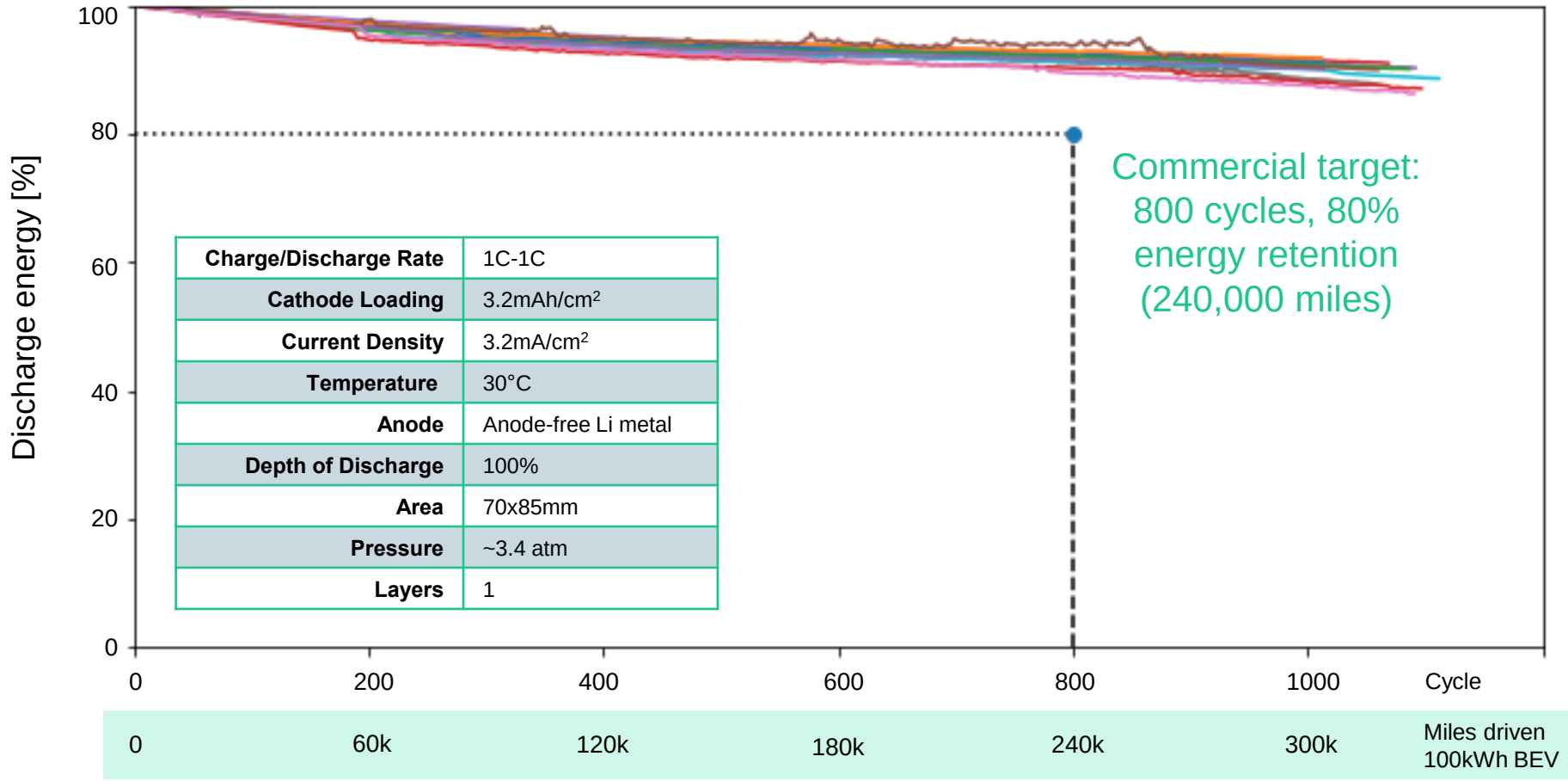
Single layer prototype

Cycling with >80% energy retention in 1000+ cycles

Chart based on 1C accelerated testing (3x typical automotive rates)



Cycle Life Under Commercially Relevant Test Conditions



Charge/Discharge Rate	1C-1C
Cathode Loading	3.2mAh/cm^2
Current Density	3.2mA/cm^2
Temperature	30°C
Anode	Anode-free Li metal
Depth of Discharge	100%
Area	70x85mm
Pressure	~3.4 atm
Layers	1

