



Materials that set a new standard for batteries

March 2016 - ARPA-E

Company Summary

- ▶ **An engineered materials company**, Sila develops and manufactures next generation battery materials that increase energy density
- ▶ Founded by **Gene Berdichevsky** and **Alex Jacobs** (Tesla) with professor **Gleb Yushin** (Georgia Tech)
- ▶ Funded by top tier venture capital investors led by **Matrix Partners** and **Sutter Hill Ventures**, along with additional investors and industry partners
- ▶ Headquartered in a 30k sq. ft development and pilot manufacturing facility in Alameda, CA
- ▶ Building the large scale synthesis tools in preparation for **first commercial deployment in 2017**
- ▶ We are ~40 world class scientists, engineers and staff with expertise in chemistry, materials science, engineering, and manufacturing automation

Headquarters:



Investors:

matrix
PARTNERS

SUTTER HILL VENTURES

Other Investors

Additional Funding:



Auto Partners

Consumer Partners

Two Markets, One Solution - Better Batteries

Value (Today)



- ▶ Our most valued personal, portable devices: \$500-700 ASP; \$150-300 BOM costs
- ▶ A \$5 battery takes up 30% of its volume & weight
- ▶ Takes away 100% of phone features by 7pm

Sila can increase runtime of any consumer device by 20-40% today for \$1-2 BOM cost

\$15B Existing Market, ~10% YoY growth

Volume (Tomorrow)

