Altech Chemicals Limited ASX: ATC FRA:A3Y

Company Presentation

Iggy Tan
Managing Director

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Tesla Battery Day 2020

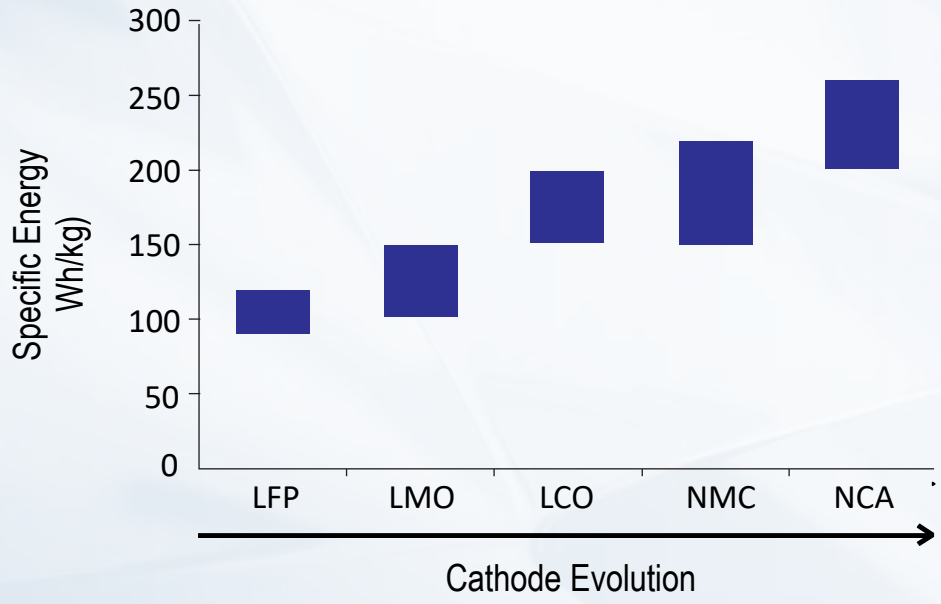
- Halve the cost per KWh of battery production
- Below the $US100/KWh threshold
- “4680” Tesla cell (5x energy, 6x power)
- 3TWh per year at its own factories by 2030
- Equal 20 giga factories
- Increased use of Silicon (30%) in anodes



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Capacity development in cathodes

- Predominant development of cathodes
- Increasing Ni, Co content
- Higher energy density

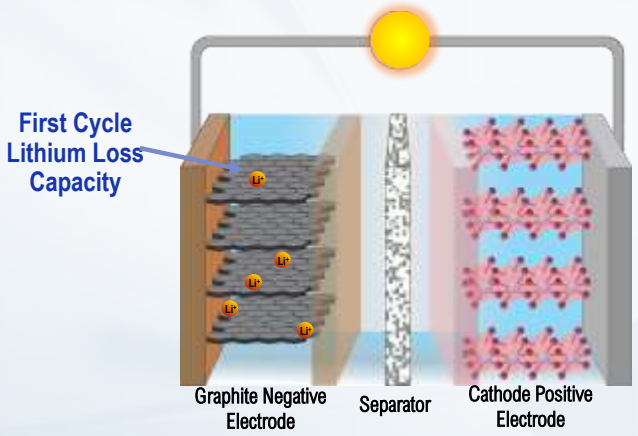


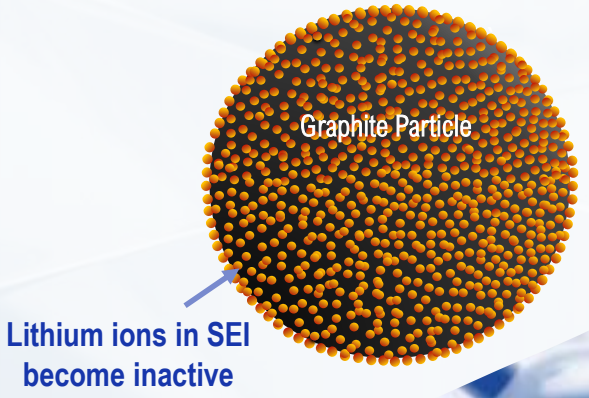
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First Cycle Lithium Loss Capacity

- 8-10% of Li becomes inactive on first charge
- Forms SEI coating on anode particles
- Industry has been trying to solve this problem
- Many research literature shows alumina coating works
- But currently expensive and not commercial

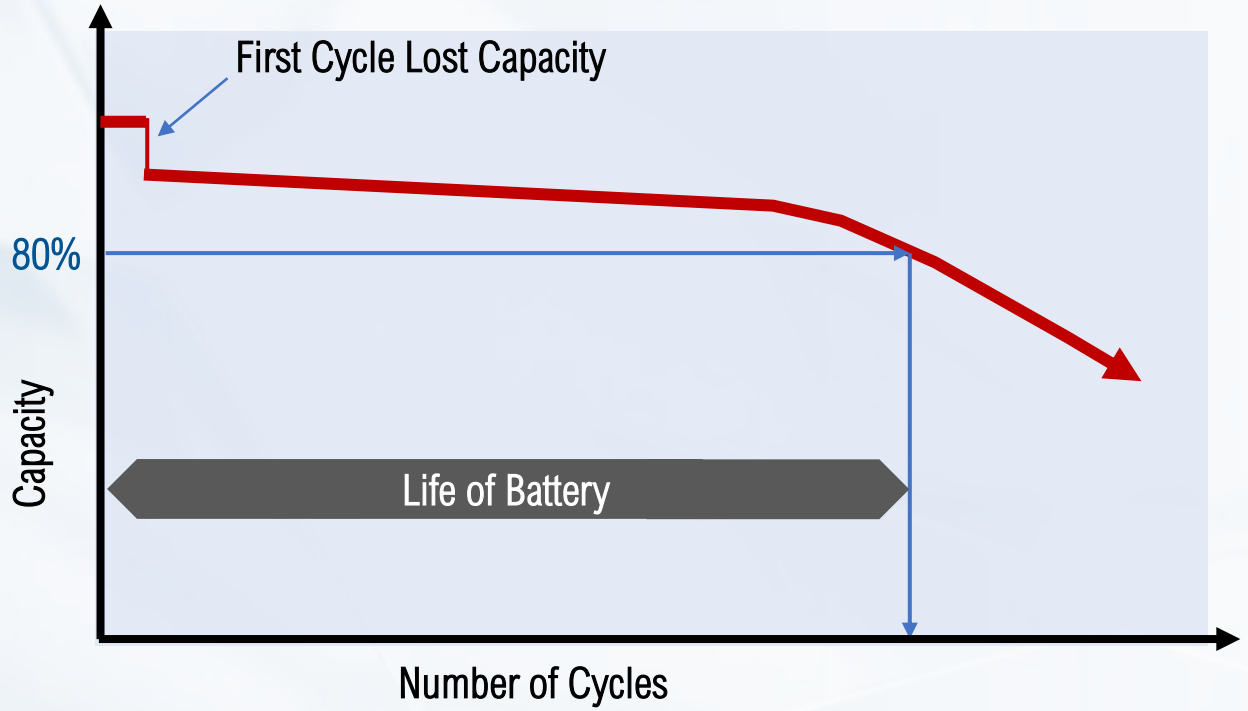




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First cycle loss capacity

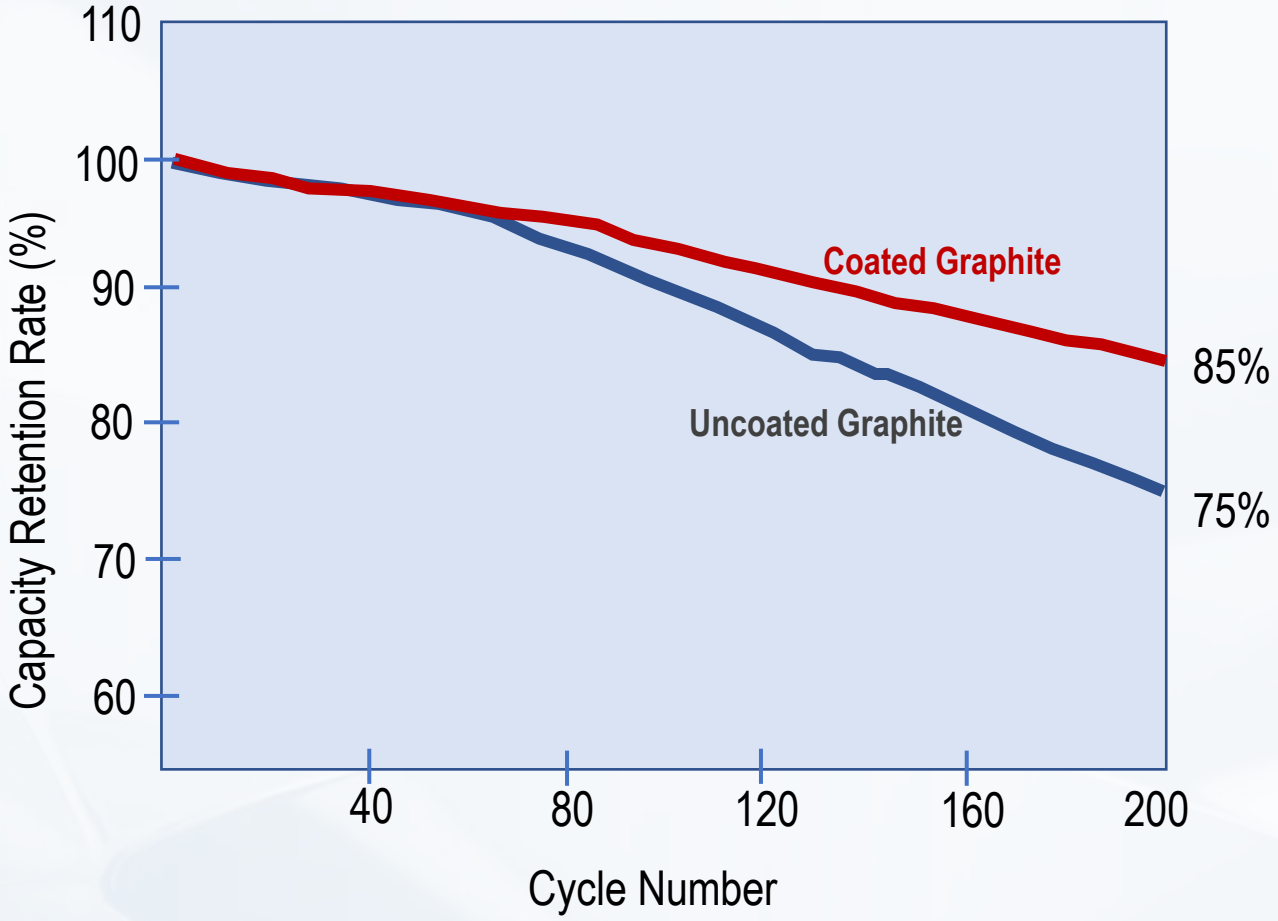
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Why HPA Coating ?