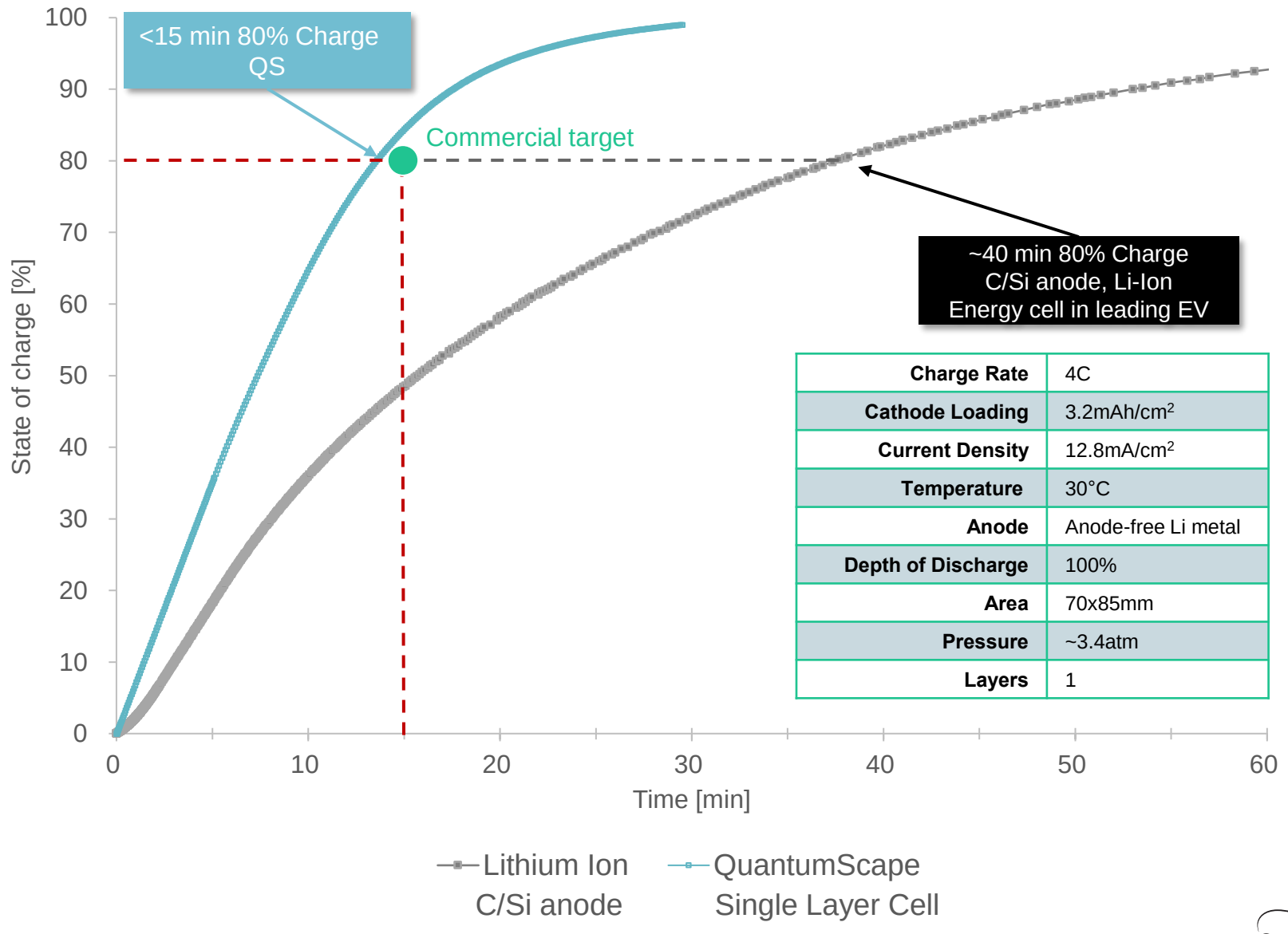
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Fast Charging

0-80% Charge in 15 minutes
10-80% Charge in 12 minutes



Fast Charging



Charge Rate	4C
Cathode Loading	3.2mAh/cm^2
Current Density	12.8mA/cm^2
Temperature	30°C
Anode	Anode-free Li metal
Depth of Discharge	100%
Area	70x85mm
Pressure	~3.4atm
Layers	1