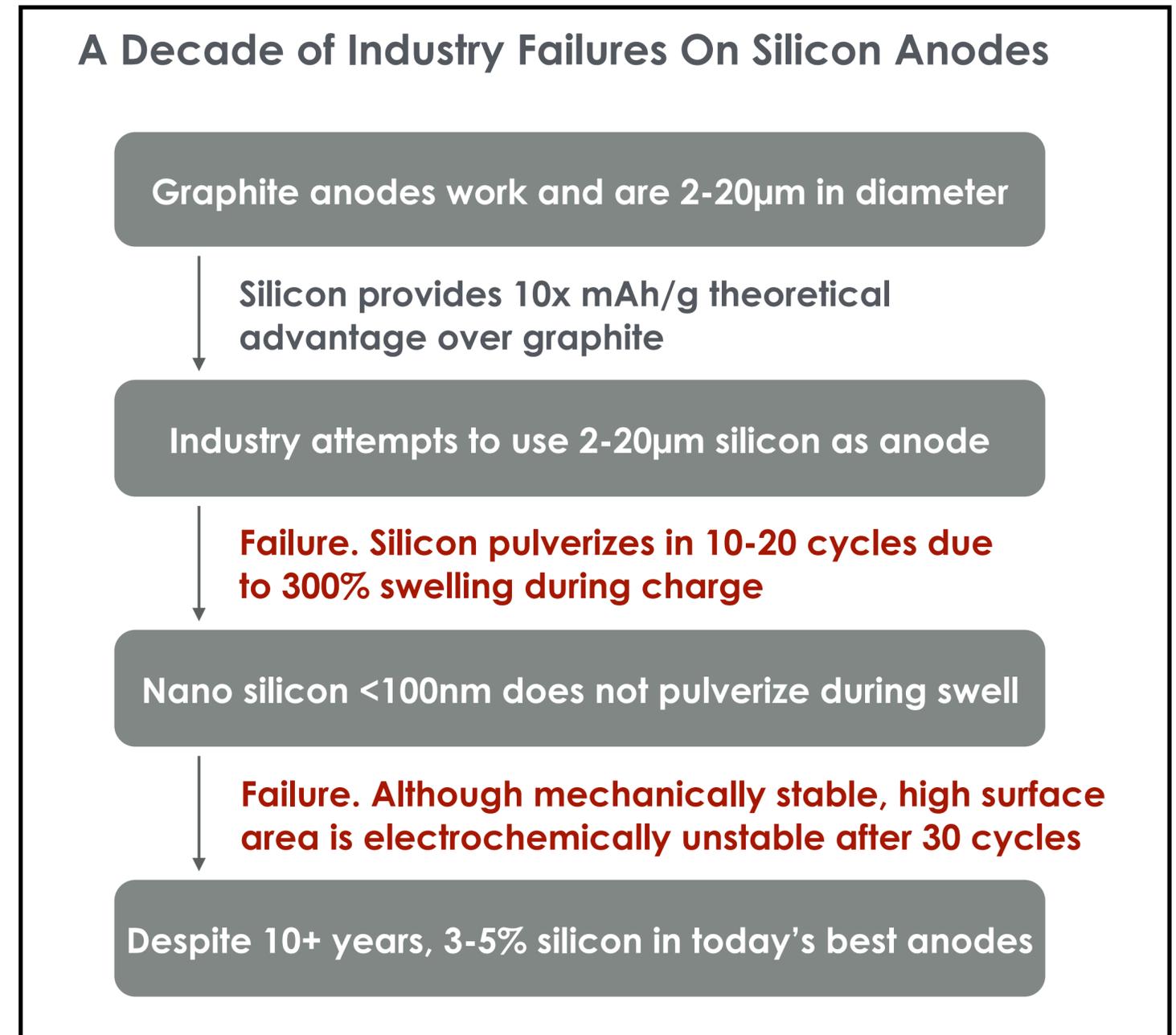
