GReen

iNnovation in

enERGY

Who is	• Grinergy is a technology start up developing next generation lithium battery, revolutionizing safety, low temperature performance and charging capability
Key members	• Founded by engineers from Apple, Hyundai, Samsung and LG. • Combined experience of more than 70 years from Battery, Electric Vehicle and Battery material development
History	• Founded February, 2017
Funded by	• Cosign Investment: Geinergy's first angel investor • Coolidge Corner: TIPS(Technology Incubation Program for Startups) partner VC • Atics Engineering: Strategic Investment • Korean Venture Investment Corp: Korean Government sovereign fund • Other individual angel investors
Products	• LTO based battery cell: -20^{o}C charging, 10x fast charge and >400^{o}C safety • LTO based Automotive Start & Ignition Battery pack: 60% weight & 50% sizer reduction • Lithium Metal Battery Cell: 400Wh/kg
IP	• 3 Korean Patents awarded • 7 PCT filed • Awarded Certificate of Technical Achievement by TCB

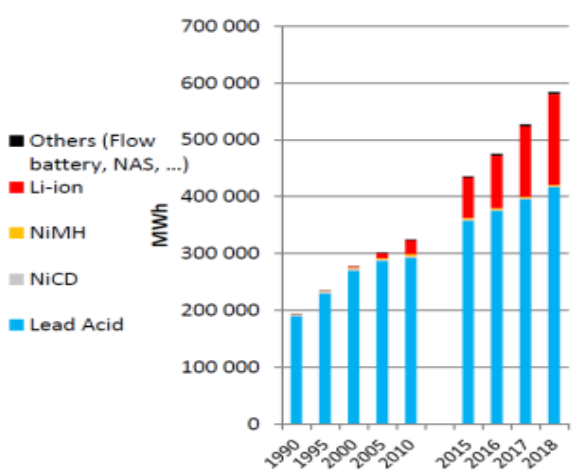
Battery in everyday life!!

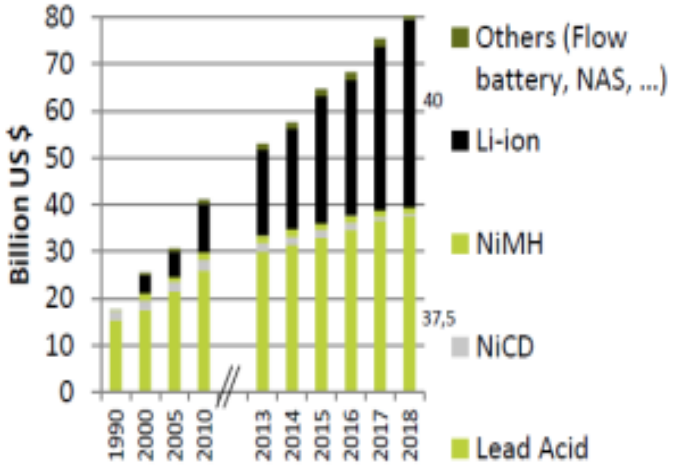
Market & Industry: Background

US$80B market is dominated by two types of battery:

- Lead Acid Battery: 47%
- Lithium Ion Battery: 50%

Global Battery Market Worldwide in 2018, US$80B



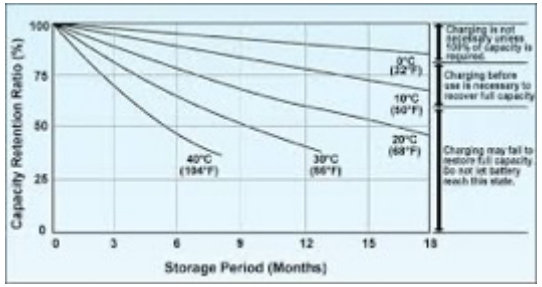


AVICENNE ENERGY Analyses, Jul. 2019

Market & Industry: Lead Acid

- Toxic and Carcinogenic
- Environmentally hazardous
- Durability & reliability

Inability to retention charge reduce performance & life

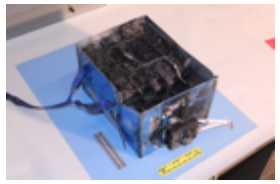


Toxic & carcinogenic substances create environmental and health issues

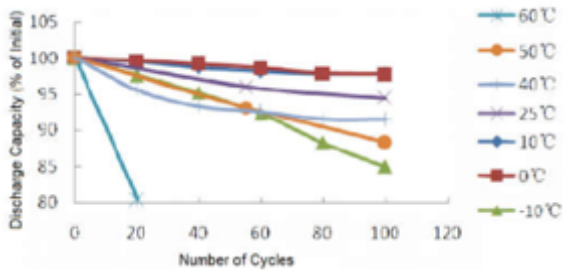
Market & Industry: Lithium Ion

- Safety; explosion and fire
- Lower temperature performance
- Inability charge fast

Lithium ion could explode ~200°C



Lithium ion's discharge curve at different temperatures



EV can not charge at sub-0 temperature

Watch: Teslas, EVs Were Struggling During the Polar Vortex, Too

BY STEPHANIE VALERA 02.01.2019 :: 4:18PM EDT

23 SHARES

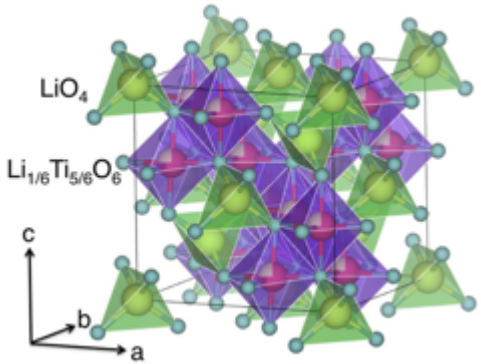
Grinergy Value Proposition: LTO

charge below
Zero temperature

charge at
10 times faster rate

safety improved by
increasing thermal
run-away temperature

energy density
increased to
400Wh/kg



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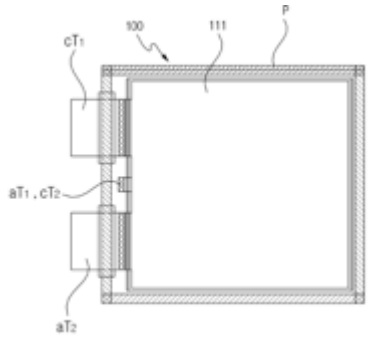
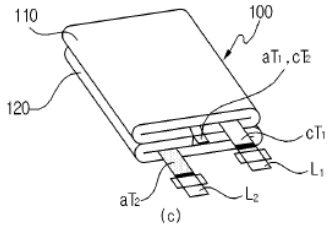




LTO chemistry with patented serial structure to increase the voltage (KR 10-1935229)

Solution creator: IP & Patents

3 Korean patents awarded, 7 additional patents & PCT filed

- 1 x LTO Battery Cell: Awarded
- 5 x Solid electrolyte: 2 Awarded
- 2 x Lithium metal
- 1 x Battery charging strategy
- 1 x Integrated busbar design for Battery pack

Solution creator: IP & Patents

dun&bradstreet

제 NDB-2019-01-023120호

우수기술기업 인증서

Certificate of Technical Achievement

(주)그리너지(Grinergy)

사업자번호 : 881-88-00727
대 표 자 명 : 정병훈,방성용,손용규
기 술 분 류 : (200905)이차전지
핵심기술명 : 리튬이차전지 개발 및 제조 기술
주 소 : 서울특별시 강남구 역삼로 169, 2층 (주)그리너지 (역삼동, 명우빌딩)

위 기업은 나이스디앤비의 기술평가 결과
기술경쟁력 및 기술사업역량이
우수한 기업임을 인증합니다.

T-3

인증일자 : 2019.06.27
유효기간 : 2019.06.27~2020.06.26

(주)나이스디앤비 대표이사

Certificate of Technical Achievement ◈ National Information & Credit Evaluation ◈ Dun & bradstreet

TCB* Technical Achievement Award

* Korean Government sanctioned agency

A Leading Credit Information Provider KOREA ENTERPRISE DATA

I. Technology (Credit) Rating

Grenergy Co., Ltd.