Source: MyEV.com and Tesla.com

Updated: 12/14/2020

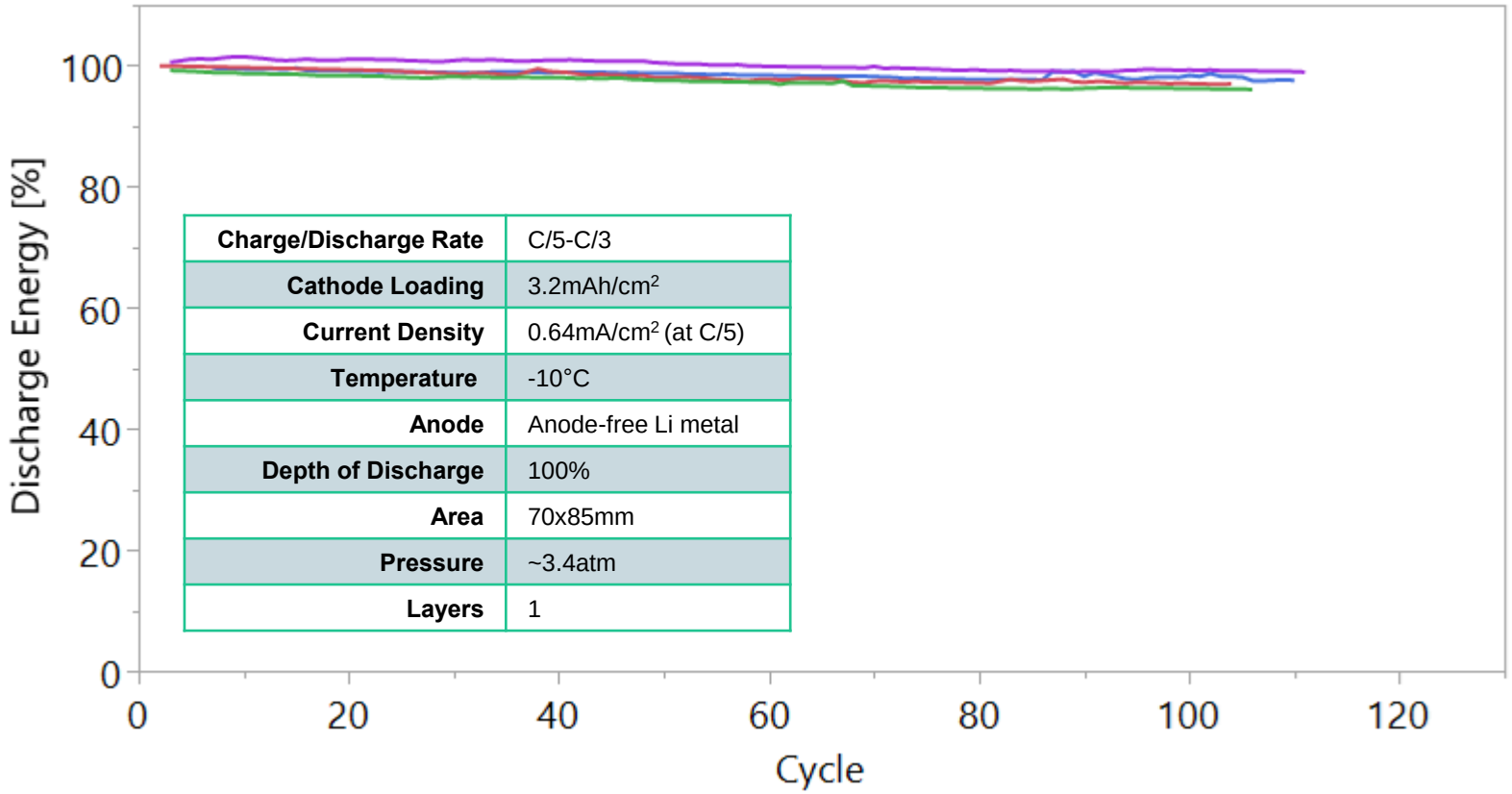
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Cell Performance:
Low Temp

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



Low temperature life



Charge/Discharge Rate	C/5-C/3
Cathode Loading	3.2mAh/cm^2
Current Density	0.64mA/cm^2 (at C/5)
Temperature	-10°C
Anode	Anode-free Li metal
Depth of Discharge	100%
Area	70x85mm
Pressure	~3.4atm
Layers	1

