Electrovaya Is Optimistic Its Solid-State Battery Has What It Takes to Reach Commercialization Soon In Increasingly Competitive Solid-State Tech Space

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As energy capacity needs grow, lithium-ion batteries — the best battery technology currently available — are rapidly approaching their limits.

Manufacturers are struggling to increase energy capacity without increasing the weight or cost of the battery. That's why the race is on to develop the market's first solid-state battery — one that uses a solid electrolyte in place of the liquid or gel found in lithium-ion batteries.

With multiple companies at the forefront of this emerging technology, the key challenges have been developing a design that's easy to manufacture at scale and functional in the larger format batteries needed for vehicles and storage systems. **Electrovaya Inc.** (OTCQB: EFLVF), already one of the industry's leaders with its safe, long-lasting lithium-ion battery, is optimistic that its innovative hybrid solid-state battery prototype is moving closer to commercialization. Here's how it compares to some of the other leading solid-state platforms in development.

Electrovaya's Solid State Battery Features Unique Attributes Already Used in Its Commercial Lithium-Ion Battery

Electrovaya's hybrid lithium metal battery features a lithium metal anode with a ceramic separator and a solid composite electrolyte. In the **latest study results** of the proprietary hybrid battery, coin cell samples reached 300 cycles with 94% capacity retention. Those preliminary results are a promising sign that the technology can meet the 800 cycles with 80% capacity retention target for a battery to be used in an electric vehicle.

The Company's proprietary woven ceramic separator technology **improves flexibility**, one of the key drawbacks of using ceramic, while still boasting high heat resistance and longevity. r Electrovaya has also demonstrated its ability to implement ceramic separators at scale as to it has already been used in thousands of the company's **infinity batteries**, high-powered lithium-ion batteries with one of the longest-lasting designs in the industry. That includes large-format batteries that power heavy equipment, buses and provide grid-scale energy storage.

That makes its solid-state battery one of the few in development that uses approaches that have already been commercialized. That, along with the low-cost solvent-free coating and Electrovaya's ability to manufacture the solid-state platform at scale using its existing process, give the company an edge on commercializing its hybrid lithium metal battery sooner. The company aims to begin providing samples of its **solid-state platform next year**.

Quantumscape's Early Stage Prototype Shows Promise

Quantumscape Corp. (NYSE: QS), another pioneer in the solid-state battery space, uses a proprietary ceramic separator and an organic gel electrolyte in its hybrid lithium metal battery. This gives it the heat resistance and high conductivity benefits of ceramic. However, it's still in the development stage and Quantumscape has not yet gone through the safety and efficacy testing to determine whether its design will work in consumer vehicles.

Initial study results of smaller prototypes of the technology are promising, though, demonstrating a long battery life of over 1,000 cycles with about 90% capacity retention and the ability to charge up to 80% in just 15 minutes.

SES AI Opts for Ceramic-Free Design In Its Later-Stage Prototype

Like Electrovaya, **SES AI Corp.** (NYSE: SES) is working on a hybrid design that incorporates both solid and liquid layers into a lightweight, less flammable battery. The lithium metal batteries SES is developing, however, use a polymer coating rather than ceramic. While more flexible and less susceptible to damage from dendrites — a kind of corrosion that happens as the battery ages — it has **lower ionic conductivity and less heat resistance** compared to ceramic.

Last November, SES **unveiled** Apollo, the scaled-up version of its Li-Metal battery, which is large enough to power a car. The prototype is one of the first lithium-metal batteries to be built to this size and boasts an energy density of 417 watt-hours per kilogram and weighs less than two pounds. However, the hybrid battery still has years of safety and performance testing before it can find its way into consumer vehicles.

Solid Power Is Betting On Its Proprietary Sulfide Solid Electrolyte

Solid Power Inc. (NASDAQ: SLDP) is working on a couple of all-solid-state battery designs, including one of the few to use an anode made primarily of silicon. Silicon is lighter than metal and more resistant to damage, making it an **attractive alternative**. But silicon can swell up to **300%** of its original size, creating cracks and significantly decreasing energy storage. Fortunately, because the solid-state design doesn't have the flammable liquids of a standard lithium-ion battery, Solid Power has been able to address that challenge.

What stands out most about its design, though, is the sulfide solid electrolyte. Acting as both an electrolyte and a barrier between the anode and cathode, Solid Power's proprietary sulfide-based solid electrolyte offers good conductivity and simple manufacturability. However, the **challenge** with using sulfides is that they don't prevent dendrites and they can be unstable. These are both especially big problems in batteries containing lithium. Solid Power says its proprietary electrolyte has been tuned for lithium metal stability.

About Electrovaya Inc.

Electrovaya Inc. (TSX:EFL) (OTCQB:EFLVF) is a pioneering leader in the global energy transformation, focused on contributing to the prevention of climate change by supplying safe and long-lasting lithium-ion batteries without compromising energy and power. Electrovaya is a technology-focused company with extensive IP, designs, develops, and manufactures proprietary lithium-ion batteries, battery systems, and battery-related products for energy storage, clean electric transportation, and other specialized applications. Company's Infinity line of batteries is focused on commercial vehicles and its Solid State Technology under Development is focused on passenger vehicles. To learn more about how Electrovaya is powering mobility and energy storage, please explore www.electrovaya.com.

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