- **Reduces first cycle loss** (Tau et al., 2019)
- **Improves cycling stability** (Tau et al., 2019)
- **Improves high-rate performance** (Feng et al., 2016)
- **Improves fast charging capability** (Kim et al., 2016)
- **Prevents thermal runaway under mechanical abuse** (Xu et al. 2019)
- **Scavenges HF in electrolyte** (Hall et al., 2019)

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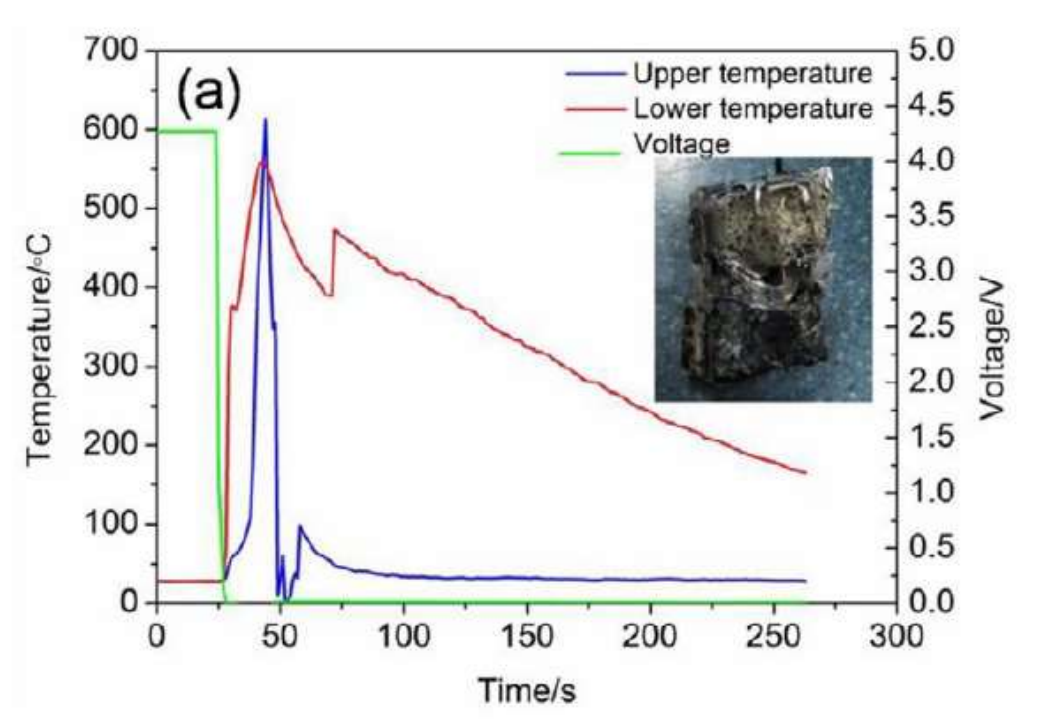
Literature - Alumina coated graphite performance [1]



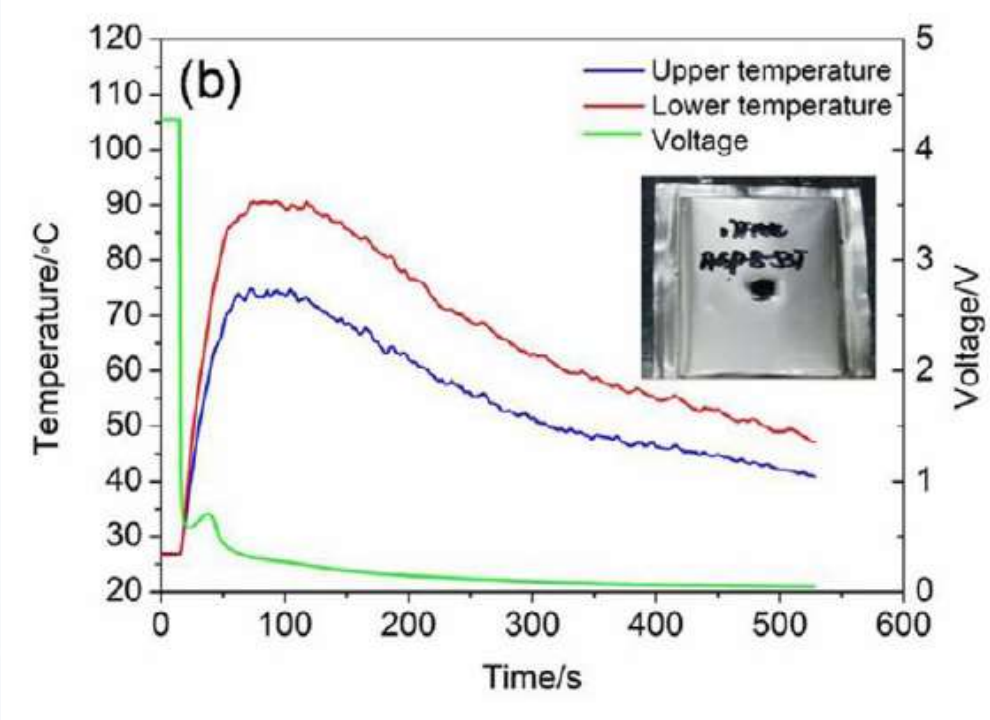
1. Synthesis of Alumina-Coated Natural Graphite for Highly Cycling Stability and Safety of Li-Ion Batteries
Tao Xu, Chengkun Zhou, Haihui Zhou,* ZekunWang, Jianguo Ren

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Literature - Nail Test, Coated graphite prevents runaway [1]



Non-Coated graphite 600 Deg C thermal runaway



Coated graphite 100 Deg C

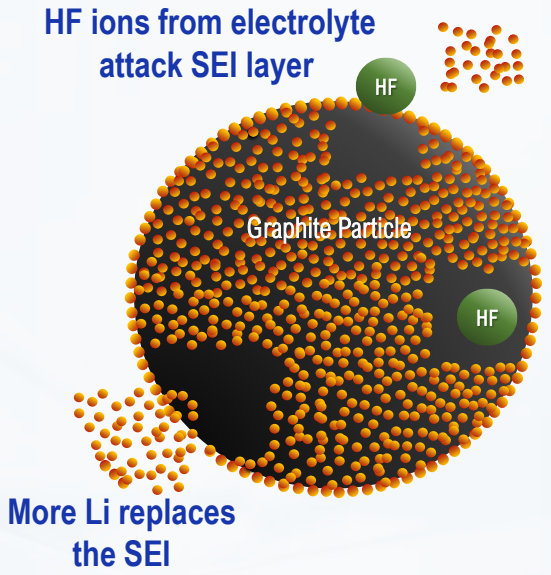
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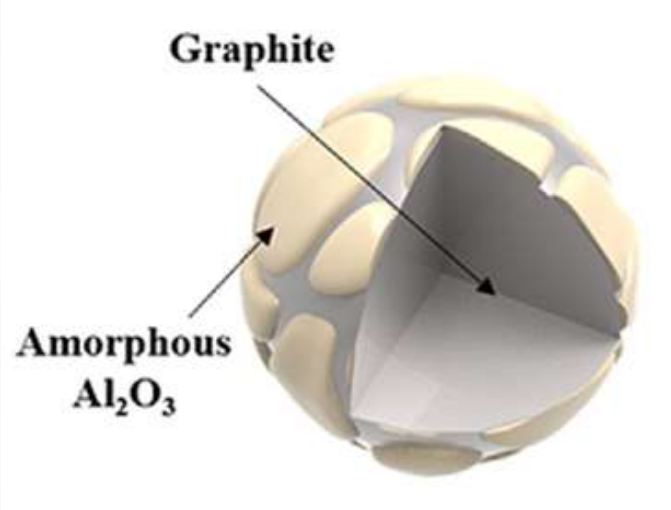
- Corrosive HF ions in electrolyte attacks SEI layer
- More lithium is used to replace SEI layer
- Lithium degradation over battery life
- Literature research demonstrates alumina layer scavenges HF
- Turns it into inert compound



Alumina coating scavenges HF ions in electrolyte

Coating Methods

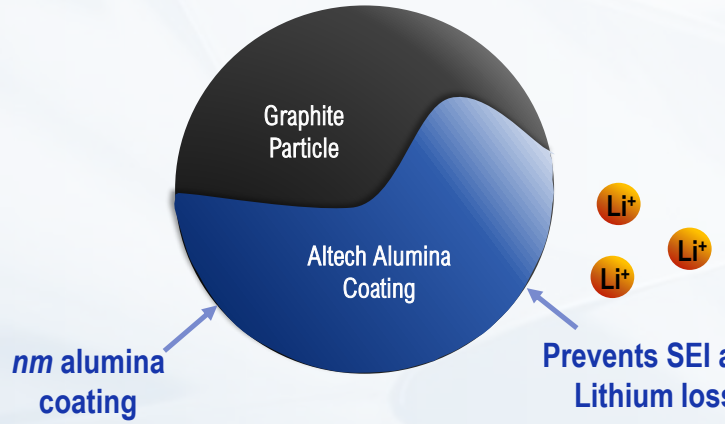
1. Vapour Method
    - Atomic Layer Deposition – costly, complex, not mass production
2. Solids Method
    - Non continuous layer
3. Liquid Method
    - Most promising
    - Easier to commercialize



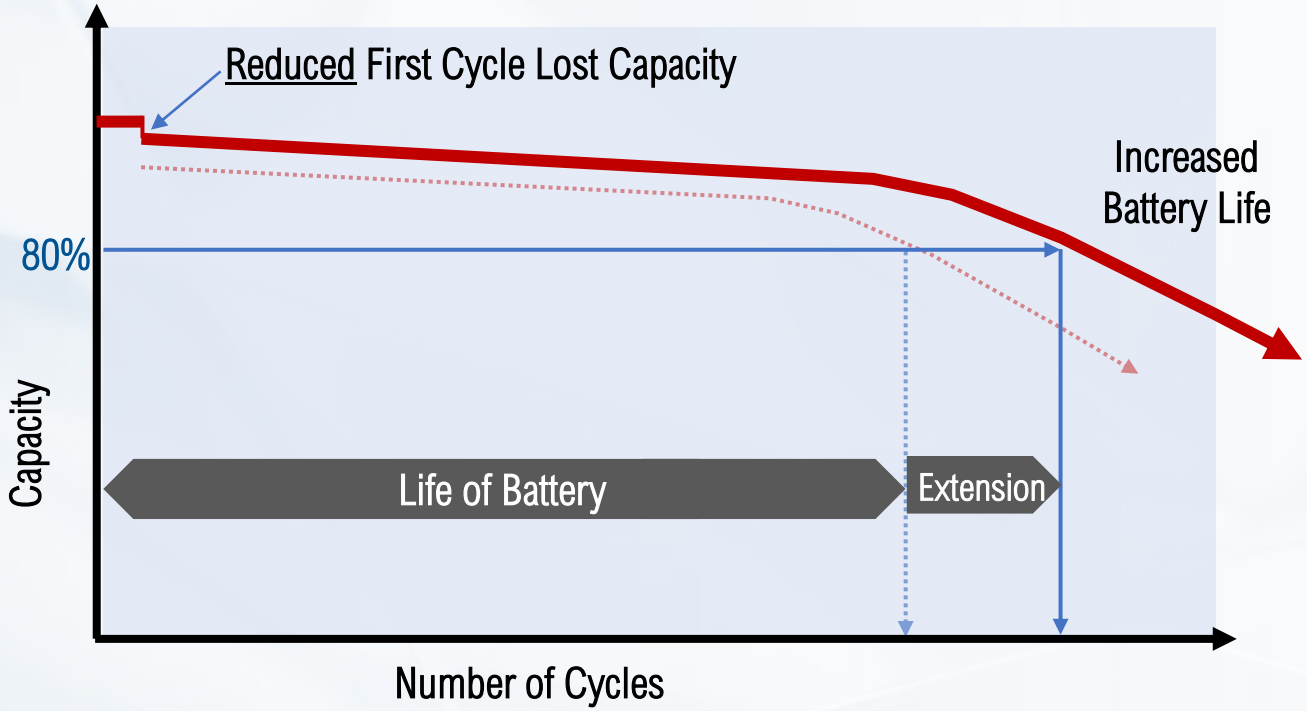
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Our Coating Advantages