Overview

Company Name	Grenergy Co., Ltd.		
CEO	Jung Byeong-hun and two others		
Business Registration No.	881-88-00727	Corporation No.	110111-6331685
Date of Establishment	May 23, 2017	Website	www.grinergy.co.kr
Company Size	Small Business	Company Classification	Regular Corporation
Address	(06247) A 5 District, 2nd Flr., 169, Yeoksam-ro, Gangnam-gu, Seoul		
Phone	TEL) 02-567-7127	FAX) 02-555-0801	
Submitted to	Others (for reference)		

Technology Evaluation Rating (for investors)

TI-3

Evaluation Date	August 7, 2020
Fiscal Year-end Date	December 31, 2019

Rating Information

Technology Evaluation Rating (for investors)	Very Weak	Weak	Inadequate	Below Average	Average	Above Average	Fair	Very Good	Excellent	Top
	TI-10	TI-9	TI-8	TI-7	TI-6	TI-5	TI-4	TI-3	TI-2	TI-1

Comprehensive Opinion

Grenergy Co., Ltd. (evaluated company) is a non-audited corporation established in February 2017. It engages in the manufacture of battery with lithium secondary battery as the main product. The company had total assets of KRW 1,200 million and equity capital of KRW 658 million (paid-in capital of KRW 329 million) won as of the end of December 2019 and two full-time employees as of the evaluation date.

The company's core technology is the "Development of lithium secondary battery with enhanced low-temperature performance, safety, and charging performance by using LTO cathode." The company is manufacturing products that can be used in small batteries with a new type of jelly roll serial connection structure using LTO cathode to secure superior charging characteristics, long life, and safety from explosion compared to conventional batteries.

The company's products have been tested for safety at low and high temperatures by the Korea Testing Laboratory (KTL) and Korea Testing Certification (KTC) and confirmed to be safe from leak, ignition, and explosion. The company has been in talks with Gridwiz, Jae Sung Electronics, MediaTech, KORAIL, and Defense Agency for Technology and Quality to develop additional technologies for the application of lithium secondary cell in batteries for emergency power in railway, batteries for military vehicles, ESS batteries, and electric carts.

Considering its technological differentiation, management capability, know-how, and commercial potential, the company is significantly likely to realize high growth based on excellent technology and growth potential. Therefore, we give a technical assessment grade of TI-3.

2

KED KOREA ENTERPRISE DATA

TI-3 TER awarded by KED*

* Korean Government sanctioned agency

Value Proposition: LTO

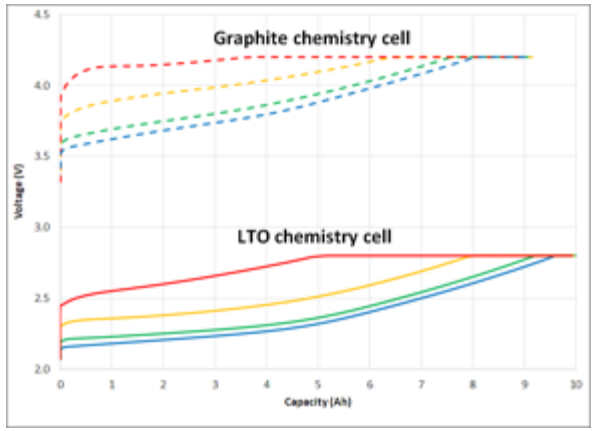
- Large form factor LTO cell for high power, fast charge & harsh environment application is production ready

