LYTEN

ALTA 2024 28 YEARS
27 - 31 May | Perth, Australia

Moving up the Value Chain: From Mines to Batteries

ALTA 2024 Conference

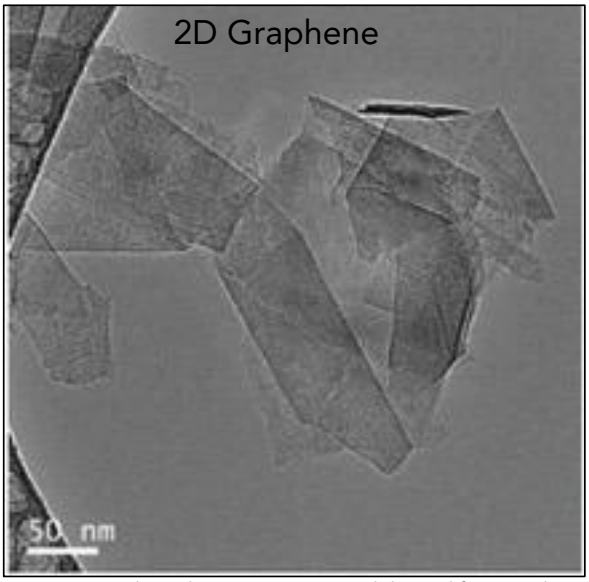
Perth, Australia
May 30, 2024

LYTEN OVERVIEW

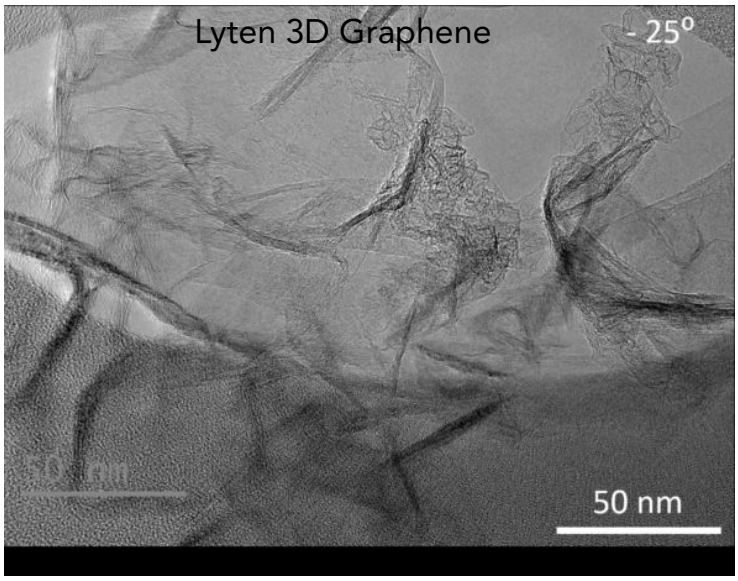
- Founded 2015 – Produce Lyten 3D Graphene™
- Leader in 3D Graphene Patents (>415 patent matters)
- >$410M Raised; finishing Series B
- Initial Applications of Lyten 3D Graphene™
  - Lithium-Sulfur Batteries
  - Composites
  - Sensors
  - US Government Applications
- 145k ft^2 Facilities in Silicon Valley
  - 3D Graphene Fab (2022)
  - Pilot Cell Production Line (2023)
- > 280 employees; >70% advanced degree [2]

3D GRAPHENE: AN ENABLING BREAKTHROUGH

Proprietary manufacturing method; proprietary application tuning

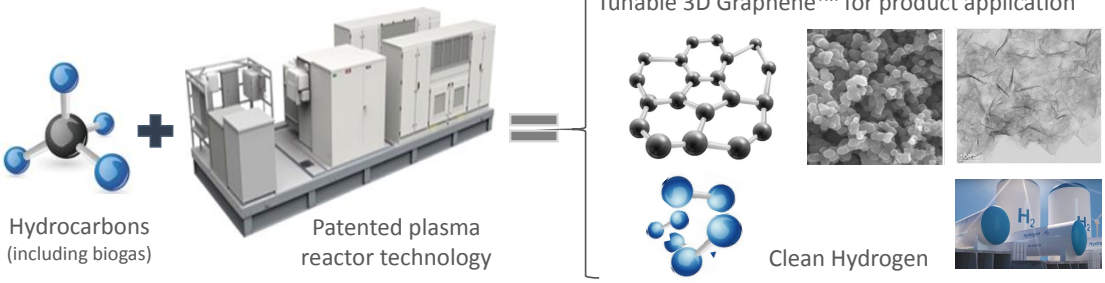


Conventional graphene: expensive with limited functionality



3D graphene: complex structure with high functionality, readily manufacturable

LYTEN 3D GRAPHENE™ PROCESSING

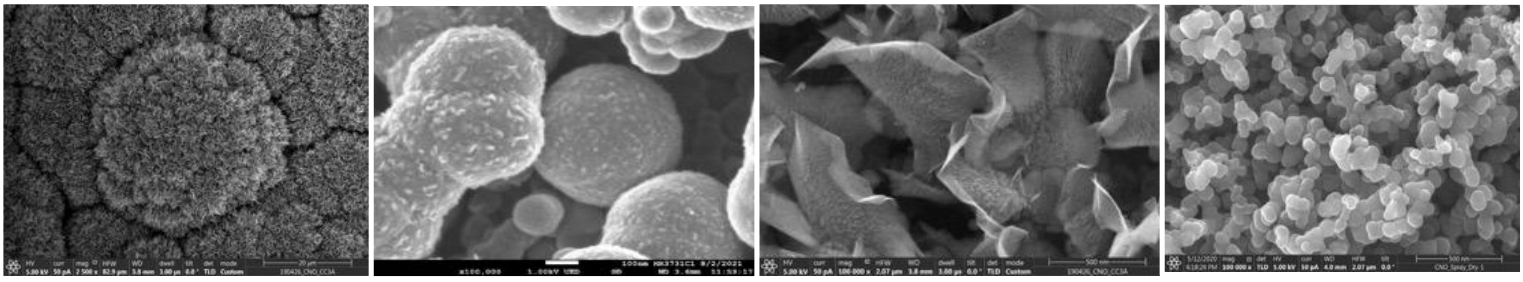


GHG Emissions Target

-2.5

KG CO_2eq / KG 3D Graphene

Lyten 3D Graphene™ targets to be a carbon negative material at scale.*



LITHIUM SULFUR CELL CHEMISTRY

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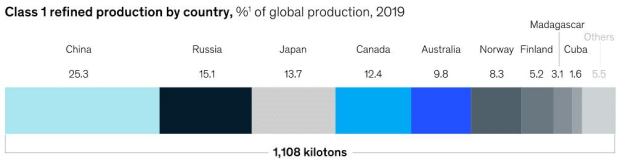
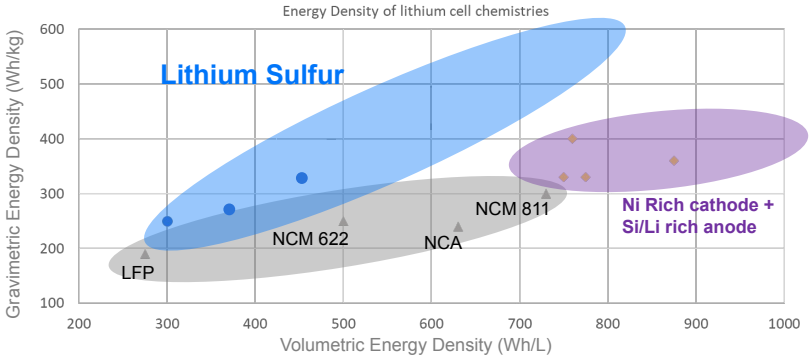
Key Advantages of Lithium Sulfur