- Cheaper process
- Easier and simple to commercialize
- High purity alumina coating – less contamination
- Coating layer uniform
- Lower processing temperature
- Adjust layer thickness – diff applications



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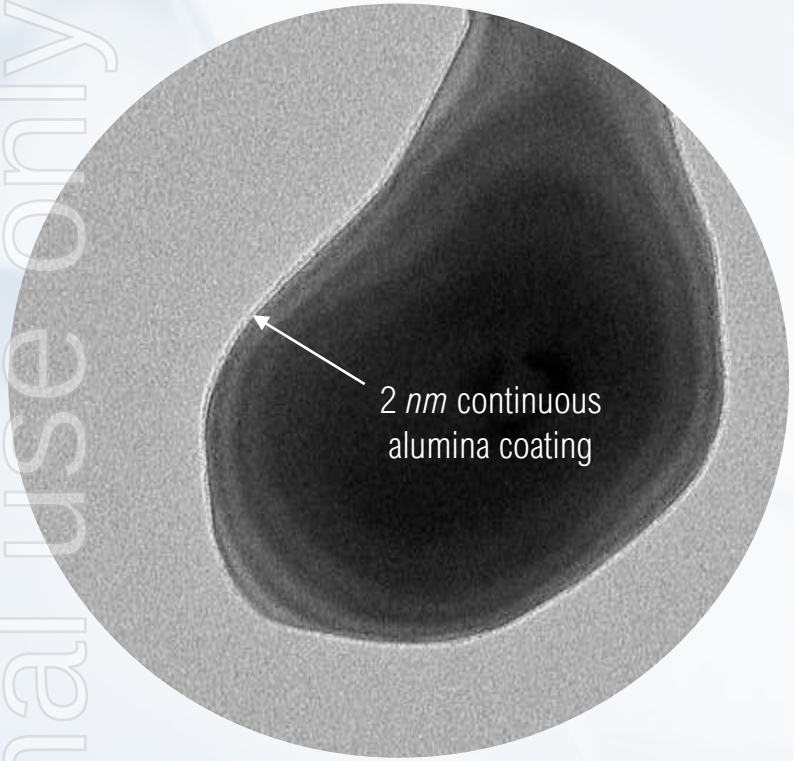


Potential reduction first cycle loss capacity

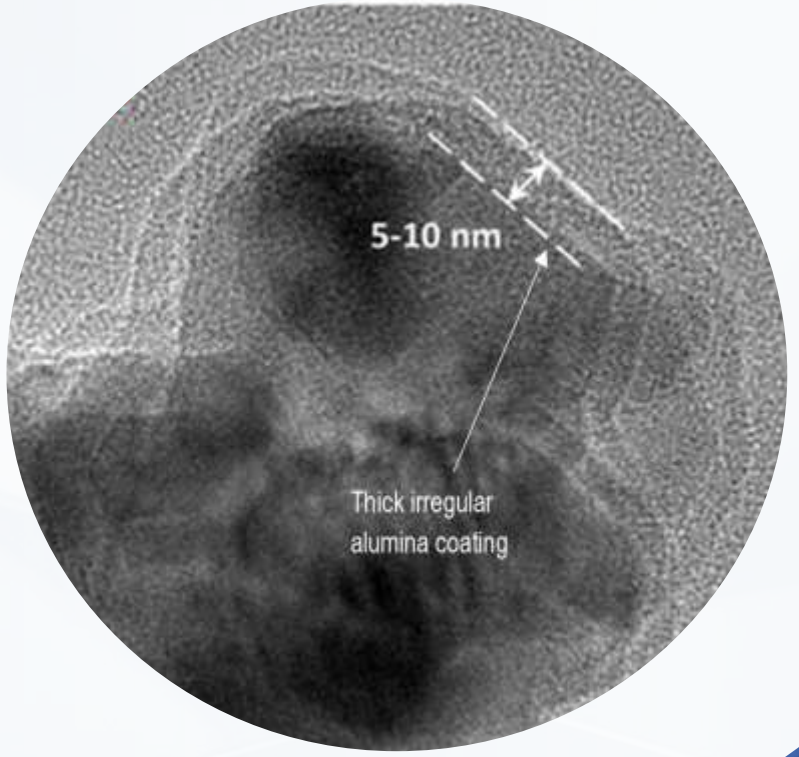
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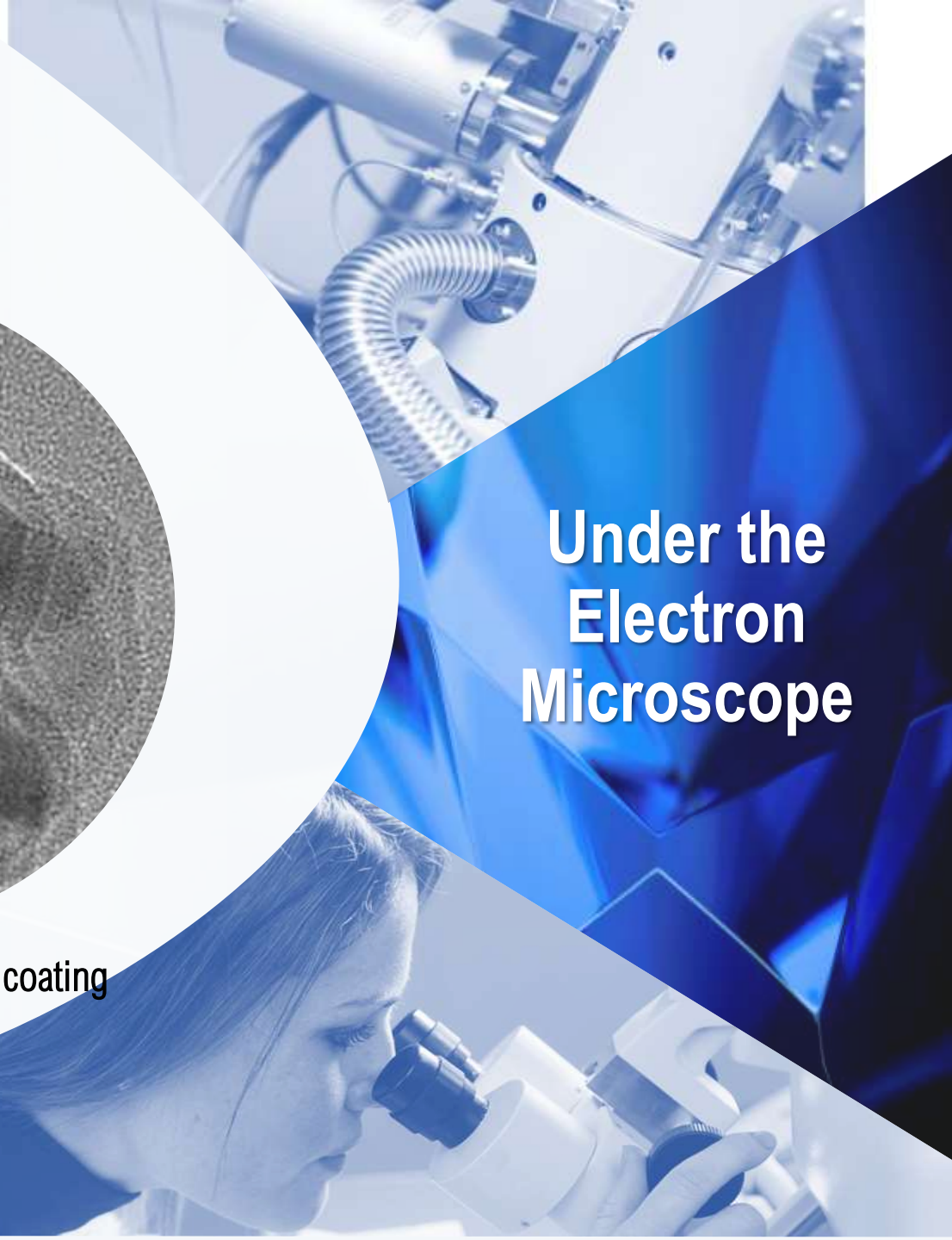
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Altech alumina coating technology



Current attempts at alumina coating



Under the Electron Microscope

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Promising Results in half cell battery testing

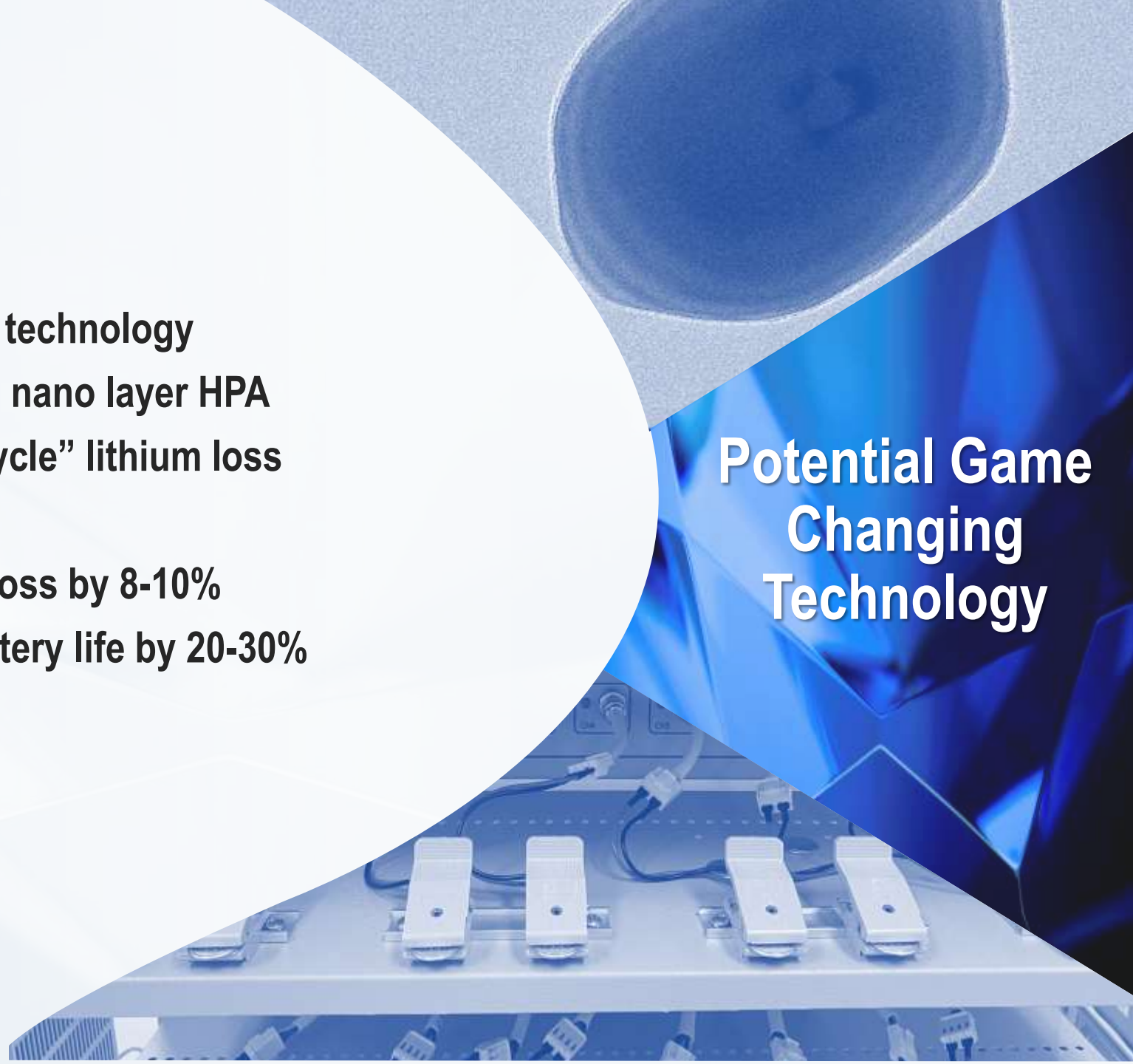
- First phase, 100 cycle battery tests completed
- Coated graphite performance over non coated is encouraging
- Further test runs required for repeatability
- Potential improvements to lithium-ion battery life, capacity and chargeability