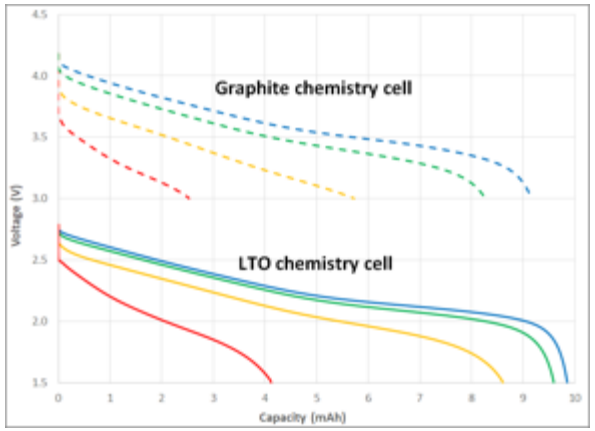
Item		10Ah	20Ah
Nominal capacity (Ah)		10.6	20
Nominal voltage (V)		2.4	2.4
Dimension (mm)		(W)203 x (D)7.1 x (H)106.5	(W)203 x (D)12 x (H)106.5
Operating voltage (V)		1.5 ~ 2.8	
Power	Generation (W)	840	
	Regeneration (W)	1750	
Rate Capability (%)		88.9	
Weight (g)		250	
Energy density (Wh/kg) / (Wh/l)		100 (Wh/kg) / 162 (Wh/l)	
Power density	Generation (W/l)	4000	
	Regeneration (W/l)	8000	
Charge/discharge max. current (A)		> 100A	
Storage/Operating temperature		-30 to 55°C	
Cycle Performance (100% DOD @25°C)		> 1000 cycles (10C/10C)	

Value Proposition: LTO

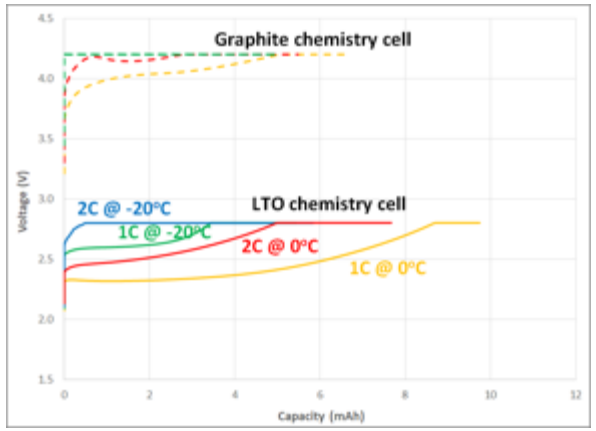
Validation, reliability & certification testing completed

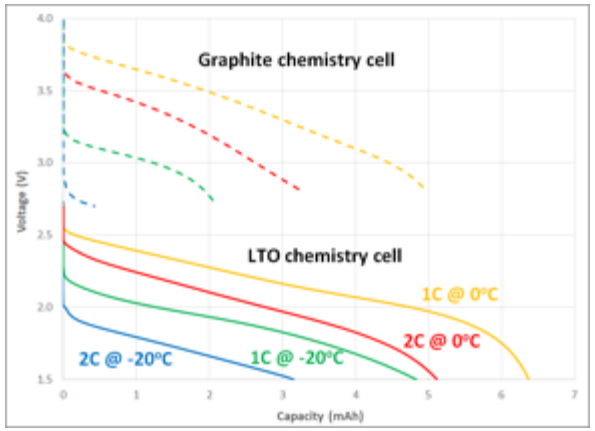
Nominal Temperature Performance: 1C, 2C, 5C,10C charge & discharge



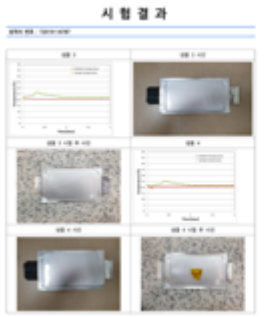


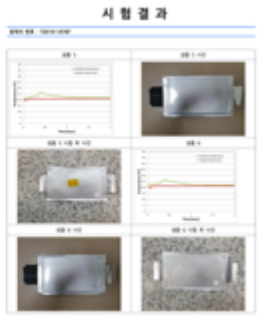
Low Temperature Performance @-20°C: 1C & 2C charge & discharge