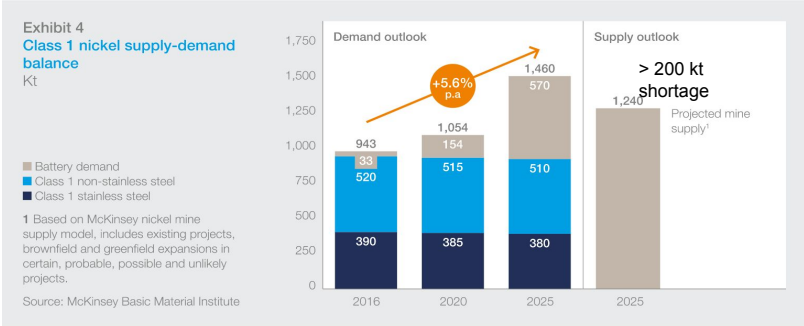
- Nickel/cobalt/graphite - free □ fully domestic supply chain
- Abundant, low-cost materials: sulfur, carbon, solvents
- Inherently safer due to unique conversion chemistry
- At maturity, 600 Wh/kg and 800 Wh/L possible

Key Challenges for Traditional LIBs

- Predominantly foreign-sourced active materials
- Cell performance reaching its fundamental limits
- Nickel shortfall in coming years







CATHODE RAW MATERIAL WEIGHT & COST (2030)

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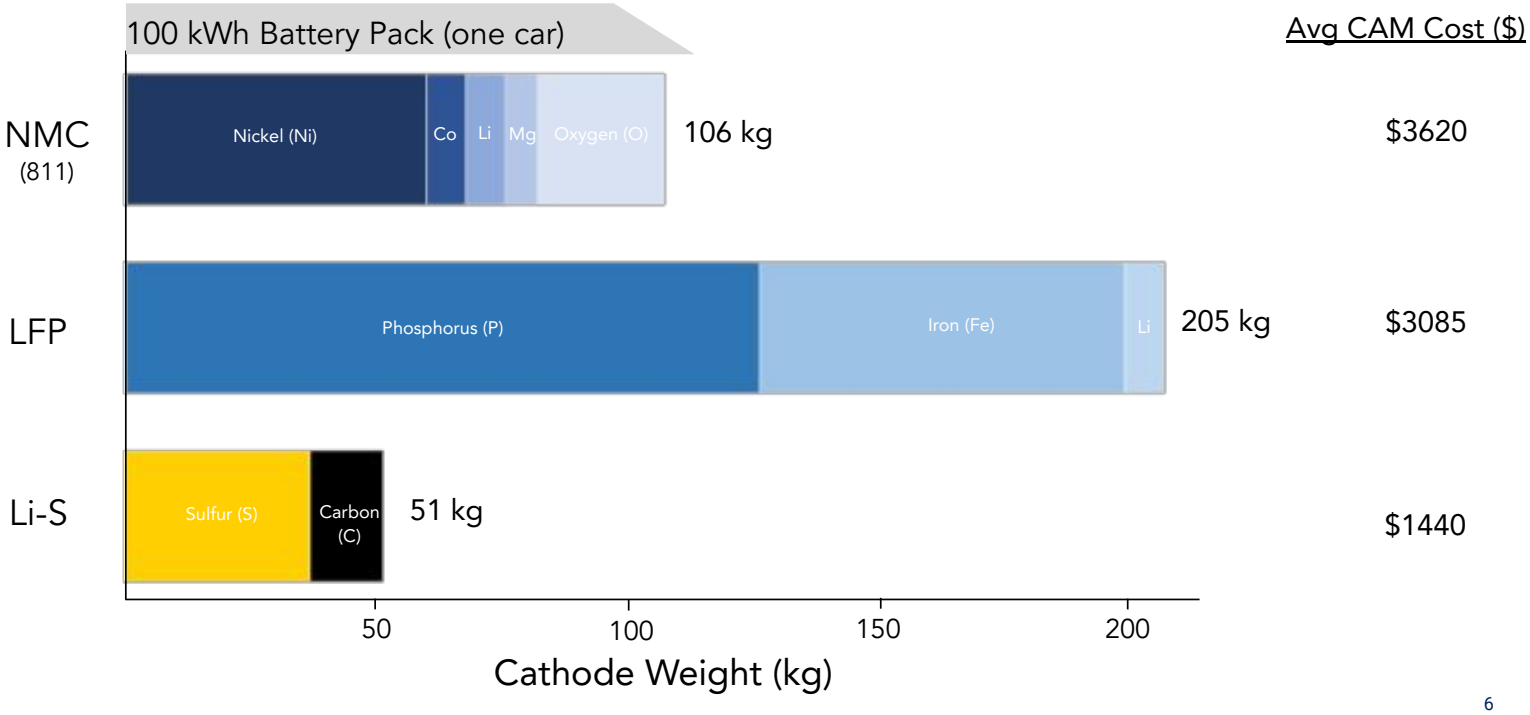

LIFE CYCLE ANALYSIS (CARBON FOOTPRINT)

- Lyten Li-S LCA estimates a carbon footprint of 24.5 kg CO2eq / kWh at scale.
- Result is 50% lower than any other battery in comparison group of 28 batteries from 10 peer reviewed LCAs. Lyten result is 80% lower than the mean of all batteries.
- Lyten working on a pathway to drive the carbon footprint Li-S towards or past carbon neutral.