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Potential Game Changing Technology

- Breakthrough alumina coating technology
- Coating graphite particles with nano layer HPA
- Potential to reduce the “first cycle” lithium loss
- Game changer if successful
- Potential to reduce first cycle loss by 8-10%
- Potential to increase Li-ion battery life by 20-30%



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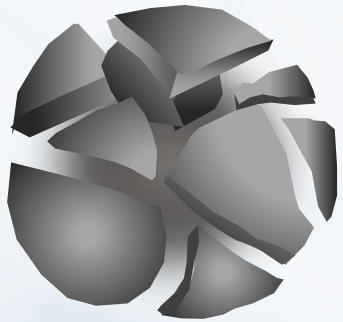


Collaboration with SGL Carbon

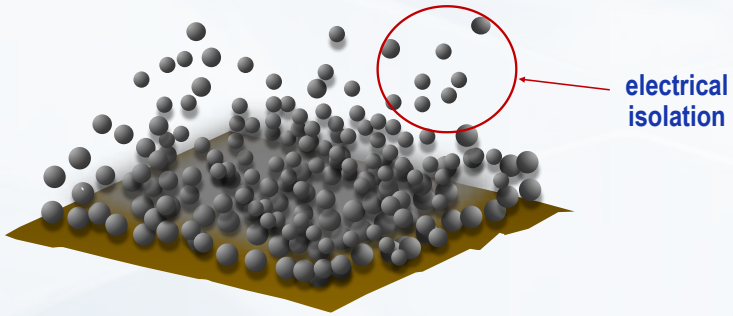
- Collaboration agreement with SGL Carbon
- Alumina coating of anode grade graphite
- Europe leading synthetic graphite producer
- 80% of graphite in batteries are synthetic
- Europe sourced graphite

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- Ten times capacity Si (3,579 mAh/g) C (372 mAh/g)
- Promising anode material
- But volume expansion 300% on lithiation - fractures
- Delamination from copper collector
- But has 40-50% first cycle loss
- But has higher fade during life

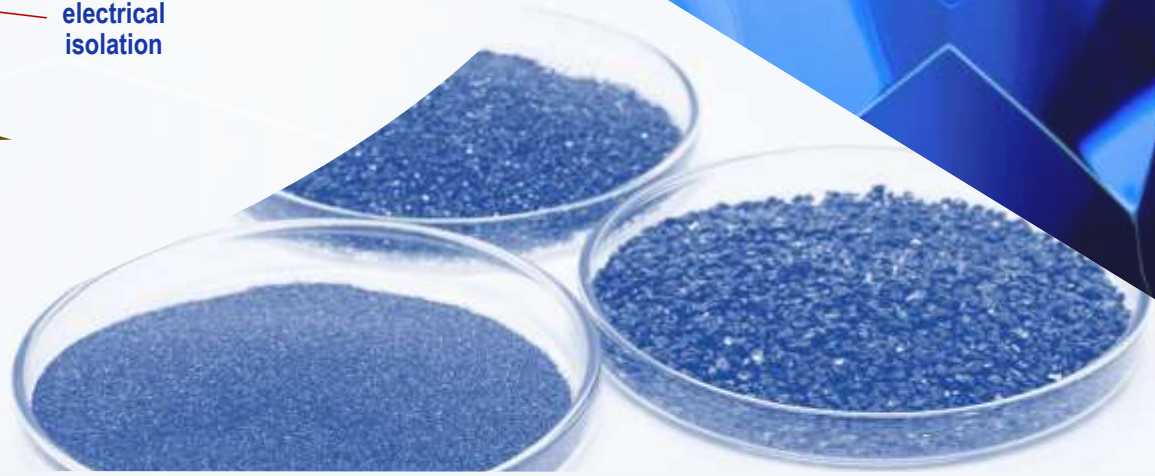


Fractures on lithiation



Delamination

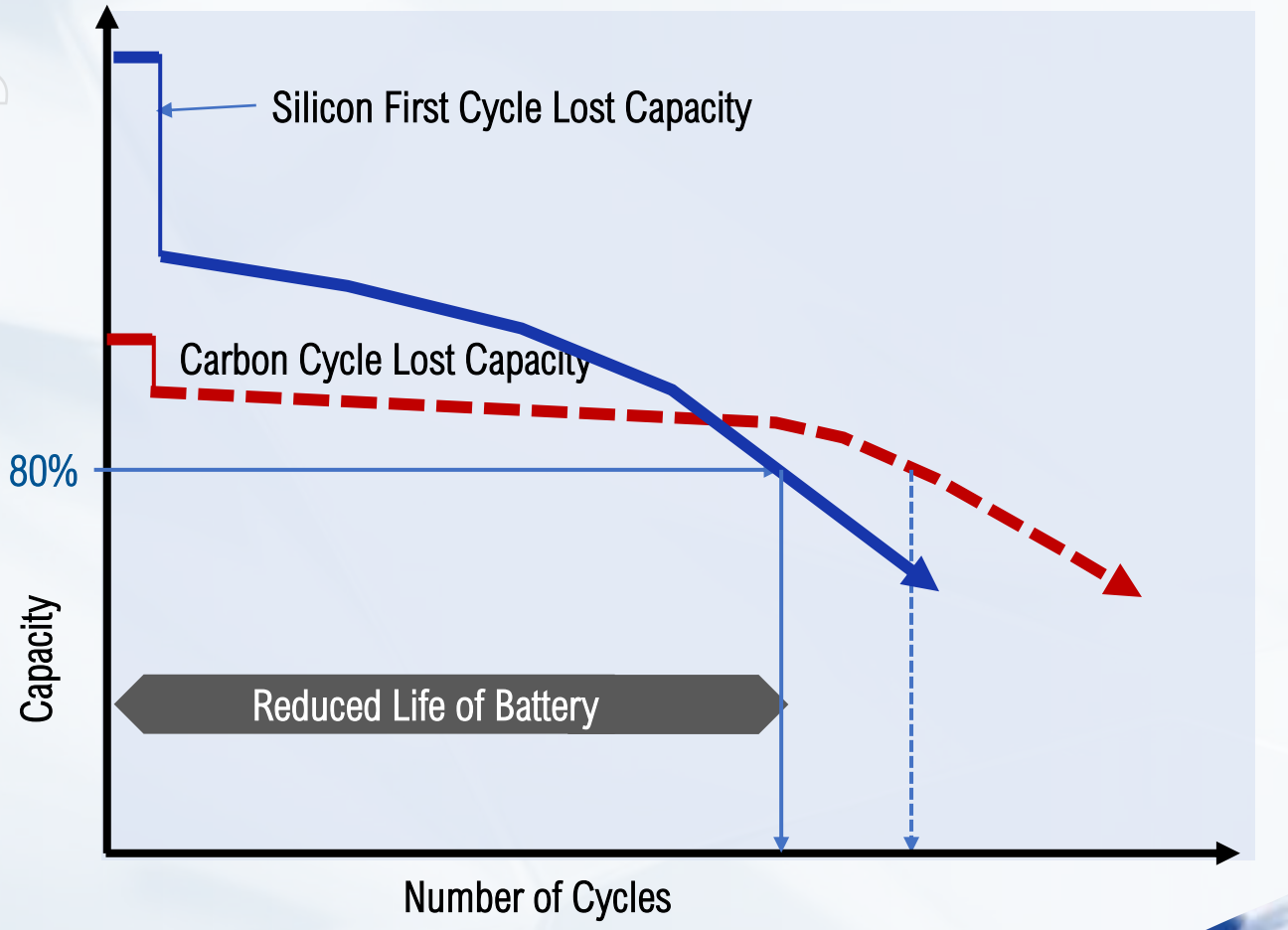
Silicon most promising future anode material



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First cycle loss capacity and fade

Alumina coating could prevent fracture & reduce first cycle loss

FULL PAPER

Artificial Solid Electrolyte Interphases

ADVANCED MATERIALS INTERFACES

www.advmatinterfaces.de

Artificial Solid Electrolyte Interphase Coating to Reduce Lithium Trapping in Silicon Anode for High Performance Lithium-Ion Batteries

*Qing Ai, Deping Li, Jianguang Guo, Guangmei Hou, Qing Sun, Qidi Sun, Xiaoyan Xu, Wei Zhai, Lin Zhang, Jinkui Feng, Pengchao Si, Jun Lou, and Lijie Ci**

The investigation indicates that lithium trapping in Si anode of lithium-ion battery is one of the key factors to affect the coulombic efficiency and capacity decay during high rate cycling. Here, it is demonstrated that $LiAlO_2$ as an artificial solid electrolyte interphase (SEI) on commercial Si nano-

with natural abundance and low discharge potential, it has been considered as one of the most promising candidate as next generation anode materials for LIBs.[5] However, Si anode have fast failure problems of structure degrada-

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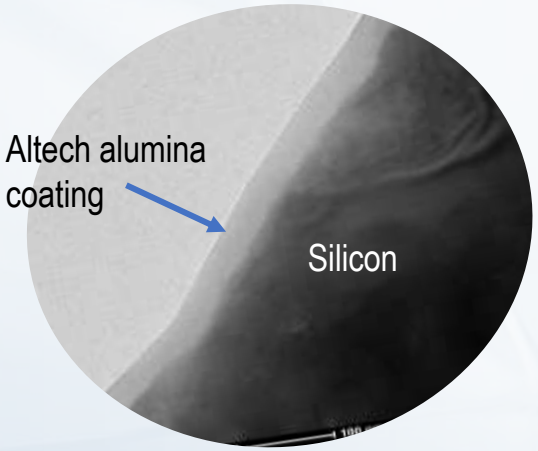
ASX ANNOUNCEMENT AND MEDIA RELEASE

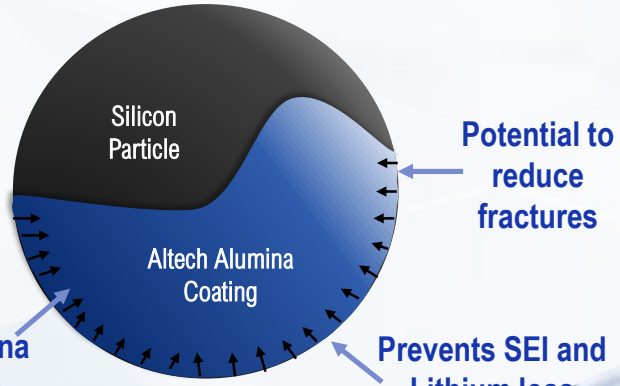
15 March 2021

ALTECH – BREAKTHROUGH SILICON ALUMINA COATING DEVELOPMENT

Highlights

- Breakthrough silicon alumina coating development
- Tesla vision is for more silicon in lithium-ion battery anodes
- Silicon has ten times energy capacity compared to graphite
- Capacity retention during cycling potentially improved via alumina coating