UL1642, UN38.3 and KC62133 passed





Value Proposition: Technical Readiness

Full operational lab in Boston & Chungju

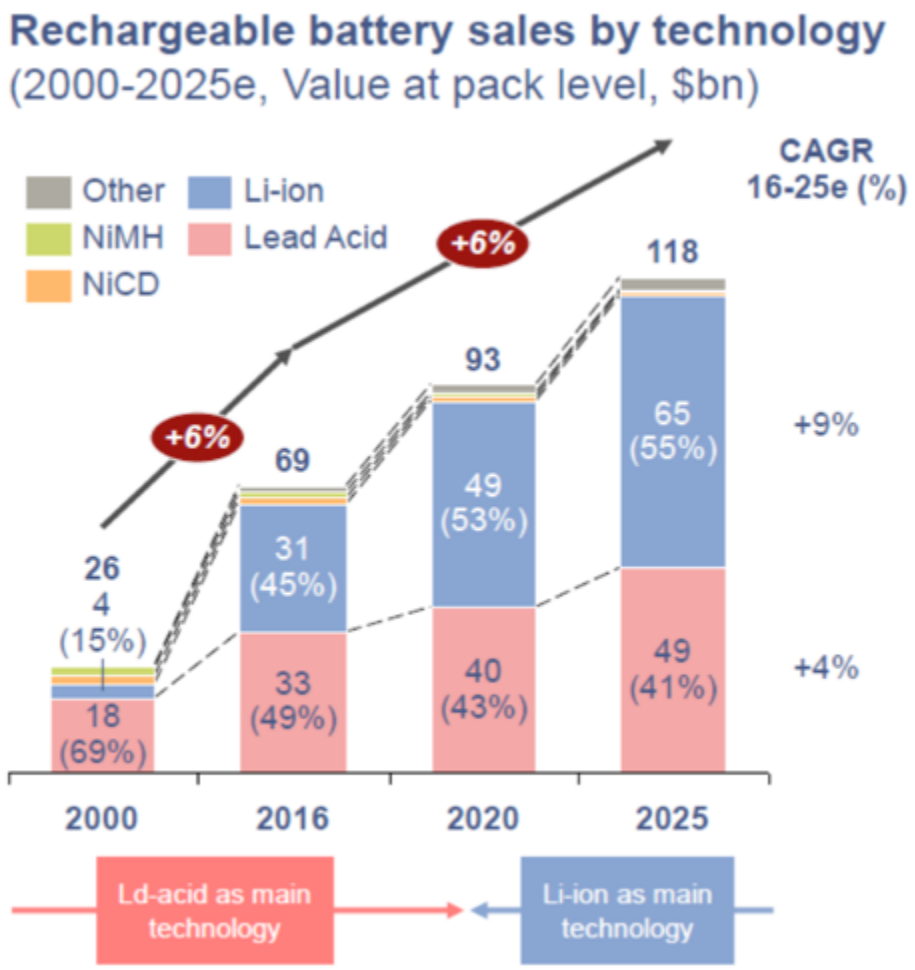
Boston Lab

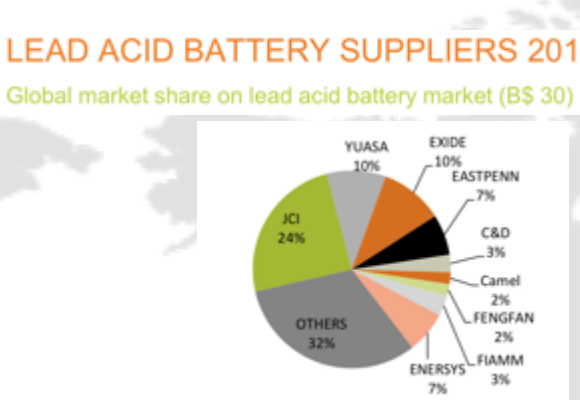
- Concept Development
- Proof of Concept
- Button cell/Gel & Solid electrolyte

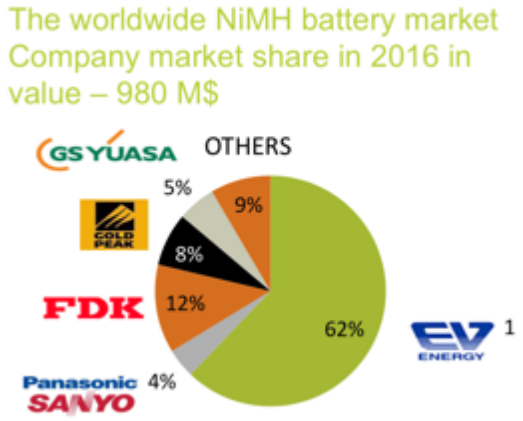
Chungju Manufacturing

- Full Prototype Development & Validation
- Small to large form factor cells(up to 50Ah)
- Pilot Production, up to 40,000cell/yr