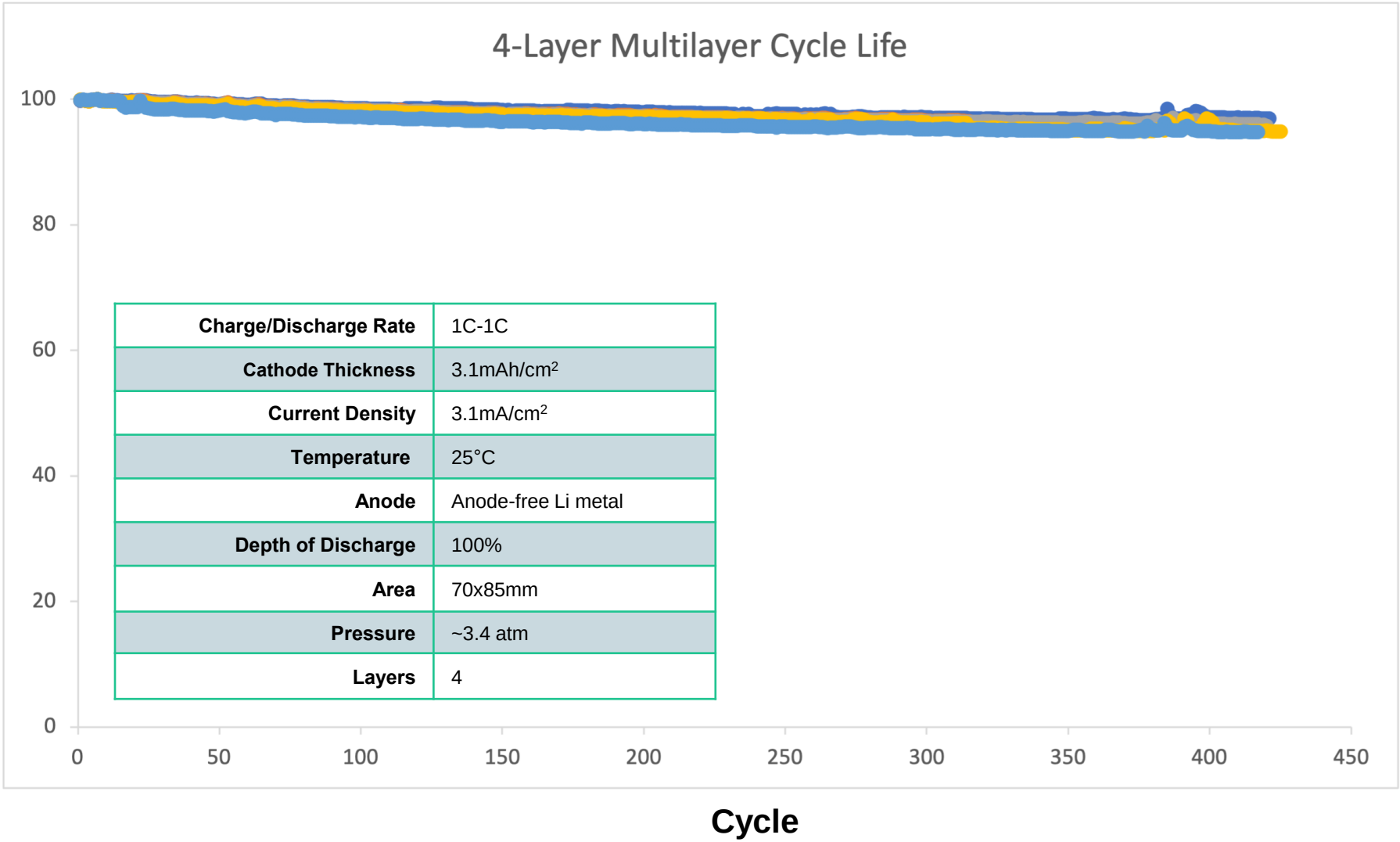
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4-layer Cells

Early results from 4-layer multilayer cells demonstrate ability to retain cycling performance in multilayer cells



4-layer Multilayer Cycle Life



Charge/Discharge Rate	1C-1C
Cathode Thickness	3.1mAh/cm^2
Current Density	3.1mA/cm^2
Temperature	25°C
Anode	Anode-free Li metal
Depth of Discharge	100%
Area	70x85mm
Pressure	~3.4 atm
Layers	4