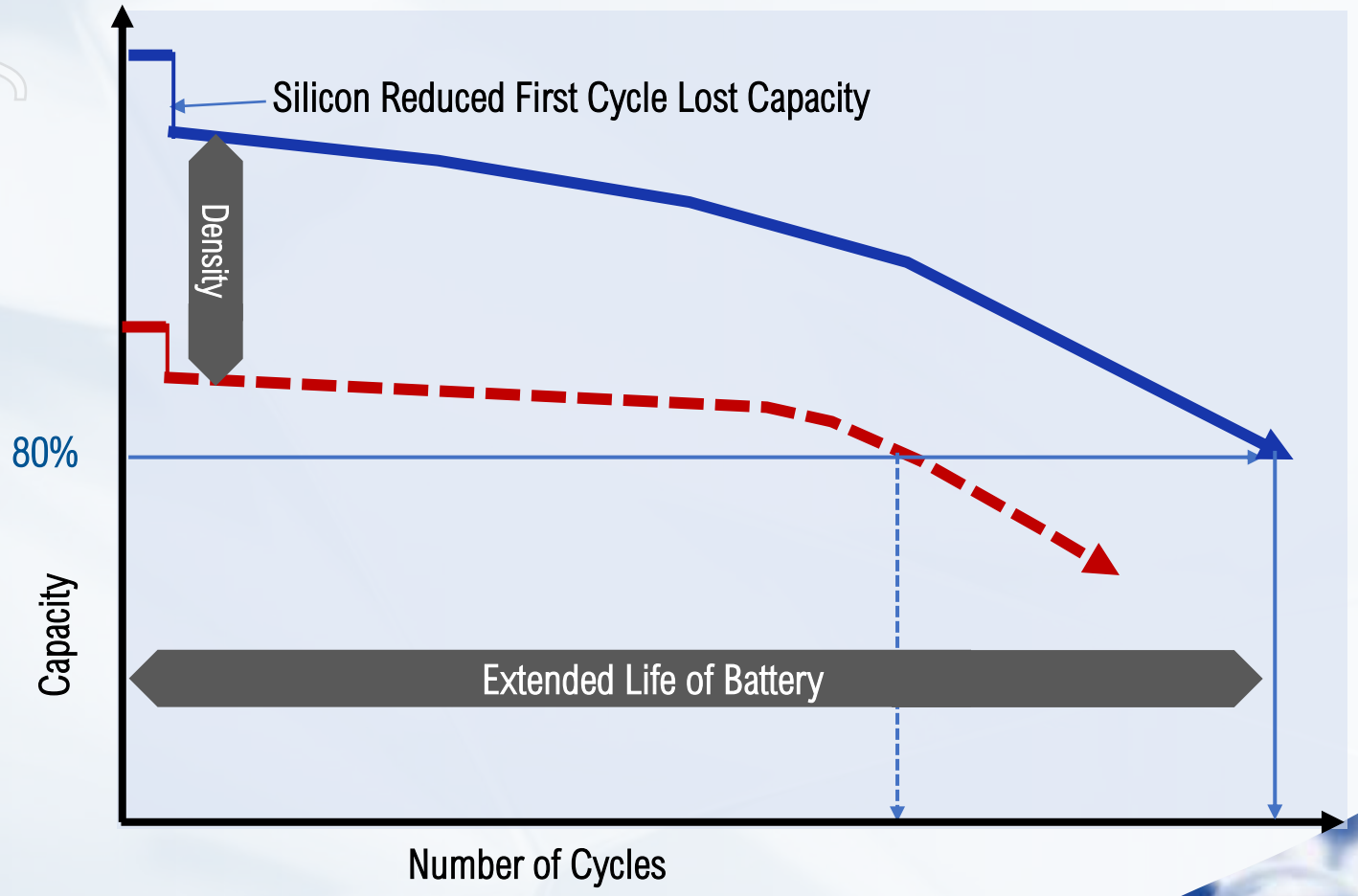


Alumina coating of Silicon in our Lab

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Potential of silicon/graphite in Anodes



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Potential impact of silicon in anode of Tesla Model 3 on single charge

0% Silicon — 423km



10% Silicon — 700km



20% Silicon — 1,000km



30% Silicon — 1,300km



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Source: Altech Chemicals

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Collaboration Agreement with Ferroglobe

- Collaboration agreement with Ferroglobe
- Leading Li-ion battery Si supplier
- Increased Si - future in Li-ion batteries
- Alumina coating of silicon seen as long-term solution
- Ferroglobe approached Altech



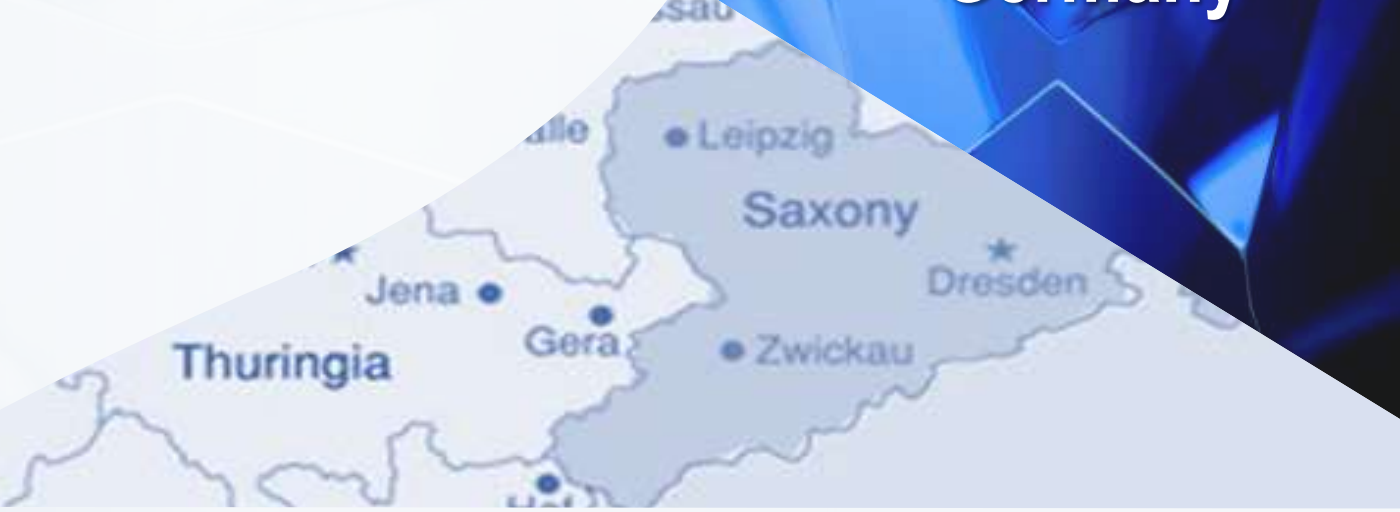
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Battery Materials Coating Project Germany

- Pre-feasibility battery materials coatings plant
- Schwarze Pumpe, Saxony State, Germany
- 10,000 tpa of graphite coating
- State where EV's and battery plants
- Option to purchase industrial site
- Study progressing well





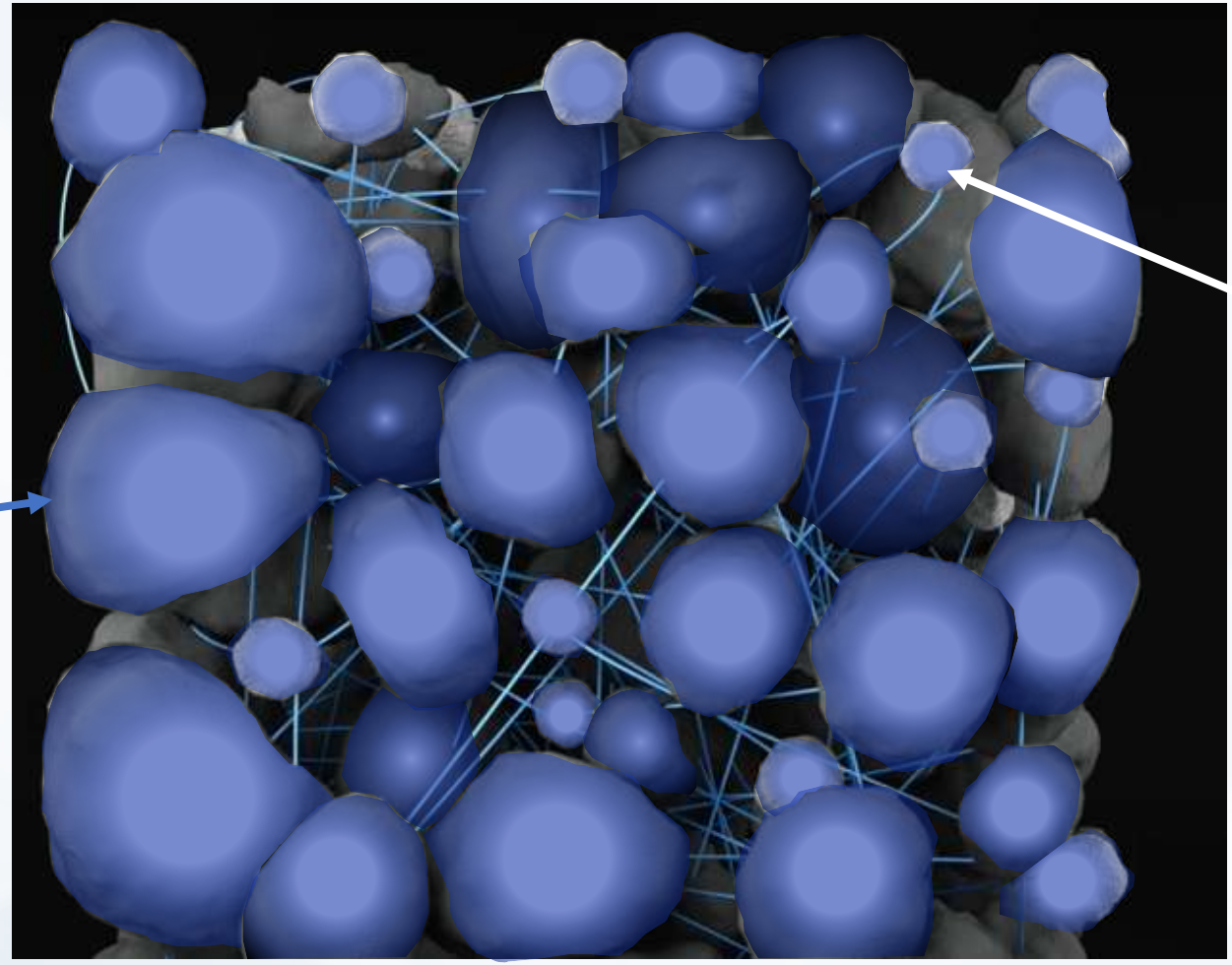




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AIG Office and warehouse bays
AIG's Site
Dock 3