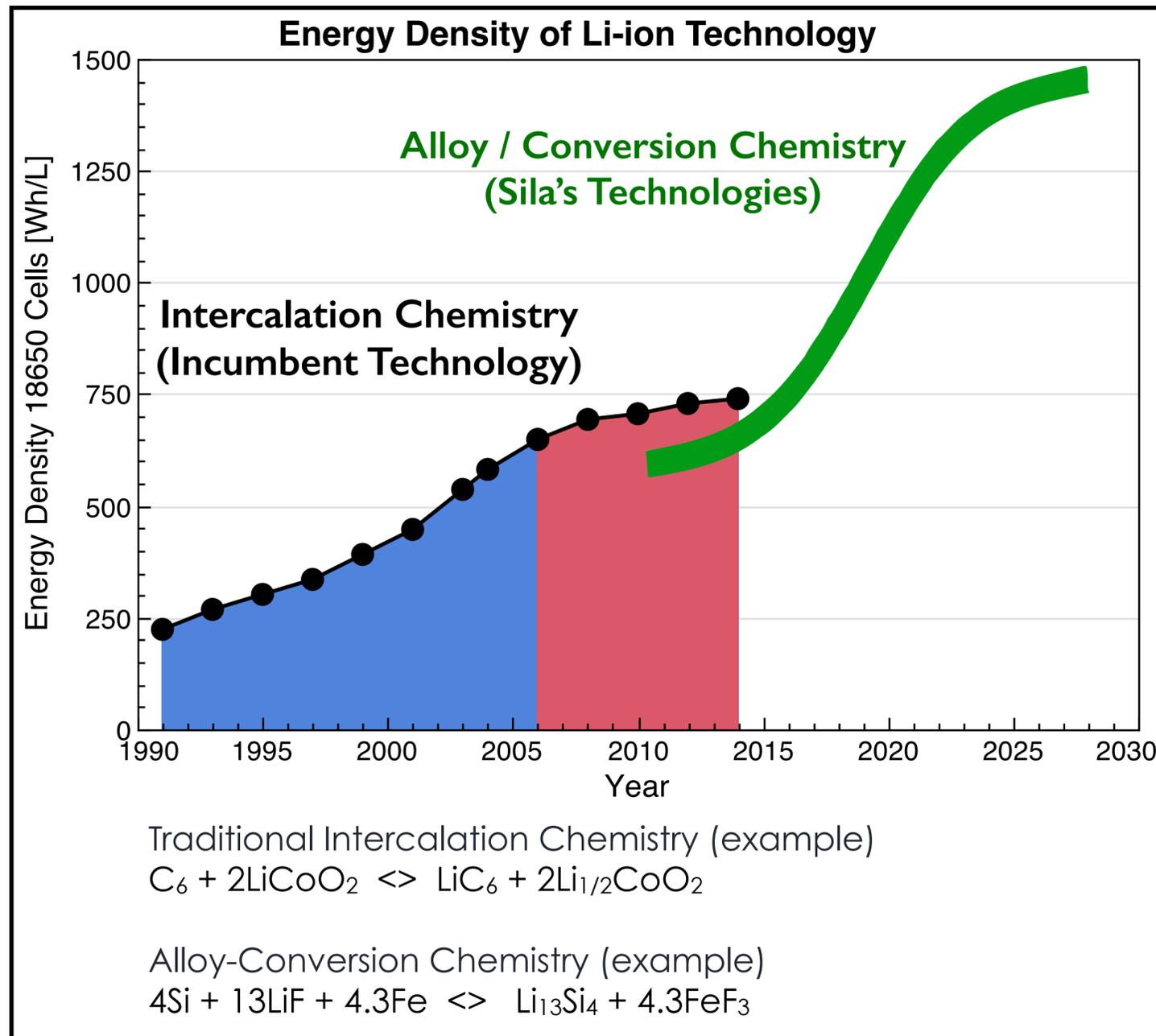