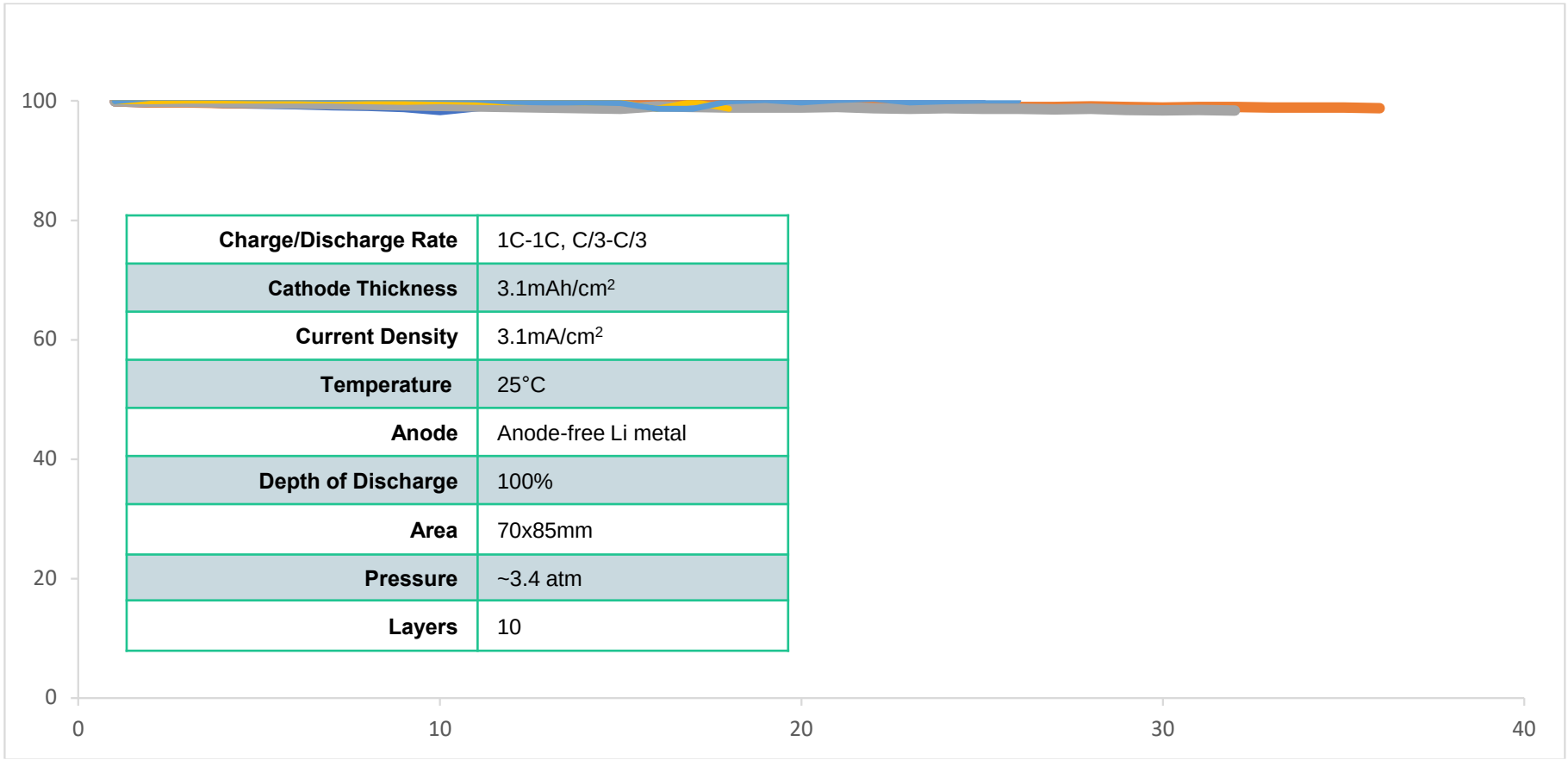
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10-layer Cells

Initial results from 10-layer cells demonstrate ability to retain cycling performance as layers are further scaled