Battery Materials Coating Technology



Coated graphite

coated silicon

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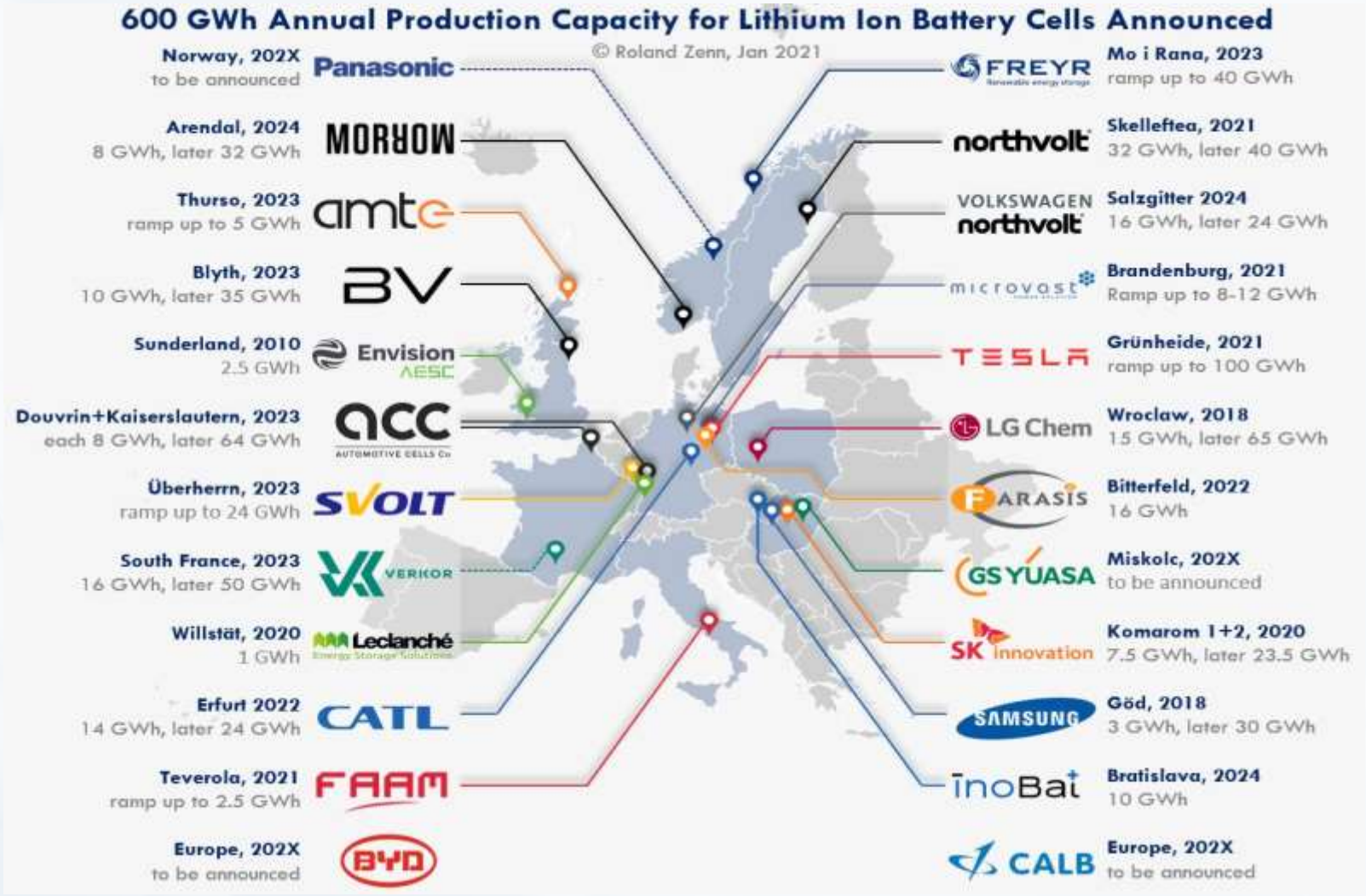
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Europe's Push for Battery Industry

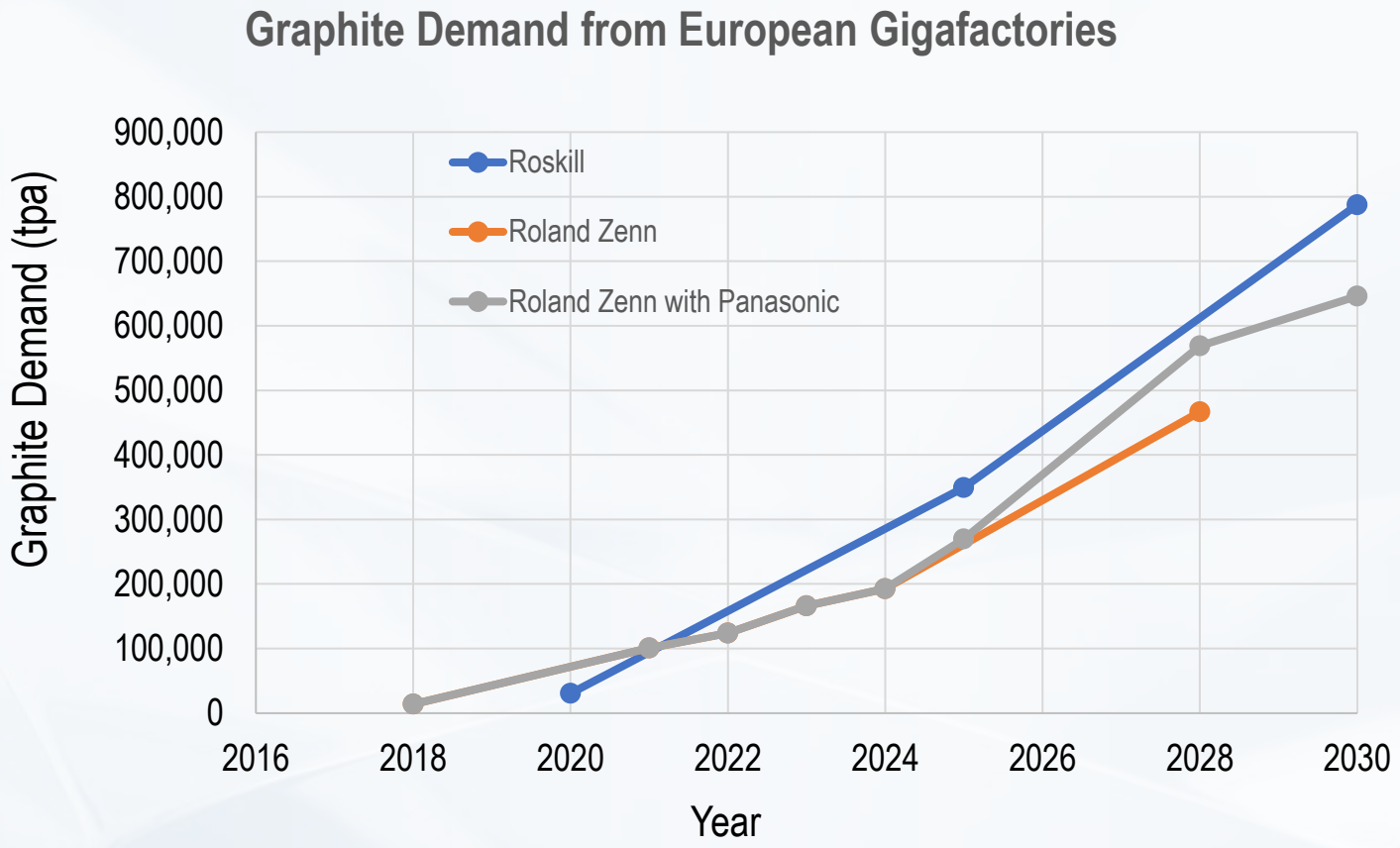
- Europe major battery industry
- Capacity of 600 GWh by 2030
- Stringent 2020 EU CO2 emission (95g/km)
- Push to EVs by European car manufacturers
- Less reliant on Asia
- VW retooling 16 factories

Li-Ion Battery Cell Capacity - Europe

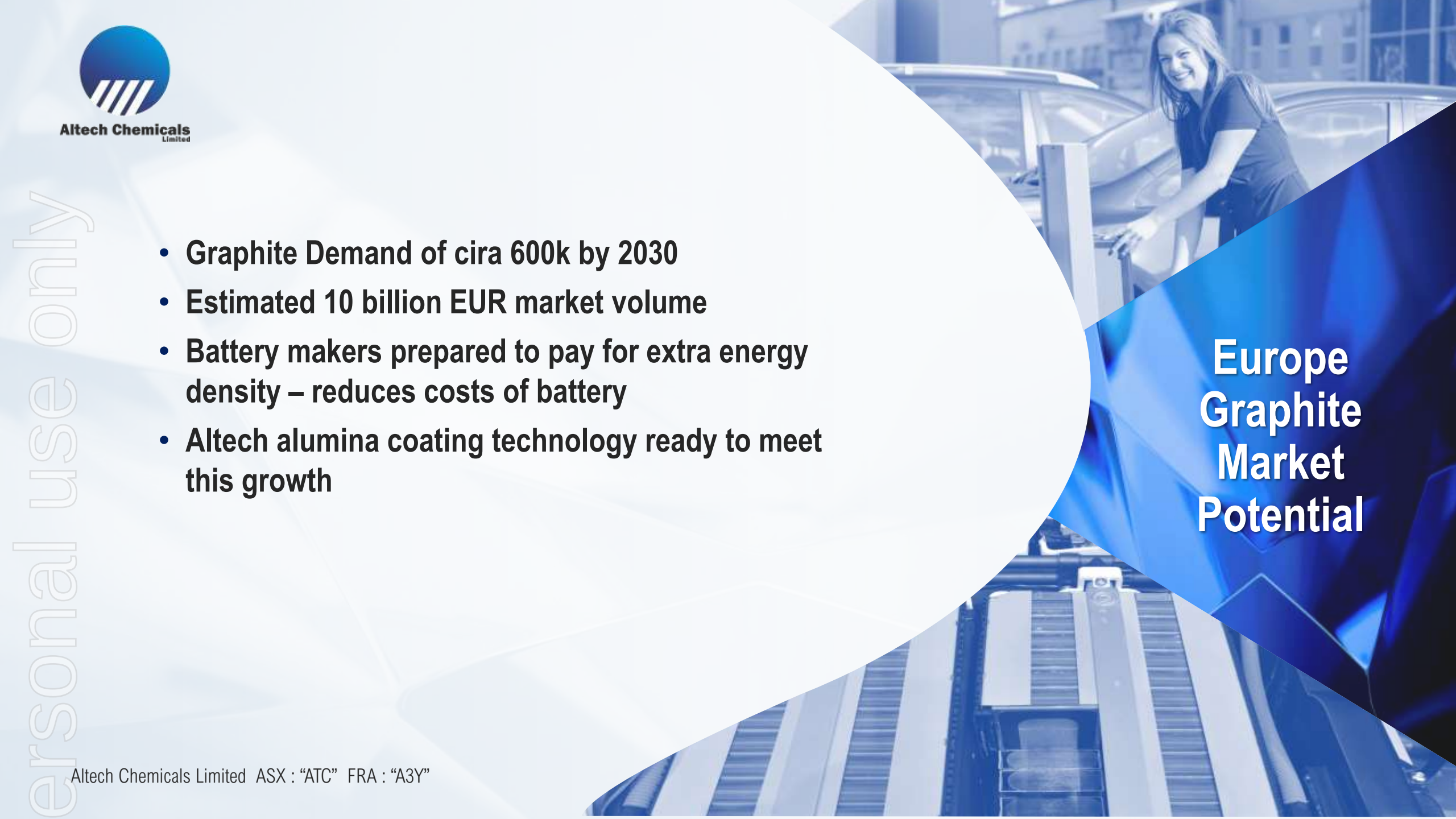


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Europe Graphite Demand of 600ktpa by 2030



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Europe Graphite Market Potential

- Graphite Demand of cira 600k by 2030
- Estimated 10 billion EUR market volume
- Battery makers prepared to pay for extra energy density – reduces costs of battery
- Altech alumina coating technology ready to meet this growth