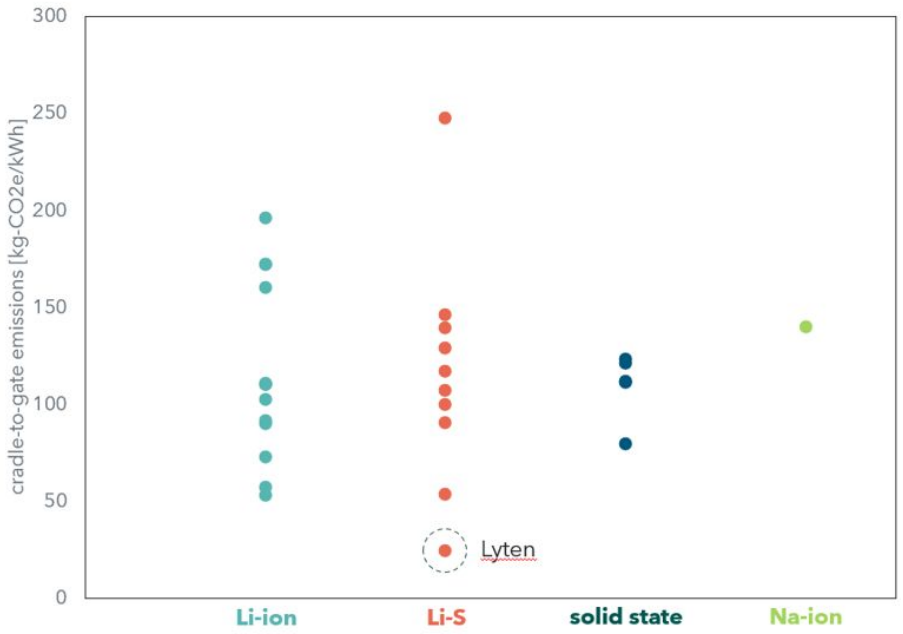

Figure. Cradle-to-gate emissions from 28 battery chemistries analyzed by 10 peer reviewed LCAs (details provided) compare to LCA for Lyten Li-S battery. LCA and comparison study completed by EcoEngineers.

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Li-S Value Proposition

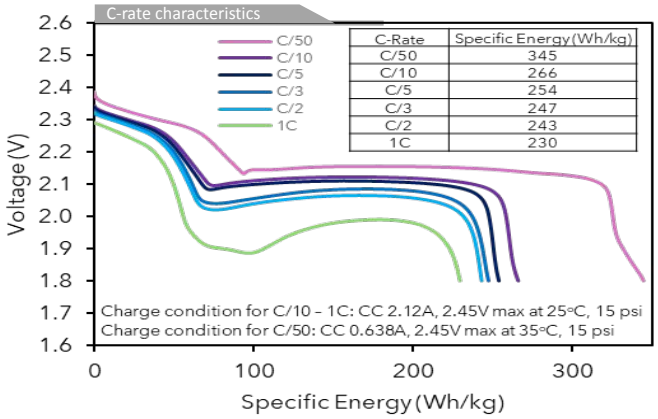
Lowest $/Wh	$	Replacing Ni-based cathodes with Sulfur is projected to lower raw material BOM cost by >50%
High Specific Energy (Wh/kg)	+ −	>2x practical specific energy compared to existing technologies
Abundant and Accessible Raw Materials		Sulfur is abundant in high quantities as a byproduct of minerals and petrochemical production – eliminates world reliance on scarce Ni resources
Reliable North America Raw Material Supply		Target 100% sourced and manufactured in NA: Lyten could help OEMs meet 2025 USMCA mandates
Decarbonization Material Platform		Target: 60%+ lower cell material emissions – eliminate conventional cathode active material production, eliminate conventional graphite processing, generate graphene and H_2 from light hydrocarbons
Safety		Strong resistance to overcharge, metal contamination, and puncture failure modes
Minimal Technology Switching Costs		Lower greenfield capex and minimal incremental brownfield conversion capex due to a simpler manufacturing process and Li-ion B facility compatibility

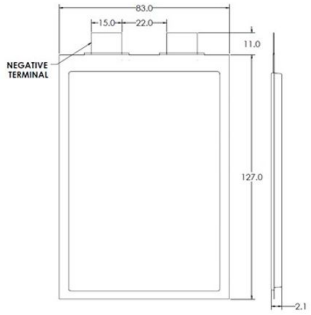
SHIPPING COMMERCIAL LI-S A-SAMPLES

- Capable of up to 345 Wh/kg at C/50, 35°C
- 93% Available energy at 1C relative to C/3

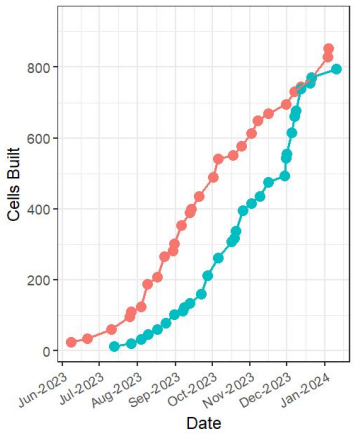
Specifications	
Nominal Capacity	6.55 Ah
Specific Energy	248 Wh/kg
Energy Density	300 Wh/L
Nominal Voltage	2.1 V
Mass	57.2 g
Cycle Life (100% DOD)	230 min. @ 60% Capacity
Max Continuous Discharge	6A @ 1C
Peak Discharge 10s	24A @ 4C (0 – 100% SOC)
DCIR @ 100% SOC, 1C, 10s	1.8 mΩ
Operating Temperature	Charge: 10°C to TBD Discharge: -35°C to 45°C Storage: -35°C to 45°C
Cell Breathing	3 – 5% typical, TBD

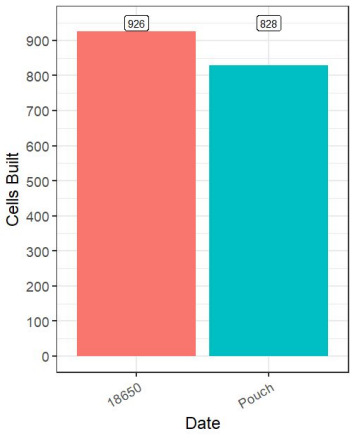
*All values are typical and determined at 25°C, C/D @ C/3 (2.12A), 15 psi