10-layer Multilayer Cycle Life



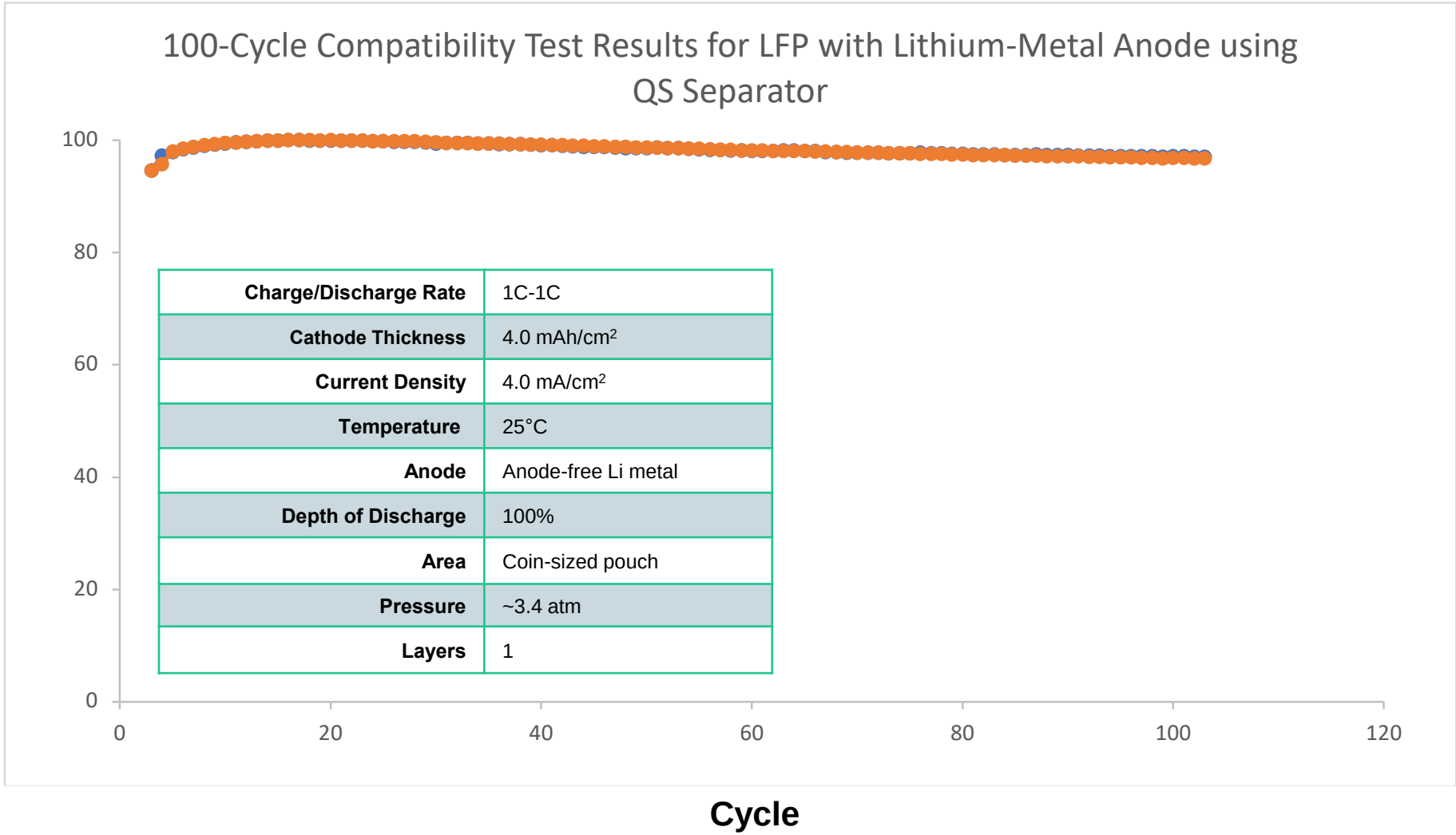
Charge/Discharge Rate	1C-1C, C/3-C/3
Cathode Thickness	3.1mAh/cm^2
Current Density	3.1mA/cm^2
Temperature	25°C
Anode	Anode-free Li metal
Depth of Discharge	100%
Area	70x85mm
Pressure	~3.4 atm
Layers	10

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LFP Cathode Cells

Initial results demonstrate the flexibility of the solid-state lithium-metal chemistry and cell design to work with LFP

100-Cycle Compatibility Test Results for LFP with Lithium-Metal Anode



Charge/Discharge Rate	1C-1C
Cathode Thickness	4.0 mAh/cm^2
Current Density	4.0 mA/cm^2
Temperature	25°C
Anode	Anode-free Li metal
Depth of Discharge	100%
Area	Coin-sized pouch
Pressure	~3.4 atm
Layers	1