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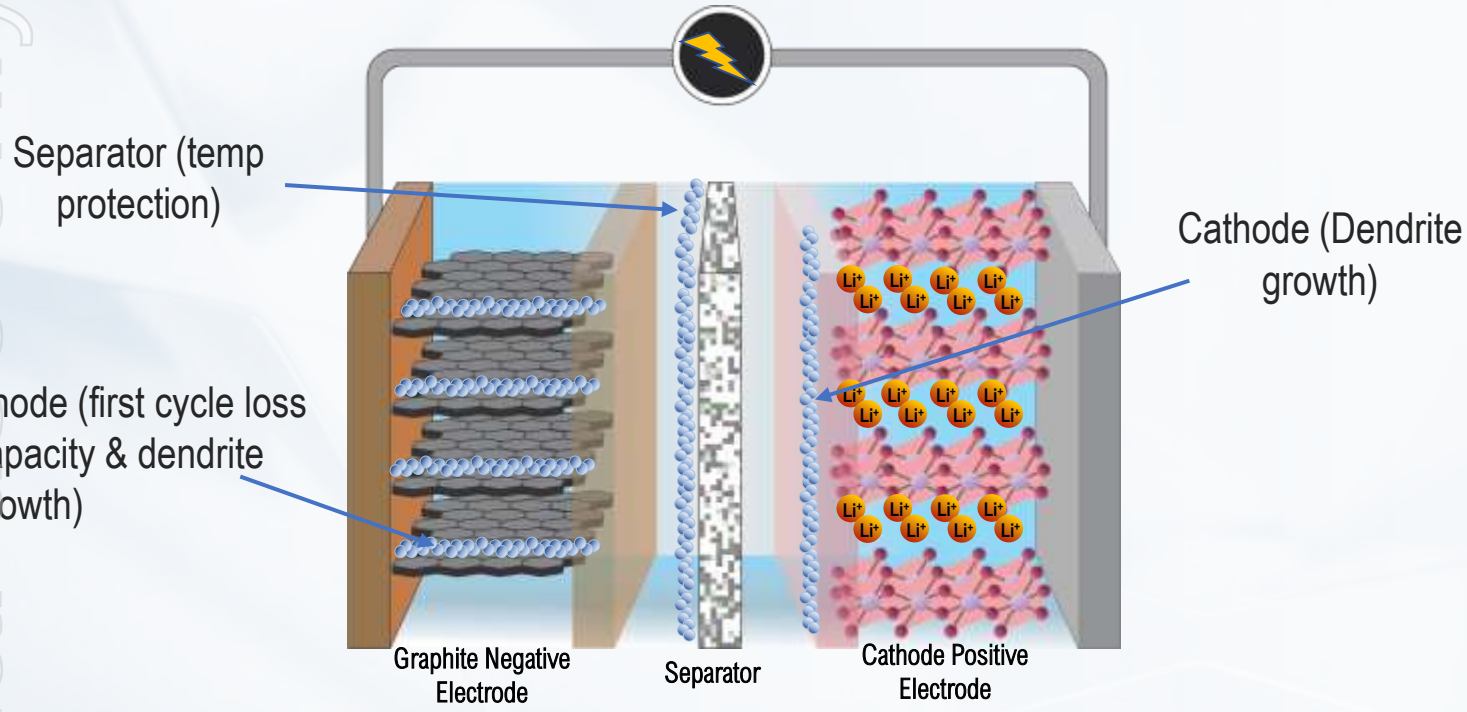


HPA Use and Market

- HPA 99.99% purity
- Feedstock for LED and Li-ion battery industries
- Sapphire wafer substrate for LEDs
- Alumina coating in Li-ion batteries
- Growth expected from 30ktpa to 272 ktpa by 2030
- Shortage of supply forecasted

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HPA used in Li-ion Batteries



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Current HPA Producers



Bauxite

Alumina Refinery



Smelter Grade Alumina
99.5%

Alumina Smelter



Aluminium Metal
~US$3,000 per tonne

Aluminium Dissolution



99.99% (4N)
HPA



Kaolin
(aluminous clay)

ALTECH HPA PLANT

One Single Process Step



99.99% (4N)
HPA

Altech's disruptive technology

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- 12.7Mt JORC Mineral Resources^
- Mining approval granted
- Works approval granted
- Simple free dig mining
- Campaign mining, 2 months - 3 years feed
- Then just sea container loading operation
- 50,000 tpa kaolin per annum



Meckering all approvals in place

^ Measured Resources 1.5Mt @ 30% Al2O3, Indicated Resources 3.3Mt @ 30% Al2O3, Inferred Resources 7.9Mt @ 29.1% Al2O3 Typical Mean Analysis

^ JORC (2012) Mineral Resources (refer ASX Announcement 11 October 2016); the Company is not aware of any new information or data that materially affects the information included in this announcement and confirms that all material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed.

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- Chemical-zoned industrial park
- 60% lower operating costs
- HCl plant nearby
- Close to end markets
- 5-10 year corporate tax free
- No radioactive waste



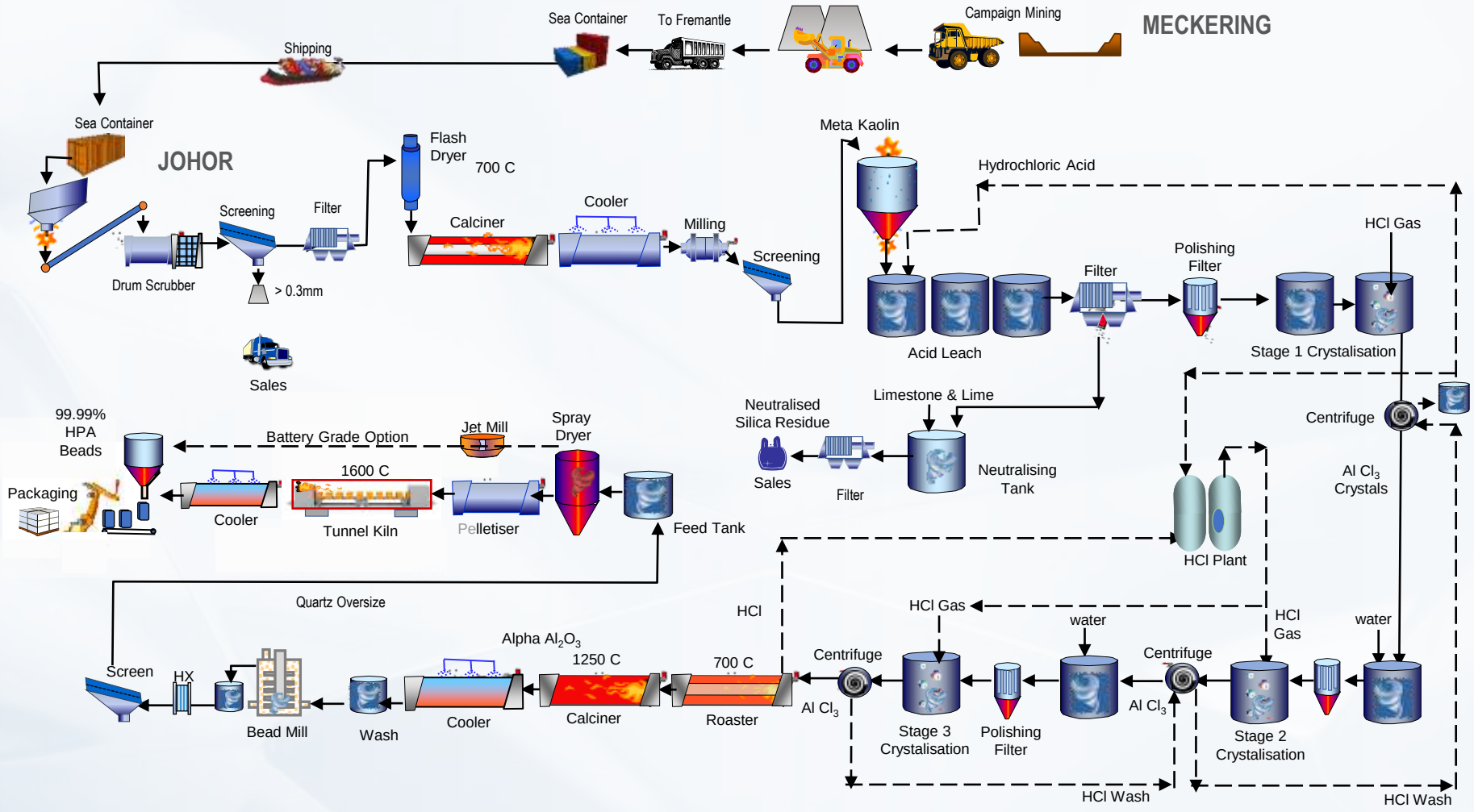
HPA Plant
Johor,
Malaysia



Proposed HPA Plant

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Altech's Patented HPA Process



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Established Proven Chemistry

- Chemistry by Swiss in 1900s
- USA & Alcoa developed further 1980's
- No demand for HPA in 1980's
- New HPA growth demand (LEDs LIBs)
- Altech applied chemistry to Meckering
- Very successful, disruptive, lowest cost
- One patent granted, 8 pending

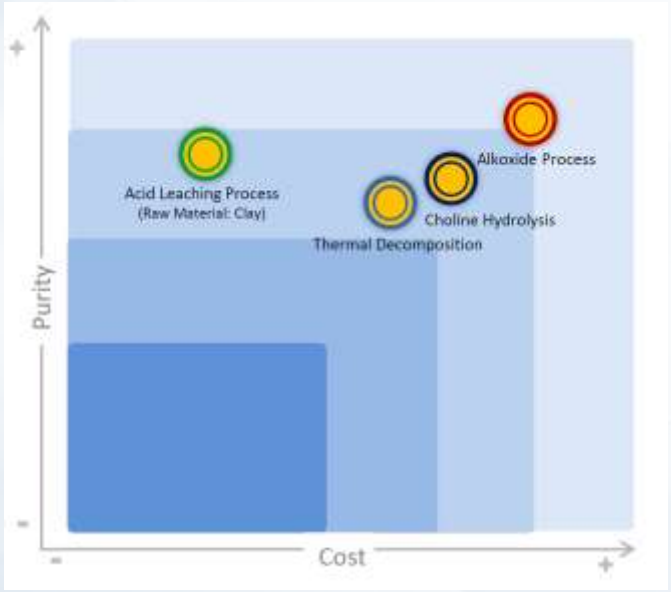
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Our Advantages

1. We own our feedstock
2. Main reactant HCl re-used
3. Plant in low cost country (Malaysia)



Source: Persistence Market Research "High Purity Alumina Market – Global Industry Analysis and Forecast 2016-2024"

Bottom Quartile for Op Costs

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Altech's Green HPA process

- Certified as "Green" project
- Centre of International Climate and Environmental Research (CICERO)
- Good environmental governance
- Doesn't use Al metal
- 46% reduction of greenhouse gases
- Uses 41% less energy than conventional





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- 10 year exclusive off-take agreement
- Mitsubishi has downstream customers
- Altech gets paid ex gate
- Price is at prevailing market price
- Strategic focus for Mitsubishi



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- SMS group – German EPC contractor
- Lump sum turn key contract
- Completion and cost risk
- Throughput guarantee
- Process & quality guarantee
- Committed US$ 15 mil equity

SMS group

Lump Sum Turn Key Contract

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Economics FIDS Equity Model

- **Pre-tax NPV7.5 US$ 505 million**
- **Payback (full rate) 3.9 years**
- **IRR - 22%**
- **EBITDA US$ 76 million p.a.**
- **Capital cost US$ 298 million***
- **Production Costs - US$ 8.55 /kg**
- **LT Sale Price - US$ 26.9/kg**
- **Gross Margin – 68%**

- Pre tax, pre financing equity model

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- Senior debt funding - KfW IPEX-Bank
- German state owned bank
- Total debt of US$ 190 million
- US$ 170 million export credit finance
- 50% of plant – German suppliers
- Low interest, long tenure
- 18 months of due diligence



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Secondary Debt – Listed Green bonds

- Listed green bond progressing well
- Target raising of US$144 million
- US$100 million as project debt
- Balance as prepaid coupon interest
- Bonds to be listed in Frankfurt
- Five year term
- SPV as lender, 2 lien to KfW IPEX-Bank