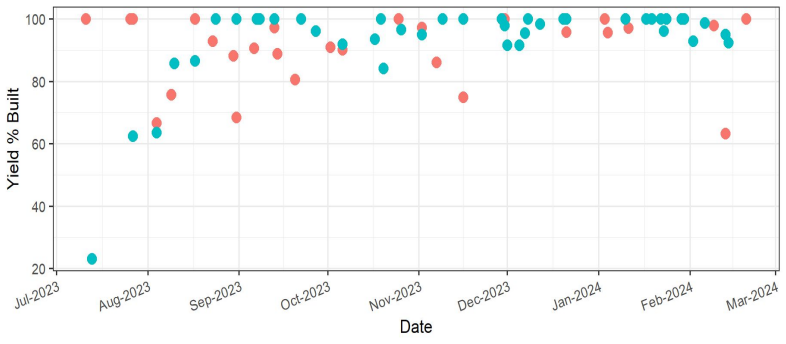




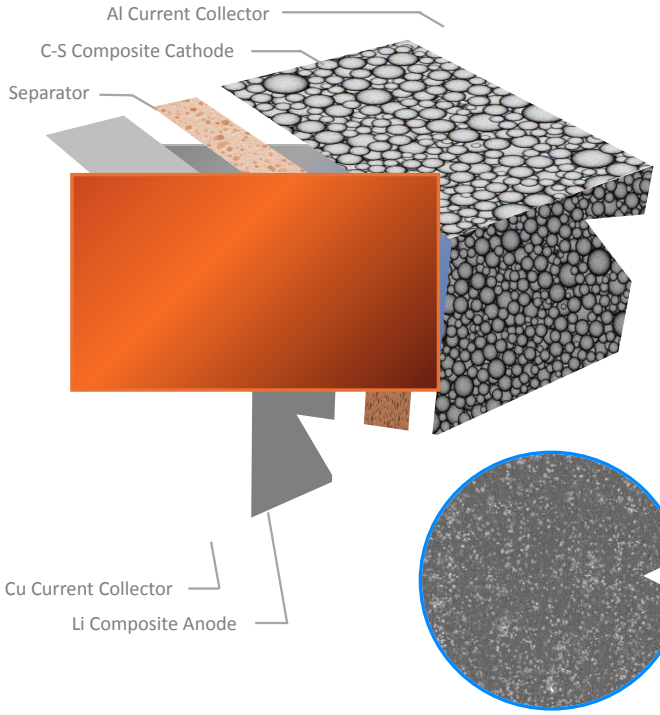
PILOT LINE YIELD AND PRODUCTION NUMBERS





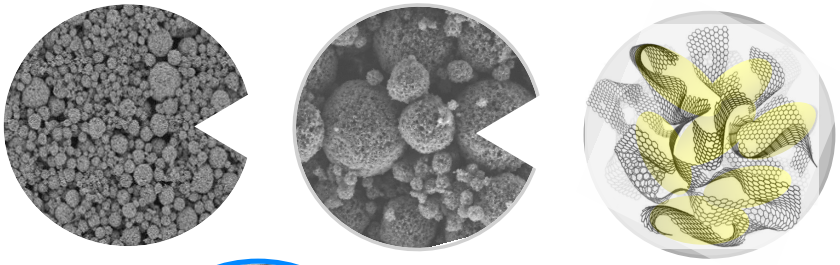


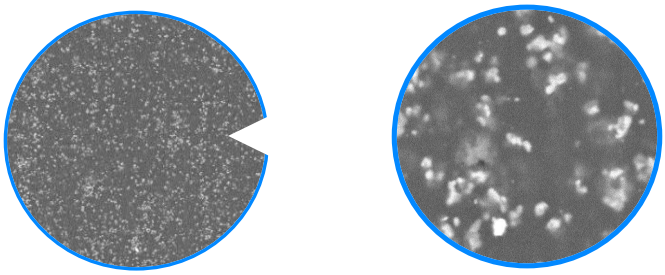
LYTEN Li-S CELL ARCHITECTURE



Nanostructured 3D Graphene™ mitigates polysulfide shuttle

High conductivity of 3D Graphene™ for high charge/discharge rates





Lithium metal composite anode mitigates anode degradation

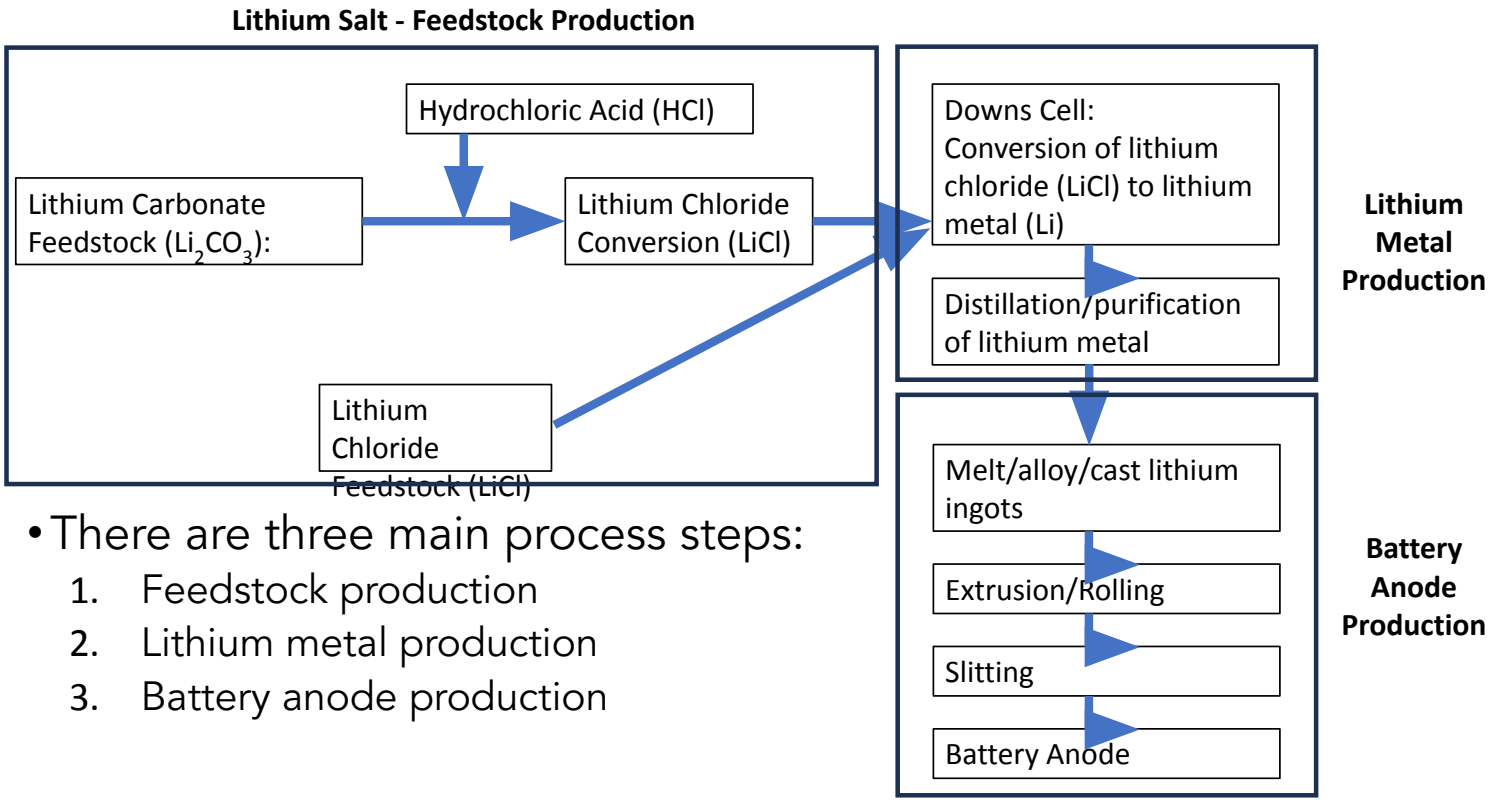
LITHIUM SALTS AND METAL PRODUCTION SUMMARY