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Deep Partnership with VW

Volkswagen Group Overview

- ~8.9 million vehicles produced in FY2020
- ~$41 billion investment in electric mobility by 2025[1]
- Plans to launch ~70 electric vehicle models and produce 25 million vehicles on electric platforms by the end of 2029
- Over 450,000 electric vehicles to be delivered to customers in 2021, more than double the 2020 figure

Select Brands



"[Solid-state] is the end game for lithium-ion battery cells"

– Frank Blome, Head of Battery Cell and System, Volkswagen Group Components

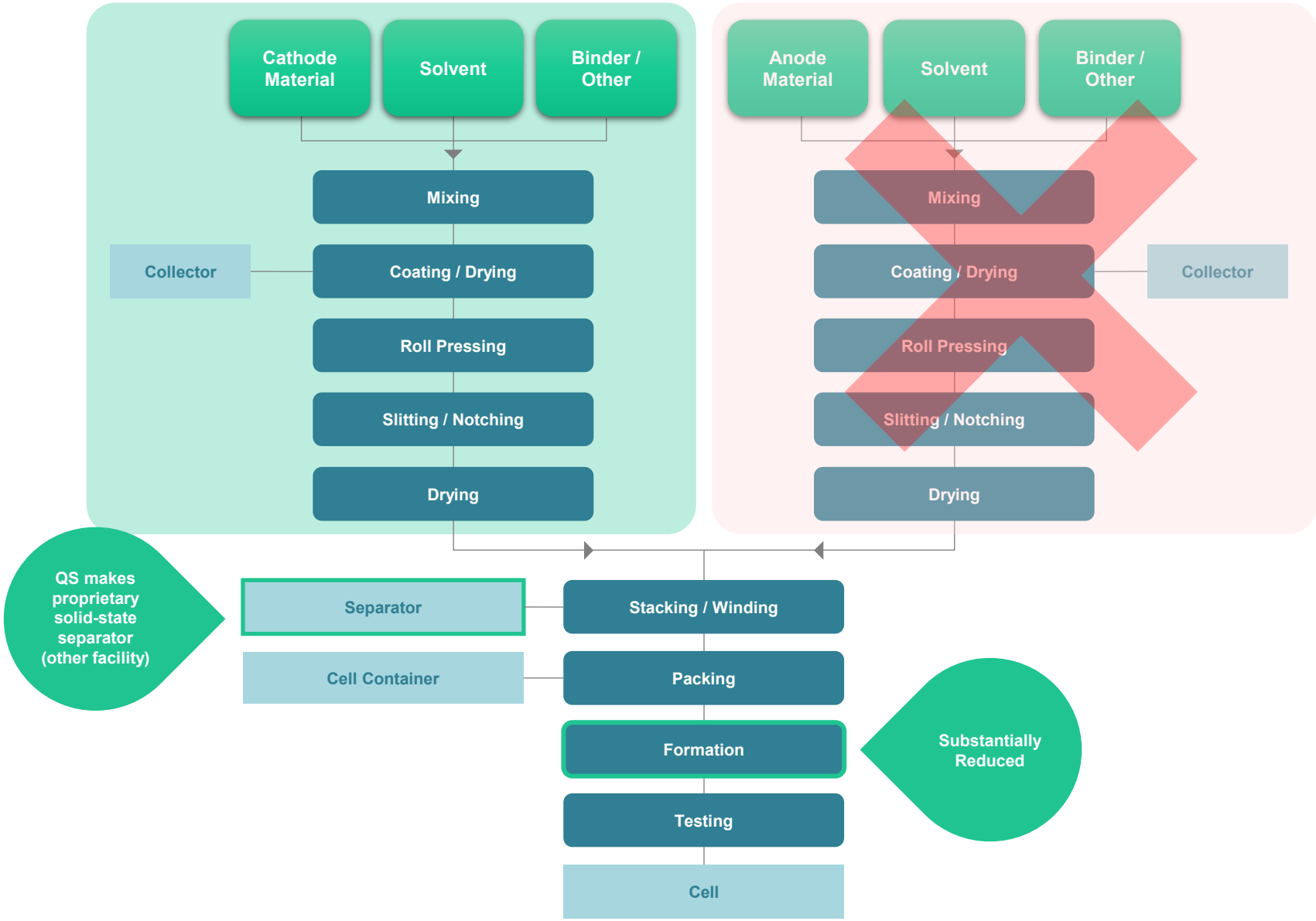
Volkswagen Partners with QuantumScape

1. VW and QS have partnered since 2012
2. Representation on the QS board of directors
3. Formed 50/50 JV to accelerate commercialization of QS' solid-state batteries, with capacity ramping to 21 GWh/yr; Site selection underway
4. Close collaboration with VW Battery Center of Excellence
5. VW has tested multiple generations of QS cells and has publicly validated performance at automotive power levels
6. Non-Exclusive: VW has first priority to cells, but allows QS to explore commercial opportunities with other partners

Sources: 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); Volkswagen AG press release published Sep-2018; Company press release May-2021

[1]Reflects ~*€35* billion investment converted at a EUR/USD rate of 1.18 as of 13-November-2020.