Addressable Market: Near Term







US$50b+

Value Proposition: LTO

Validation completed and ready for deployment

Application	High speed rail Emergency battery	Military Battery	ESS Battery Cell Module	Marine Electric Powertrain
				
Partners	KRI 한국철도기술연구원	TQ DTaQ 국방기술품질원 Defense Agency for Technology and Quality	Gridwiz	ATiCS
Specification	64.8v/30A battery pack	12v/100A(crank) battery pack	12v/10a battery cell module	12v/100A generator

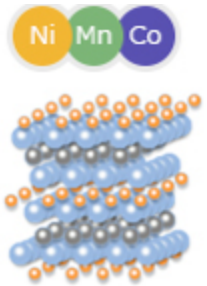
Grinerav Value Proposition: Lithium Metal

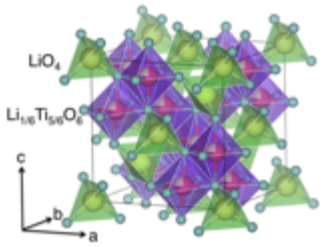
charge below
Zero temperature

charge at
10 times faster rate

safety improved by
increasing thermal
run-away temperature

energy density
increased t0
400Wh/kg





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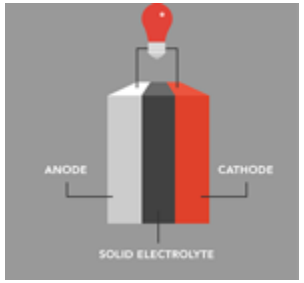
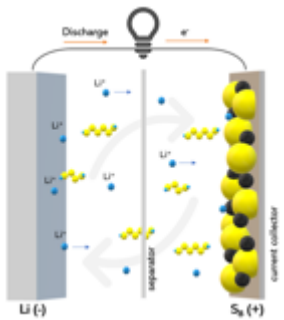
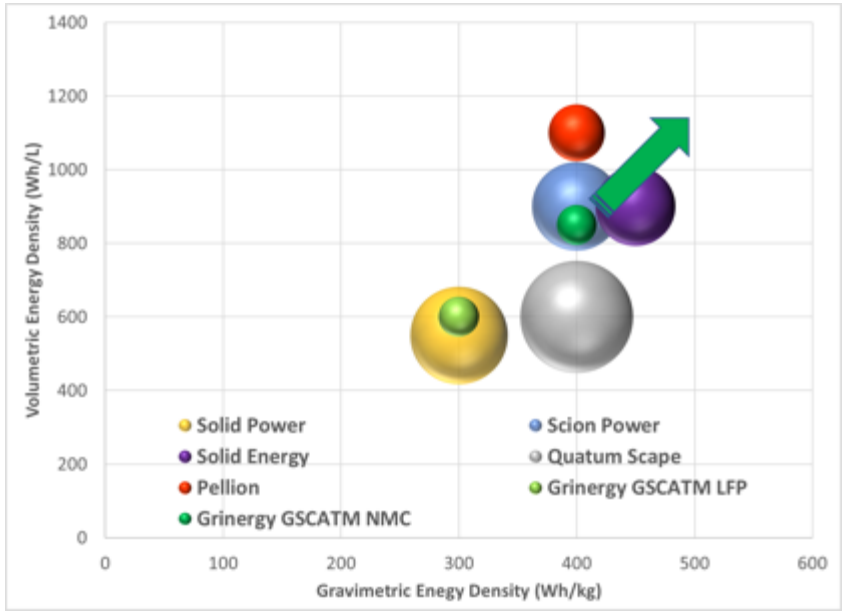




