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Electrek spoke with Dr. Greg Hitz, founder and CTO at Beltsville, Maryland-based ION Storage Systems, about what solid state batteries are, why they"re considered the "unicorn" of battery technology, why they have yet to hit the market, and how his company is working to move the needle.

Electrek: Could you explain what solid state batteries are, what they"re used for, and how they differ from lithium-ion batteries?

Greg Hitz: Solid state batteries replace the flammable liquid electrolyte in a traditional lithium-ion battery with a solid electrolyte that serves the same function. They"re generally accepted as the key to unlocking the safety and energy density required for advanced electric vehicles and electrified flight.

It"s important to note, though, that not all solid state batteries are created equal. The different materials and configurations that underlie solid state battery technologies matter for safety, performance, energy density, and manufacturability.

Electrek: Solid state batteries are often referred to as the "unicorn" of battery technology. Why is that?

Greg Hitz: It"s a great analogy - you"ve never seen a solid state battery just like you"ve never seen a unicorn. Solid state batteries have long had the potential to outperform the batteries you see in most EV"s today; longer range, shorter recharge times, they"re safer. But nobody has yet shown that solid state batteries can deliver on their performance promise without making major sacrifices during battery pack integration like heating or compression requirements and can be produced with scalable manufacturing techniques.

Electrek: Why haven"t solid state batteries taken off yet?

Greg Hitz: No solid state battery manufacturer has yet to offer a 100% solution. Looking across the industry, there are technologies that have incredible rate performance, great energy density, strong safety, scalable manufacturing, and simple pack integration, but no single product offers all of that without significantly compromising one or more of the other aspects.

This is where we think ION differs from other technologies. Our first market customer will get a battery manufactured in the US that offers 40% more energy than their current solution and meets their needs on rate performance, cycle life, and production costs, all while inherently safe.

After our first market release, our second-generation product will incorporate future developments that will

hugely extend the reach of the technology: doubling energy density, increased rate performance, order of magnitude decreases in production cost, qualifying long cycle life, and all the other targets required for wider market release such as EV production.

Electrek: How could solid state batteries achieve scale?

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