Our Technology Eliminates Anode BOM and Manufacturing Costs



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Uses Abundant Materials and Continuous Flow Production Processes





Separator precursor materials are abundant and widely used in other industries

Continuous flow production processes already used at scale in battery and ceramics industries

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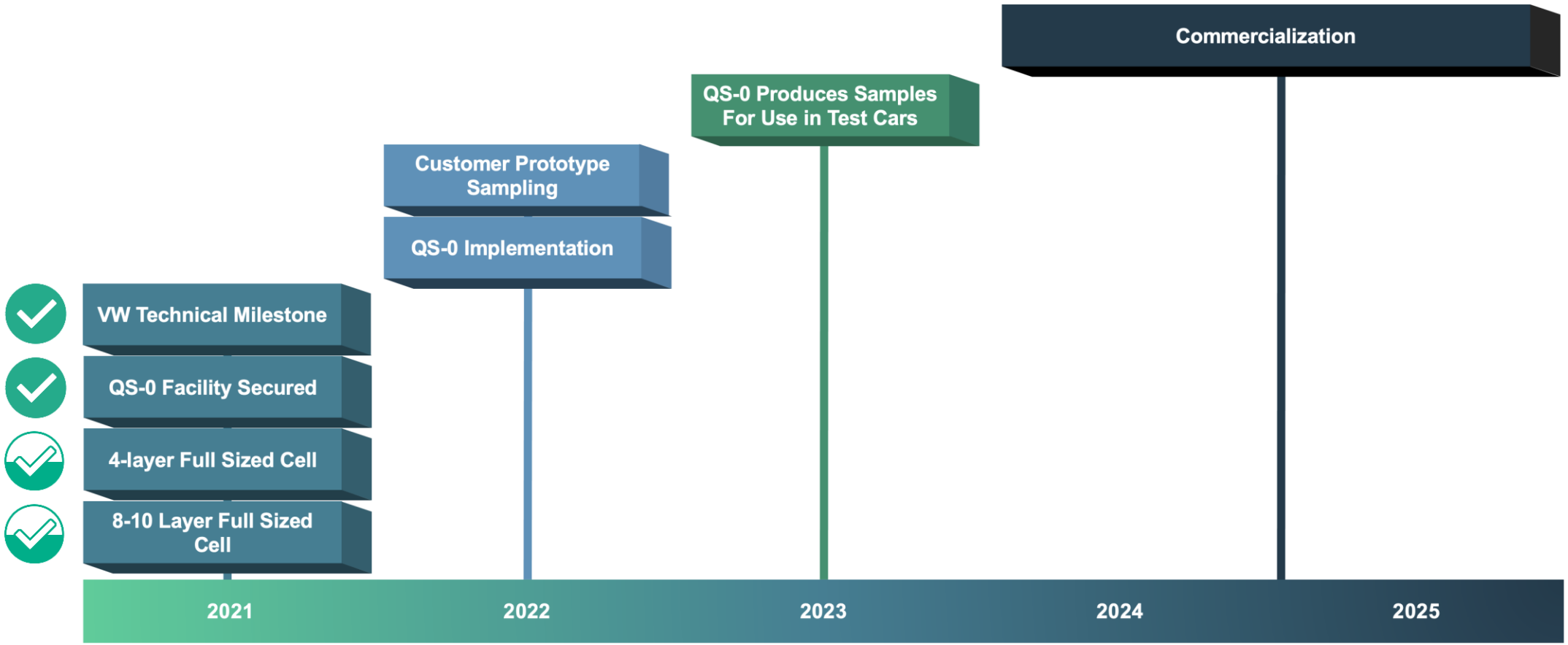
Key Remaining Tasks

Improve Separator Process

Increase Layer Count in Multilayer Cell

Improve Volume Manufacturing Processes

Key Milestones



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