- ▶ Electric Vehicles Mass Tipping Point is when $\$(\text{Battery} + \text{Electricity}) \leq \$(\text{Engine} + \text{Gas})$
- ▶ Today: $\$(100\text{k miles electricity}) \sim \(Engine)
- ▶ \therefore @ tipping point, Battery TAM \sim Gasoline TAM

2015 - \$3-4B with 50%+ YoY growth since 2011
2020 - \$20-25B assuming 40-50% growth

Worldwide Light Vehicle Petroleum Use >\$1T

Technical Challenge

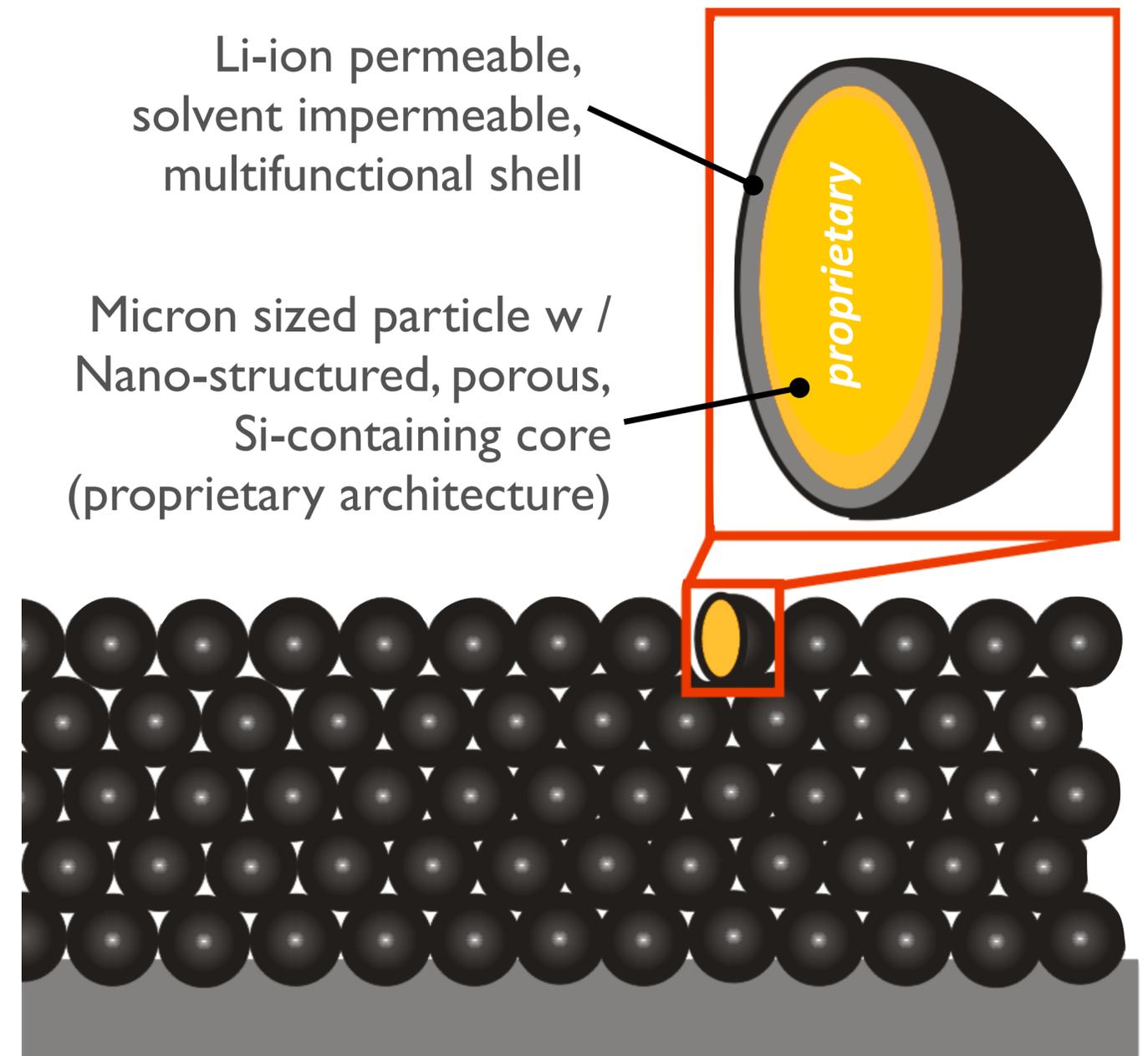


Intercalation materials have asymptoted

Sila's anodes break the failed industry cycle

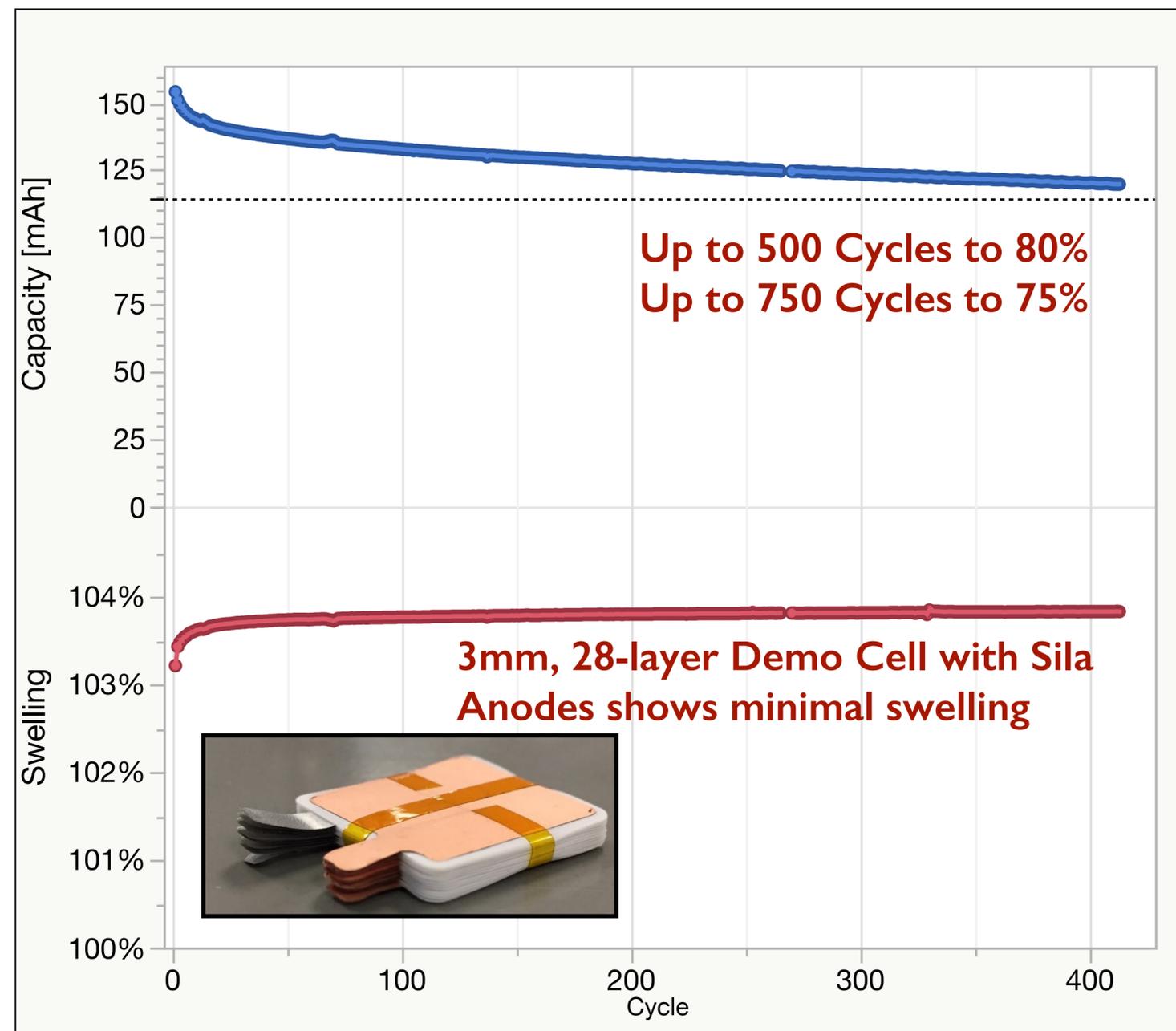
Sila's Successful Approach

- ▶ Sila has built a **micron-size particle** that doesn't pulverize due to a proprietary **nano-structured, silicon-based core and multifunction shell**. It has these critical features:
 - ▶ **Drop-in replacement** for graphite in Li-ion cell fabrication. No new CapEx for cell manufacturers to adopt.
 - ▶ Designed for **zero volume change** which allows long cycle life due to low SEI losses and stable cell size
 - ▶ **Low outer surface area** dramatically reduces electro-chemical side reactions responsible for capacity loss
 - ▶ Volumetric and gravimetric electrodes with **1,000 mAh/cc** and **1,000mAh/g** are 2x and 3x of graphite, respectively
 - ▶ Electrode-level packing due to mono-dispersed spherical particle size allows for **excellent electrolyte percolation**
 - ▶ **Tunable properties** including silicon content, diameter, shell surface, etc. for high rate or high energy uses
 - ▶ Synthesized via bulk processes using only gas and liquid **commodity precursors** for low cost