- To achieve energy densities required by customers Lyten utilizes lithium metal in the anode of our batteries
- >90% of all lithium metal is produced in China with ~4.5% of worldwide lithium metal produced in the United States
- The most common lithium metal conversion process is using a modified Downs cell to convert lithium chloride to lithium metal
- The inflation reduction act (IRA) changed the dynamic and sourcing strategies for battery manufacturing in the USA
- Lyten is developing lithium metal production and anode processing in-house but is also looking for partners to work on creating a new lithium metal ecosystem based on safety, efficiency, and cost reduction

INFLATION REDUCTION ACT (IRA)

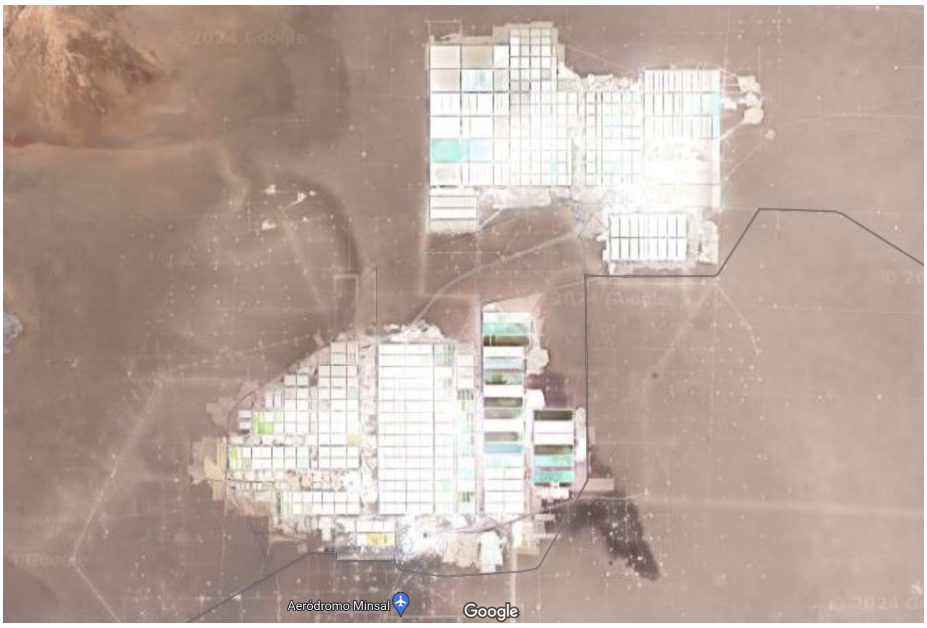
- Inflation reduction act was signed by President Biden on August 16, 2022 and became law
- The inflation reduction act provides subsidies for USA domestic battery manufacturing
- Foreign entities of concern (FEOC) were defined and sourcing products/components from them are not allowed if the manufacturing subsidy is to be received
- The legislation also resulted in defining fifty critical minerals strategically needed by the USA though only lithium is mentioned and not any specific form (e.g. Li_2CO_3, LiOH, LiCl, Li metal, etc.)
- Lyten is developing strategic partnerships to create a non-FEOC lithium ecosystem as we begin building our first Giga-Factory with production expected in late 2026 – lithium metal is the end-goal of this ecosystem

LITHIUM ANODE PRODUCTION



- There are three main process steps:
  1. Feedstock production
  2. Lithium metal production
  3. Battery anode production

LITHIUM SALT PRODUCTION



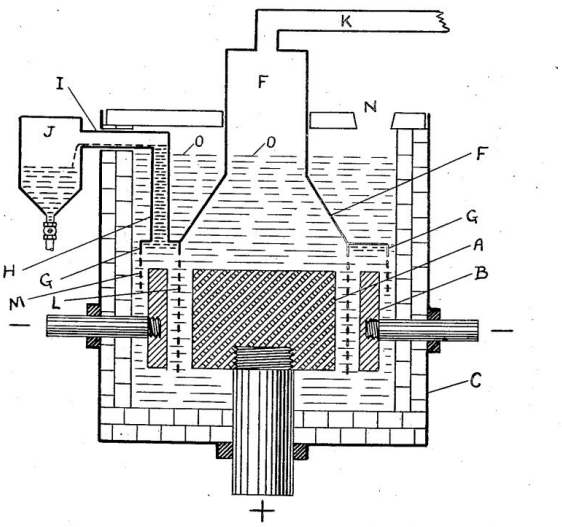
LITHIUM SALT PRODUCTION

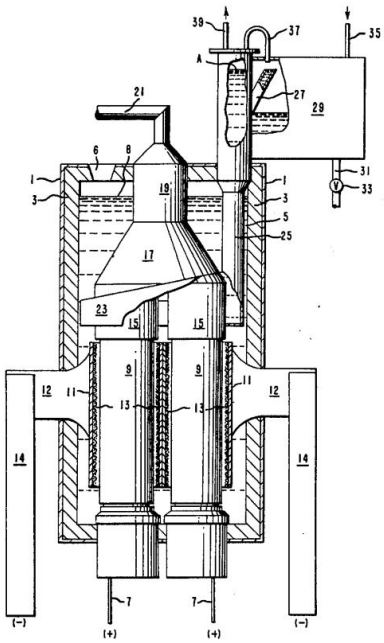
- The main processing routes for lithium salts are:
  - Brine
  - Hardrock
  - Direct Lithium Extraction (DLE)
  - Lithium from recycled batteries
- From all the processing routes there are two main grades of lithium salts that are available for purchase:
  - Technical and Battery Grade
- In the future, to improve sustainability and minimize processing steps Lyten would like to work directly with mining operators to break free of these standard grades and determine what levels of impurities are acceptable:
  - Lithium sulfur batteries can accept significantly higher and different levels of impurities in the feedstock as compared to traditional battery chemistries (NMC, NCA, and LFP)
  - Because the lithium salts will be converted into a distilled lithium metal product the balance between purity and final processing needs to be established

LITHIUM SALT PRODUCTION

- Lyten is actively working with suppliers of lithium salts to identify what impurities can be allowed and at what levels
  - Allowance of impurities and minimizing processing is critical to creating a cost-competitive lithium metal product
- Many producers that we talk to mention that they will make >99% pure lithium salts…this is most likely not needed and will result in over-processing of the mineral
- The end user and the mineral producer need to have constructive dialogs to minimize processing to be cost competitive across the entire value chain

LITHIUM METAL PRODUCTION





LITHIUM METAL PRODUCTION (DOWNS CELL)

- Lithium metal is produced primarily from the conversion of lithium chloride to lithium metal
- A modified Downs cell is used for the conversion (originally used for conversion of sodium chloride to sodium metal)
- Though there have been advancements in cell operation the basic design of the cell has not changed significantly since it was patented in 1924