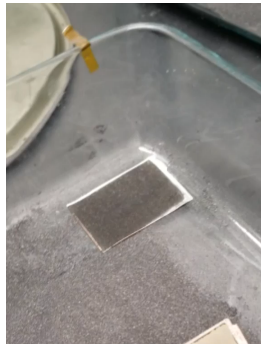
Value Proposition: Next Generation

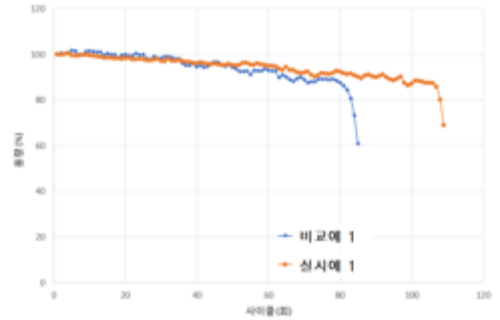
Next generation Lithium Metal with patented surface treatment and unique design



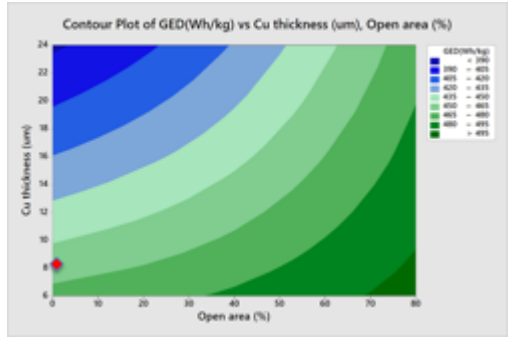
- Patented surface treatments improves life durability and safety
- Unique perforated film design allows the best energy density in the world