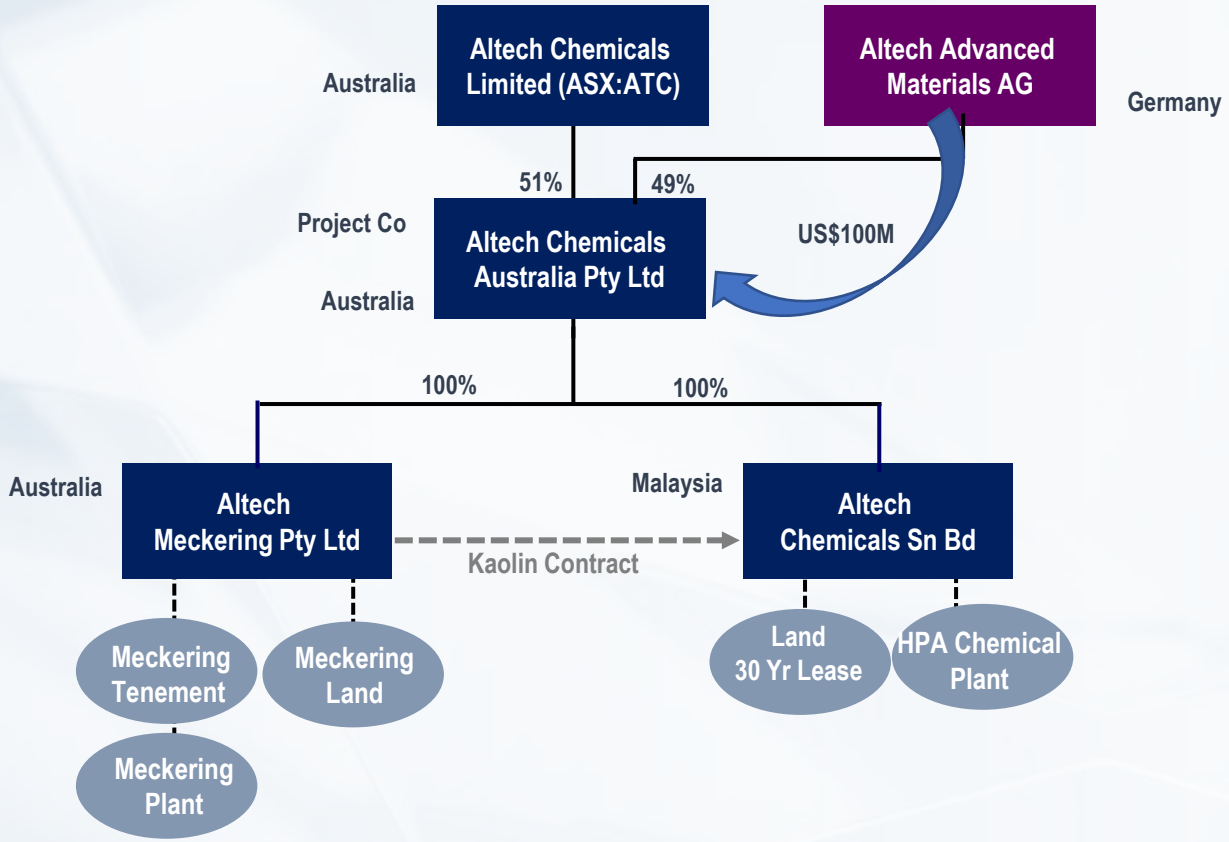
Use and Source of Funds

Use of Funds (US$m)		Source of Funds (US$m)	
Plant Capex	$298		
KfW Contingency	$ 28*	KfW Senior Loan	$190
Debt Res & WC	$ 46*	Sec Debt (Green Bonds)	$ 90
Fees & Costs	$ 41	SMS Equity Contribution	$ 10
Less Spent	($ 23)	Project Equity (Sell 49%)	$100 ^
Total Use of Funds	$390	Total Funding	$390

* US$ 76 m of cash reserves required by KfW for project protection
^ Altech Advanced Materials AG has option to purchase 49% for US$100m
^ Open to other strategic investors or JV partners

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Equity sell down of 49% for US$100m

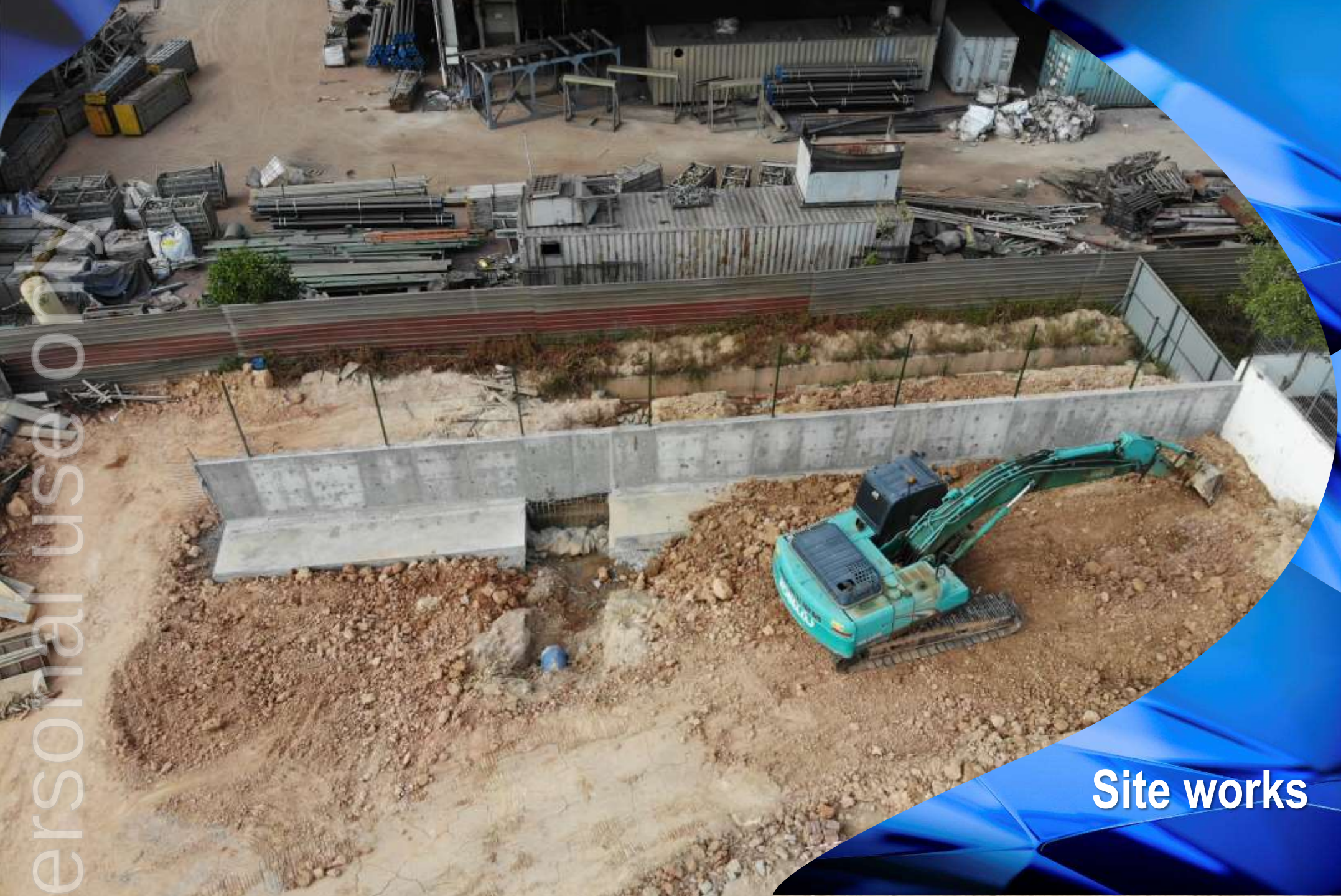
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- Environmental approvals completed
- All permitting approvals completed
- Operating licence granted
- Construction commenced
- Ground conditions known
- Contractors known
- Stage 1 and 2 completed
- Running start when project finance done



Removed Greenfield Risks Construction Commences



Site works

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Maintenance Building



Maintenance Building

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Electrical Substation

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Altech - Development leader in HPA

	ASX Code	Deposit location	JORC Resource	Scoping or PFS Study	Pilot Plant	JORC Reserve	DFS Study	Offtake Arrangement	HPA Plant Engineered	Site for Plant Purchased	EPC Contractor Appointed	Lump sum fixed price	Mine Permitted	Plant Contruction Commenced	Final Investment Decision	Senior Project Finance Secured	Balance of finance/equity
Accelerate Resources (kaolin to HPA)	**AX8**	WA (Tambellup)															
Alchemy Resources (kaolin to HPA)	**ALY**	NSW (West Lynn)	✓														
Alpha HPA (Solvent Extraction)	**A4N**	Qld (Gladstone)	n/a	✓	✓	n/a	✓						n/a				
Altech Chemicals (kaolin to HPA)	**ATC**	WA (Meckering)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Andrometa (kaolin to HPA)	**ADN**	SA	✓														
FYI Resources (kaolin to HPA)	**FYI**	WA (Cadoux)	✓	✓	✓	✓	✓										
Peak Minerals (kaolin to HPA)	**PUA**	WA (Yendon)	✓	✓													
King River (Solvent Extraction)	**KRR**	WA	n/a	✓									n/a				
LavaBlue (kaolin to HPA)	**n/a**	QLD (Lava Plains)															
VeccoGroup (kaolin to HPA)	**n/a**	QLD (Arizona)															
Zeotech (kaolin to HPA)	**ZEO**	QLD (Abercorn)	✓														

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Altech Chemicals Limited

Right Place

Right Time

Right Feedstock

Right Technology



Thank you

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Forward Looking Statements

Forward-looking Statements

This announcement contains forward-looking statements which are identified by words such as 'anticipates', 'forecasts', 'may', 'will', 'could', 'believes', 'estimates', 'targets', 'expects', 'plan' or 'intends' and other similar words that involve risks and uncertainties. Indications of, and guidelines or outlook on, future earnings, distributions or financial position or performance and targets, estimates and assumptions in respect of production, prices, operating costs, results, capital expenditures, reserves and resources are also forward looking statements. These statements are based on an assessment of present economic and operating conditions, and on a number of assumptions and estimates regarding future events and actions that, while considered reasonable as at the date of this announcement and are expected to take place, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of our Company, the Directors and management. We cannot and do not give any assurance that the results, performance or achievements expressed or implied by the forward-looking statements contained in this announcement will actually occur and readers are cautioned not to place undue reliance on these forward-looking statements. These forward looking statements are subject to various risk factors that could cause actual events or results to differ materially from the events or results estimated, expressed or anticipated in these statements.

The mezzanine debt facility terms referred to in this ASX announcement are indicative in nature; are non-binding; and contain the general terms of proposed a transaction. Any future commitment for the facility will be subject to and is contingent upon all internal approvals of the financial institution as well as the completion of detailed due diligence (including but not limited to HPA market, legal and technical due diligence) and legally binding documentation and senior lender agreement. There is no certainty that the mezzanine project debt finance will be approved or that a transaction will be concluded based on what is contemplated in the term sheet. The Company makes no representations or warranties whatsoever as to the outcome of the mezzanine debt finance process.

Competent Persons Statements – Meckering Kaolin Deposit

The information in this announcement that relates to Mineral Resources and Ore Reserves is extracted from the report entitled "Maiden Ore Reserve at Altech's Meckering Kaolin Deposit" released on 11 October 2016; the report is available to view on the Company's website www.altechchemicals.com. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Mineral Resources and Ore Reserves, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.

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