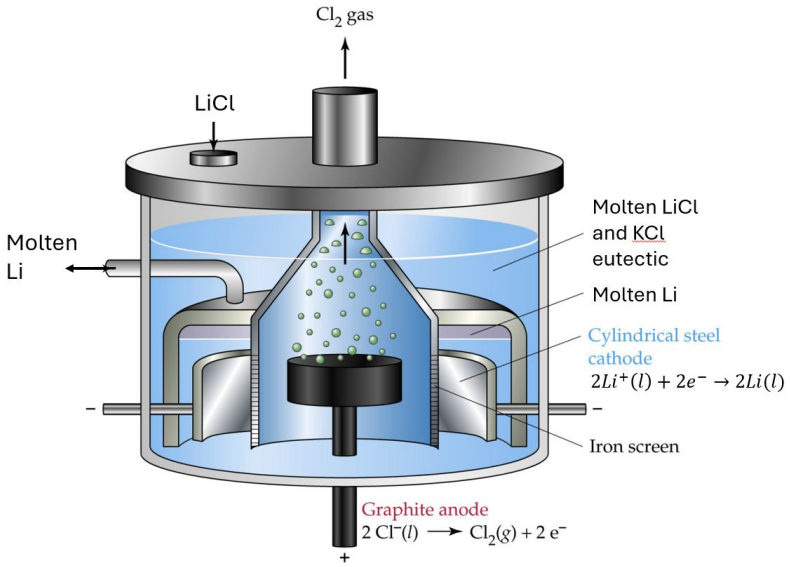


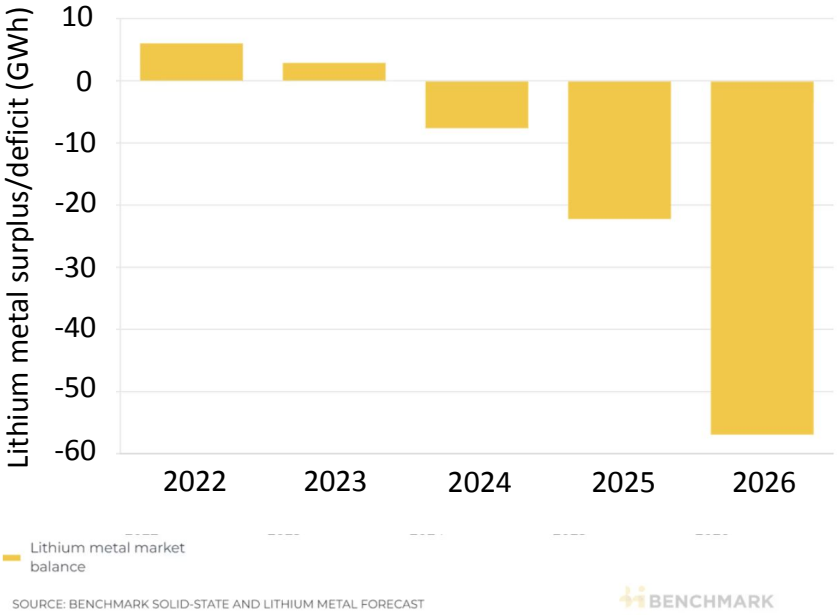
Figure modified from:
CHEM 1180: November 2010

LITHIUM METAL PRODUCTION

- China produces >90% of all lithium metal worldwide
- The USA produces ~4.5% of worldwide lithium metal
- Russia capacity is no longer catalogued

There is not enough available lithium metal for Lyten's growth plans!

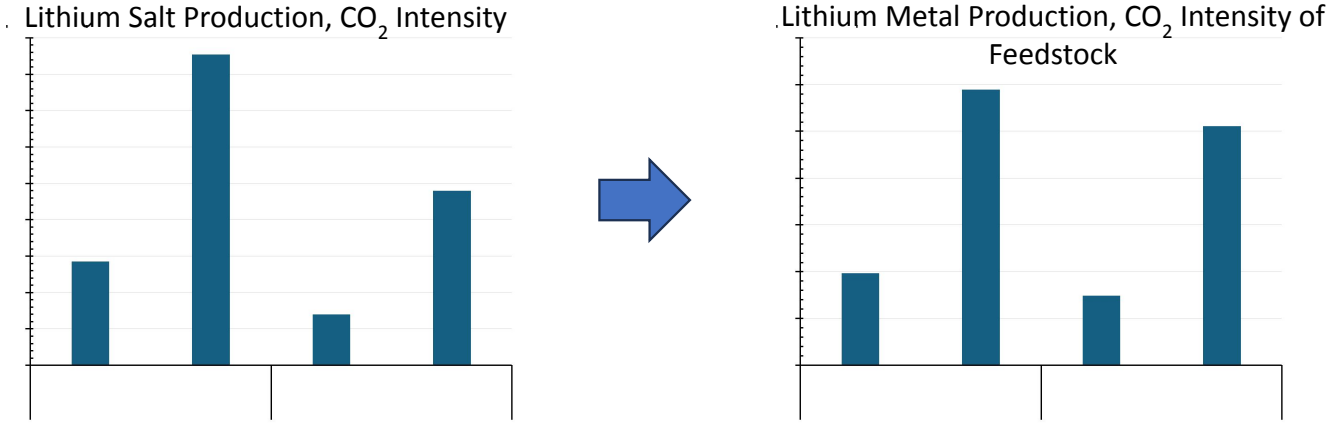
LITHIUM METAL PRODUCTION



- A lithium metal deficit has been predicted and we are seeing this play out with the development of solid state and lightweighting with lithium metal anodes
- To not use Chinese produced lithium in our supply chain we will need to begin building and innovating on production of lithium metal in anticipation of mass production in 2026

LITHIUM METAL PRODUCTION – CO2 INTENSITY

- Hardrock lithium production results in more CO_2 emissions than Brine production however other metrics such as production location, water use, and energy mix will be considered as we move towards mass production of lithium metal
- Using a theoretical conversion of 3.45 for LiOH and 5.32 for Li_2CO_3, the CO_2 intensity for the lithium metal feedstock can be calculated
- Coupled with a low carbon Lyten battery net negative or close to zero total carbon intensity per battery cell can be achieved through the LiOH or Li_2CO_3 processing routes



GHG emissions intensity for lithium by resource type and processing route – Charts – Data & Statistics - IEA

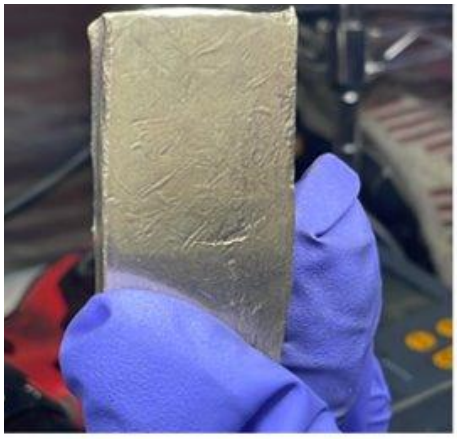
LITHIUM METAL PRODUCTION

- Using the current SMM spot price for Li_2CO_3 and LiOH the input material costs for lithium metal can be calculated
- Processing costs for lithium metal include conversion of feedstock to LiCl and final conversion to metal
- Because the Downs cell is powered only by electricity (as opposed to natural gas) it lends itself well to being powered entirely by renewable energy

