## The Energy Venture Investment Summit

## **THURSDAY, FEBRUARY 17** 1:45 PM (MT)









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GARY CLIMATE SOLUTIONS





# PRIETO BATTERY





#### The Energy Venture Investment Summit February 17, 2022



## **Company Overview**

- Advanced Li-ion battery technology company
  - Commercializing proprietary solid-state 3D Li-ion batteries
  - Prototypes working
  - Robust global IP portfolio
    - 28 issued patents
    - 7 patent families
- Targeting multiple multi-billion-dollar markets
  - Electric vehicles
  - Industrial and medical products
  - Consumer products
- Strategic partnerships
  - Hercules Electric Vehicles for electric pickups and marine
  - Stanley Black & Decker for power tools and lawn equipment
- Experienced senior management team





## Attractive Growing Markets

#### **Expanding Markets**

- Overall market demand for batteries is accelerating, growing at >18% per year
- Total market expected to grow from \$40B in 2020 to \$215B in 2030
- EV market dominates growth but all sectors growing



#### Li-ion Battery Market (\$ in Billions)

Source: Prieto analysis of publicly available reports / forecasts



## **Batteries Still Not Good Enough**

- Li-ion batteries have improved dramatically over the last 20-years
  - Increased energy densities
  - Lower cost
  - Enabling new products from cell phone, power tools to EVs
- Batteries still have significant issues especially in EVs
  - Lack of range
  - Slow charging
  - Narrow operating temperature range
  - Thermal runaways / fires
  - Too expensive



Photo Ride and Drive EVs Plug'n Drive Ontario.jpg



## **Unprecedented Investment**

- Massive amount of investment pouring into EVs and Batteries
  - \$100B VW over 4 years
  - \$35.5B Stellantis over 4 years
  - \$30B Ford over 4 years
  - \$72B Toyota by 2030
  - \$46.3B Honda over 6 years
  - \$5.2B LG over 4 years

#### Above 10%

Passenger electric vehicle sales as a percentage of total sales, quarterly





## **Conventional Li-ion Batteries Are Limited**

#### **Current Li-ion Batteries**

- 2D architecture
- Energy density focus improve anode only



#### Challenge

- Energy density is not the only issue with current commercial Li-ion batteries
- Other issues include:
  - Safety
  - Power density
  - Recharging time
  - Low Cost
  - Cycle or lifetime

#### **Prieto Battery Solution**

 Combine higher energy densities with higher power densities through use of new materials and 3D architecture and lower cost manufacturing



Even with high-capacity anodes, <u>the architecture</u> is what limits the balance of power and energy density in current batteries.



Prieto's 3D architecture provides *high* capacity, *fast* charging, and is safer



Prieto strategy was to start with large scale manufacturing *first*, then work backwards:

- What manufacturing process would enable low cost and high volume?
  - Water based electroplating
- Based on lithium chemistry, what are the key compounds to use in each component?
  - Copper antimony anode
  - Polymer electrolyte
  - Commercially available cathodes



### Prieto Approach: 3D Architecture and Manufacturing





## 3D solid-state Full Cell Successfully Validated

#### **Technology Update**

- Achieved 300+ cycles
- Operating at temperatures from 30 °C to 120 °C
- The 3D cell stores the **same** amount of energy as the 2D cell in a much smaller footprint
- 5X the power density
- Solid polymer electrolyte safer eliminates flammable liquid electrolyte







## Manufacturing Proven at Lab Scale

- Electroplating standard lowcost commercial process
  - Water based
  - Recycled water limited waste
  - Used extensively in semiconductor industry



Representative commercial electroplating line

- 70% of manufacturing process will be drop-in to existing battery manufacturing
  - Slitting
  - Calendaring
  - Welding
  - Etc.



Existing battery manufacturing equipment



Own and Control the Critical IP for Economic Commercial Production of Advanced Li-ion solid- state Batteries									
Materials	Architecture	Manufacturing Processes							
γ									
<ul> <li>28 Patents Issued</li> <li>7 Patent Families</li> <li>Other Patents Pending</li> </ul>	USA								
	EU								
	China								
	India								
	Korea								
	Japan								



### Growth Plan – Product Roadmap



Prieto Battery, Inc.© 2021



## EV Market - \$100+B Opportunity by 2030

#### **Opportunities**

- EV sales are expected to accelerate over the next 10-years
  - Forecasts range from 15% to 30% of all Global sales will be BEV
  - VW expects 70 BEVs by 2025
- Revenue for Li-Ion batteries will exceed \$100B by 2030
- To achieve forecasts batteries must improve:
  - Higher energy density to extend range
  - Faster charging
  - Safer
  - Operate in colder weather
  - Lower cost
  - Better cycle life



Prieto batteries will enable auto manufacturers to achieve these targets by addressing all the current short-comings of BEVs



- Company goal is to be the battery technology of choice for the automotive industry
- Goals 2022 will to be develop relationships with auto companies and to get our batteries into their product testing and development process
- Commercial sales are expected by 2025/26
- Strategic partnership with Hercules Electric Vehicles for electric pickup trucks





## **Industrial Market**

#### **Opportunities**

- Telecom
  - Moving from diesel to solar + storage
  - Operators moving to 100% renewables
- Electric forklifts
  - Euro regulations for low emissions
  - Major suppliers providing more electric models
  - Safety
- Power tools
  - Demand for cordless equipment is growing
  - Construction sites want 100% cordless job sites
- Medical Devices
  - Integral component to many medical devices
  - Growing digitalization expected to drive growth for batteries

#### Industrial (\$ in Billions)





## Industrial Market – Commercial Plan

- Medical device market is extremely attractive due to the attributes of Prieto batteries
  - Safer
  - High power
  - Customizable formats and geometries
- Strategic partnership with Stanley Black & Decker for power tools





## Competitive Landscape

	Advanced Architecture	Energy Density	Power Density	Manufacturability	Safety	Sustainability	
Prieto Battery	~~	~	~~	$\checkmark\checkmark$	~~	~~	
Enovix, Addionics, 24M, EnPower, Xerion	~~		$\checkmark\checkmark$			_	Advanced architectures
Solid Power, Ilika Sion Power,Oxis Prologium, Ionic, QuantumScape	××	~~	××	××	~~	××	Solid-state
Amprius, Enevate, SilaNano, Leyden- Jar, Nanograph	××	~~		××	××	××	Silicon Anodes

Prieto Battery has developed next generation materials and design in parallel with developing sustainable manufacturing methods to enable a safe, platform architecture.



## **Experienced Senior Management**



#### Michael Rosenberg, CEO

- Experienced Cleantech Executive
- CEO, Novinda Holdings, Inc. Sold to Environmental Energy Services
- CEO, OPX Biotechnologies, Inc. Sold to Cargill
- Ballard Power Systems 10 years of executive roles at leading fuel cell company



#### Amy Prieto, Ph.D., Founder and CTO

- Founded Prieto Battery, Inc. in 2009
- Invented the 3-D Li-ion battery architecture
- Presidential Early Career Awardee for Scientists and Engineers (PECASE, an honor she received from President Barack Obama)
- ExxonMobil solid-state Chemistry Faculty Fellow
- L'Oréal USA for Women in Science Fellows



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