Lithium Metal Surface treatment; patented

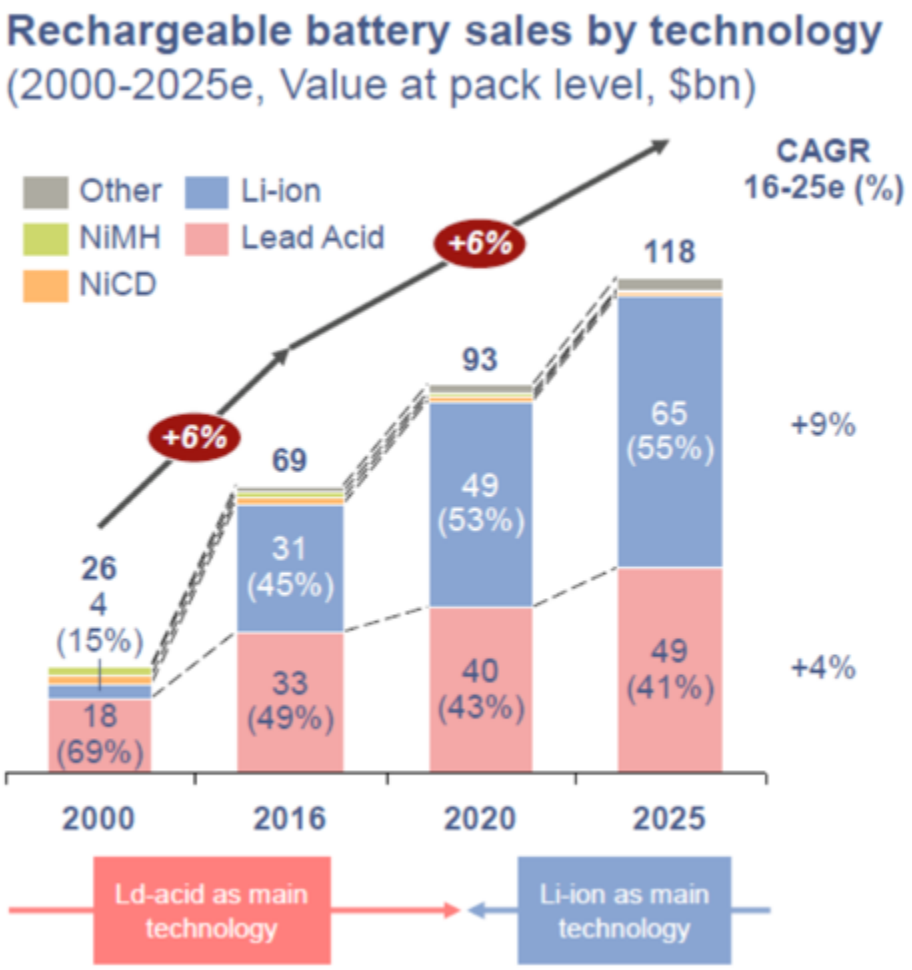




Perforated Anode design



Addressable Market: Long Term



	Solid Power	QuantumScape
Founded	2011	2010
Raised	$20m	$100m
Series/Round	3(B)	5(D)
Investors	• Cradle • Samsung Ventures • Solvay • A1234	• VW • Prelude • Keiner
Revenue(/yr)	$5.3m	$25m
Key Tech	Solid State Battery	Solid State Battery

Business Model: POC/Market Entrance

Customer	D&I Technology (KOR)	(KOR)	(US)	(KOR)	DA Communication (KOR)
Project	High speed train battery pack	Battery Cell Module for ESS	Lithium Battery Cell Assembly & Cathode material	Racing and High P erformance Start & Iginition Battery	Powerpack for Camping and Utilities
Revenue	$5mil	$0.4mil/yr	$0.7mil	$0.8mil/yr	$0.5mil/yr
Timing	2021 ~ 2025	2020 ~	12/2020 ~ 7/2021	6/2021 ~	4Q/2021~
Status	Contract completed	Cell development completed	Price Negotiation	Prototype Test in progress	MOU signed


GO+ GRINERGY

Grinergy as Solution creator

New LIB technology solution creator
with Flexibility & Creativity

LTO Technology

- Business awarded in 2018 & 2019
- Production: 2020
- Performance validation completed

S2 Technology

- 3 x POC prototypes
- 1 x patent published

Solid-State Electrolyte

- Concept design completed
- 4 x patent filed

Lithium Metal Technology

- 2 x patent filed

Lithium Sulfer Technology

Guro Lab

Boston Lab

Over combined 70 years of Battery Cell, Battery Pack, EV & Consumer Electronics R&D experience

Team – Founders/Board of Directors

SY Bang

Academic – MBA from Aalto University

M.S. University of Colorado, in Aerospace Engineering

B.S. Michigan Technological University

Experiences – Expert in electric car development, 18 yrs. in electric car industry with experience from Apple, LG, Tesla, Hyundai Motors

BH Chung

Academic - Ph.D. Texas A&M University, in Mechanical Engineering

M.S. University of Michigan, in Mechanical Engineering

Experiences – Expert in strategic planning, 14 yrs. in IT industry with experience from Samsung Electronics (TSST)

Dr. Battery

Academic – M.S. & B.S. Sungkyunkwan University, in Chemistry

Experience – Expert in battery cell development, 16 yrs. in battery cell industry with experience from Apple, Johnson Control, Samsung SDI

Team – Core members

BH Chung: CEO

MD Cho, R&D Center Head

Academic – M.S. & Ph.D. New York Polytechnic University, in Chemistry

Experiences – Principal Engineer at Samsung Electronics, focused on electrolyte development

SI Hwang, Principal Engineer

Academic – M.S. University of Seoul, in Material Science & Engineering

Experience – Expert in battery cell development & manufacturing

Van Hiep Nguyen, Senior Research Engineer

Academic – M.S. & Ph.D from Chonnam National University, in Electrical Engineering

Experiences – Expert in ESS and Secondary battery cell development

Grinergy is a lithium ion battery technology company with multiple solutions to revolutionize the shortcomings of the conventional lithium battery industry and replace lead acid battery in the market. Its technologies are consisted of a patented LTO cell structure, Solid-state electrolyte & Lithium metal technologies. Grinergy's first product will provide 10x fast charge, ability to charge at -20^{o}C and superior safety performance compared to the conventional lithium battery. Key differentiator of Grinergy are wide spectrum technology development experience of key members to develop both new chemistry and structure of battery, as well as battery pack as a system.

Solution creator: IP & Patents