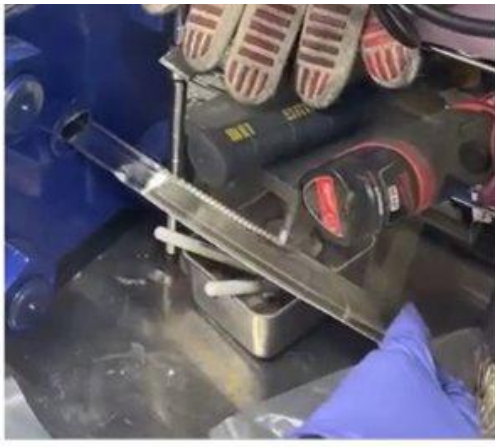
	Product Grade	Cost/kg[1]	Theoretical Conversion	Input Material Cost
Li_2CO_3	Battery (>99.5%)	$14.63	5.32	$77.83
	Industrial (>99.2%)	$14.07		$74.85
LiOH (>56.5%)	Battery	$13.83	3.45	$68.48
	Industrial	$11.98		$59.30
Li Metal	Battery	$124-225		

[1] Spot prices accessed from Shanghai Metal Markets (SMM) on 5/28/2024

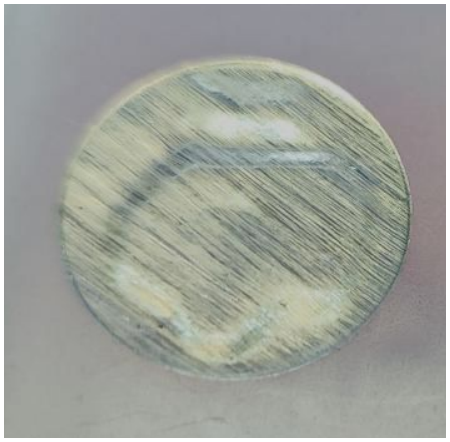
BATTERY ANODE PRODUCTION



Ingot Cut for Extrusion



Extruded (300um)



Cut Li-sample for Coin Cell Testing

BATTERY ANODE PRODUCTION

- Lyten is developing or commissioning the following systems for anode production:
  - On order: Lithium melting/alloying/casting system to produce lithium ingots and the gen2 system is being designed
  - Lyten commissioned a lithium extrusion/rolling system to produce anodes for pouch and cylindrical cells
  - Slitting system for lithium metal has been designed and ordered

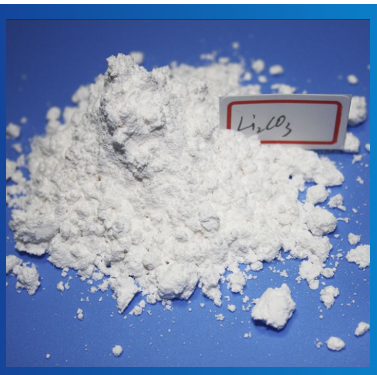
BATTERY ANODE PRODUCTION

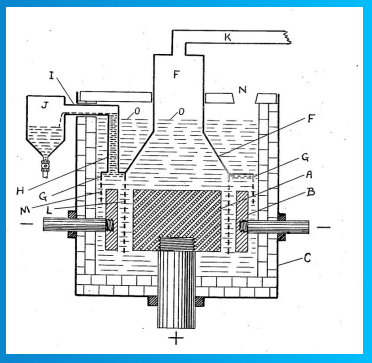
Lithium Extrusion Unit

With the commissioning of the extrusion and rolling mill at Lyten's HQ in San Jose we believe that we have one of the largest lithium processing capacities in North America

Lithium Rolling Mill

Lithium: What is Next?





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LITHIUM METAL INNOVATION

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- Learn from other metal chloride to metal processes (e.g. magnesium, aluminum, and titanium) to determine efficiencies and optimization for future lithium metal cells
- Develop in-house expertise and capability to vertically integrate the lithium value chain from mine to anode.
- Engage directly with mines to source “non-standard” lithium salts
- We believe that with innovation and engagement from mineral processors we can develop the next generation of lithium metal production that is safer, more efficient, and are cost competitive with lithium metal made in China
- Bottom line: there is room for innovation

CONCLUSIONS

- The production of lithium salts falls into commodity "bins" but we are looking to find partners that want to sell a specialty mineral that minimizes processing and CO_2 intensity to create a cost-competitive feedstock for metal production
- Leveraging all the innovation over the last century since Downs original patent, other metal chloride processes, and using modern control systems we are confident that we can create a lithium metal conversion process that is safe, efficient, and cost competitive
- Lithium sulfur batteries can be produced from domestically sourced minerals in any country that has lithium metal, elemental sulfur, and natural gas

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ALTA 2024 28 YEARS
27 - 31 May | Perth, Australia

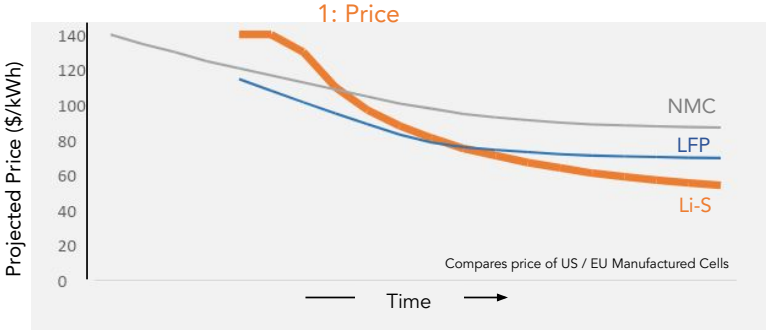
LYTEN BATTERY TEAM

Approximately 80 members: ~ 50 engaged in R&D, ~30 in cell manufacturing

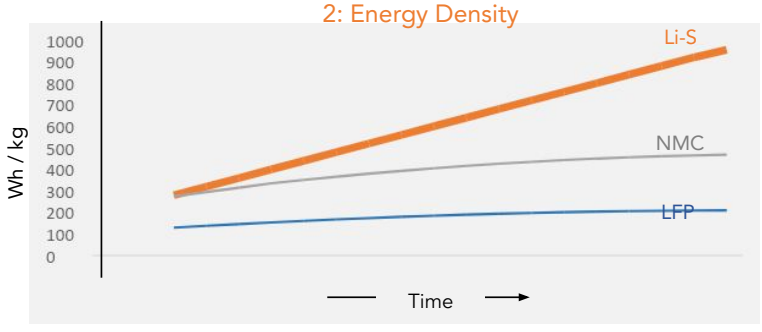
- 20 Technicians, 60 engineers and scientists
- 23% Female
- 30% Caucasian, 20% Asian, 34%South Asian, 12% Latino, 4% African
- Backgrounds in industrial cell development and manufacturing, Cell R&D, and EV, Solar, and Semi-Conductor Industries: Panasonic, Tesla, Rivian, Quantumscape, A123, NexTech, ZAF, Sakuu, AB Systems, Apple, Applied Materials, NOHMs, Paraclete, JPL, PNNL, Sandia National Labs, Joby Aviation, Equity Solar, Lam Research, Micron, 3DXPoint, Intel