Technical Achievements

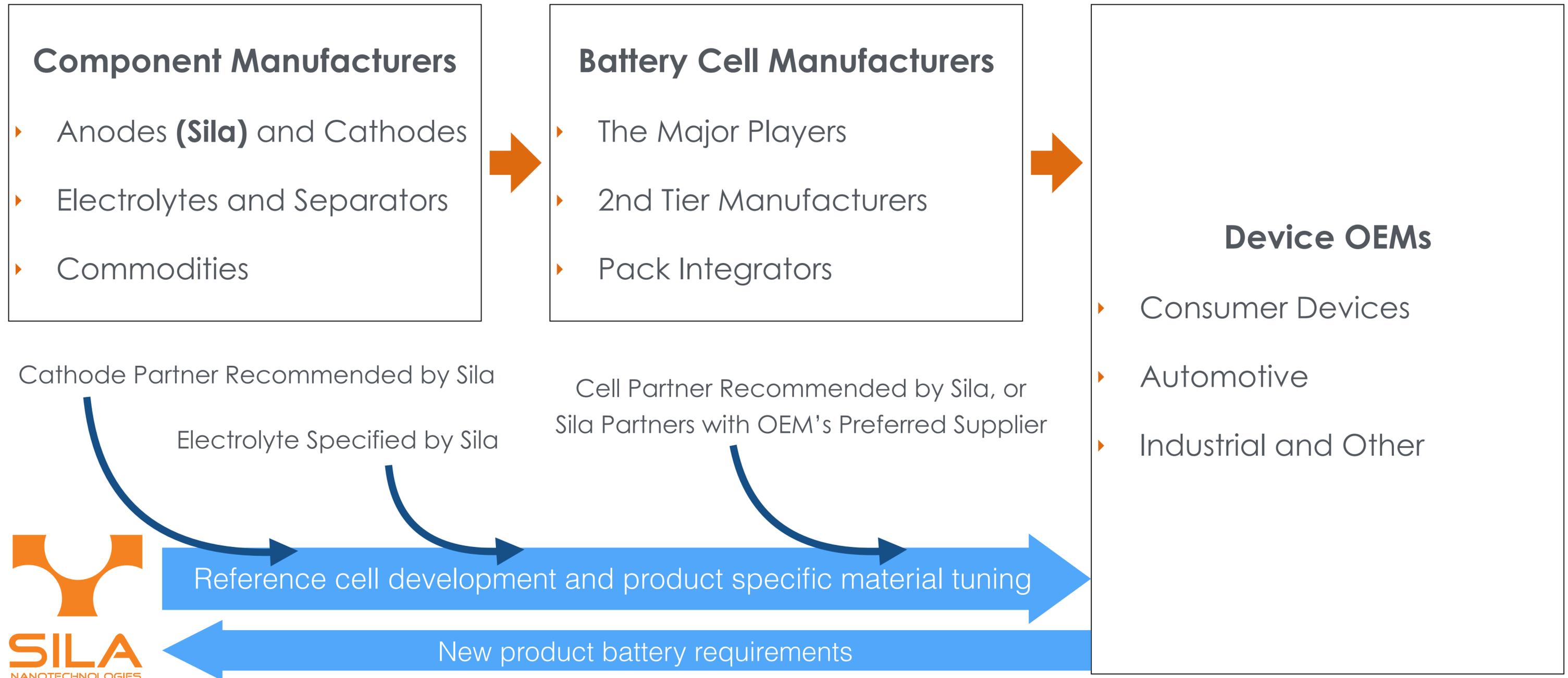
	Sila Today	Wearable Need	Smartphone Need	Auto Need
Full Cell Cycles to 80%	500	300	500+	1000+
Gravimetric Capacity [mAh/g]	>1300	1000	1200	1300
Active Particle %	85%	80%	85%	95%
Capacity Loading [mAh/cm ²]	5	3	3.4	5
Electrode Charge Density [mAh/cc]	>800	800	800-1000	1000+
Full Cell First Cycle Efficiency [%]	88%	80%	85%	90%
Lifetime Cell Swell	<4%	<10%	<10%	<5%
Drop in for cell manufacturing	Yes	Yes	Yes	Yes



Sila has achieved critical metrics today

Sila anodes exhibit high cycle life, low swell

Market Structure



Go To Market - Same Product, Many Markets



Segment	Wearable	Smartphone	Auto
WW Units (est 2016)	100M	1,500M	0.75M
Typical Battery Size (ea)	200mAh	2Ah	6,000Ah
Market Capacity (M Ah)	20M Ah	3,000M Ah	4,500M Ah
Cycle Life Required	250+	500+	1000+

Go to market guided by market capacity needs and cycle requirements

Current Status

▶ 2016 Q1-Q2 Select Charter Customers

- ▶ Trials with OEMs to deliver α -cells and validate performance
- ▶ Goal is to understand requirements and select 2-3 charter customers for 1st commercial line in 2017
- ▶ Currently in trials with:
 - ▶ World class auto
 - ▶ World class consumer device
 - ▶ World class battery
 - ▶ Specialized industrial