Li-S VS NMC (SOLID STATE, Si ANODE) AND LFP

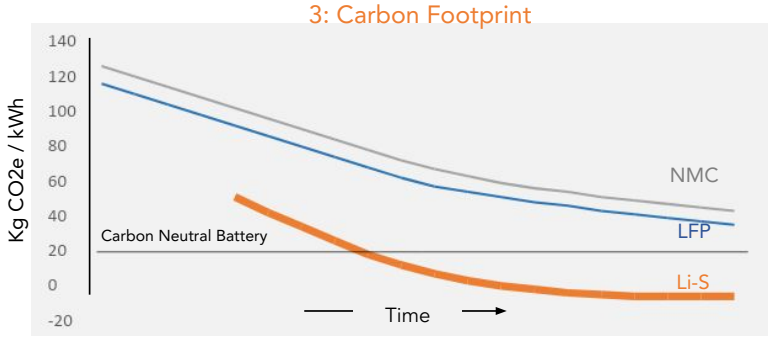
1: Price



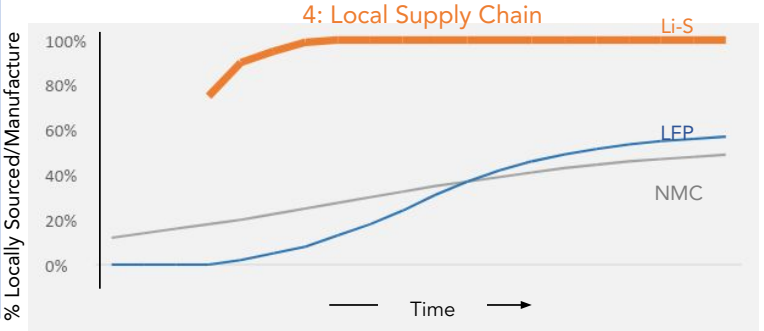
2: Energy Density



3: Carbon Footprint



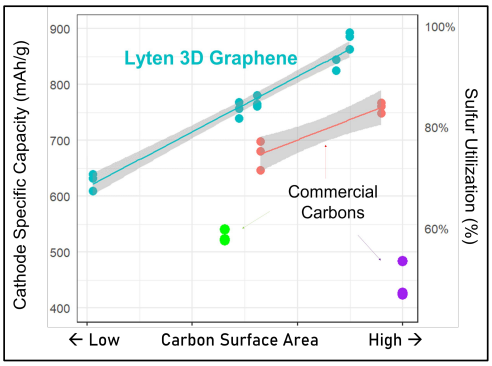
4: Local Supply Chain

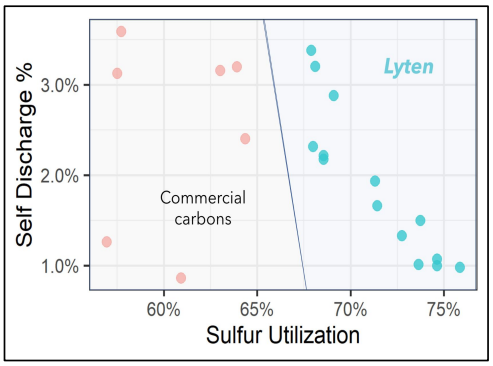


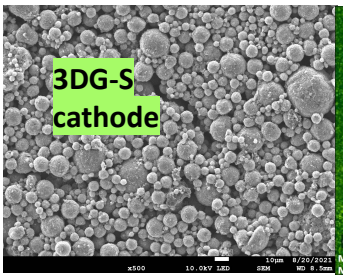
LYTEN 3DG EXHIBITS SUPERIOR PERFORMANCE

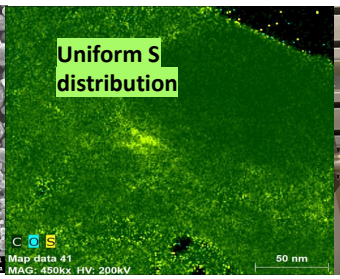
Lyten 3D Graphene forms the primary structure of the cathode

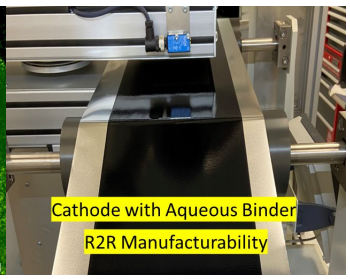
- Chemical environment of 3D graphene may be tuned with aliovalent doping and functionalization to enhance sulfur affinity and kinetics
- Outperforms high surface area commercial carbons. Unique core-shell structure, coupled with high surface-area, results in excellent utilization and low self-discharge.
- Cathodes fabricated with spray-dried active materials with aqueous binder using standard coaters









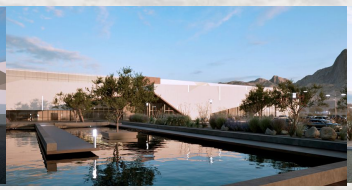


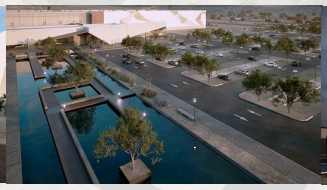
Li-S PRODUCT AND INDUSTRY ROADMAP

Sectors	Qualification Timeline	Cell Form Factor	2024	2025	2026	2027	2028	2029
Automotive	2.5 - 3 Years	Pouch 21700	TRL4	TRL5	TRL6	TRL7	TRL8	
Last Mile Delivery	2 - 2.5 Years	21700	TRL4/5	TRL6	TRL7	TRL8		
Defense - General	1.5 -2 Years	18650	TRL5/6	TR7	TRL8			
Defense/Commercial - Drone	1 - 1.5 Years	Pouch	TRL 7	TRL8				
Defense/Commercial - Satellite	1 - 1.5 Years	Pouch 18650	TRL5/6	TRL 7	TRL8			
EVTOL	2.5 - 3 Years	21700	TRL5	TRL6	TRL6/7	TRL7/8	TRL8	
Non-Auto (e-bike, Motorcycle, Marine)	2 - 2.5 Years	TBD	TRL4/5	TRL6	TRL7	TRL8		
Other (e.g. Heavy Trucking, Earth Moving)	2 - 2.5 Years	TBD	TRL4/5	TRL6	TRL7	TRL8		

TRL4/5	Sampling
TRL6	Fleet Testing
TRL7	Field Piloting
TRL8	Full Production

▲ First gigafactory start




SAN JOSE PILOT LINE

Commercial LIB production line
With only minor modifications

Ramping to 200,000+ cells per year
2MWh nameplate capacity