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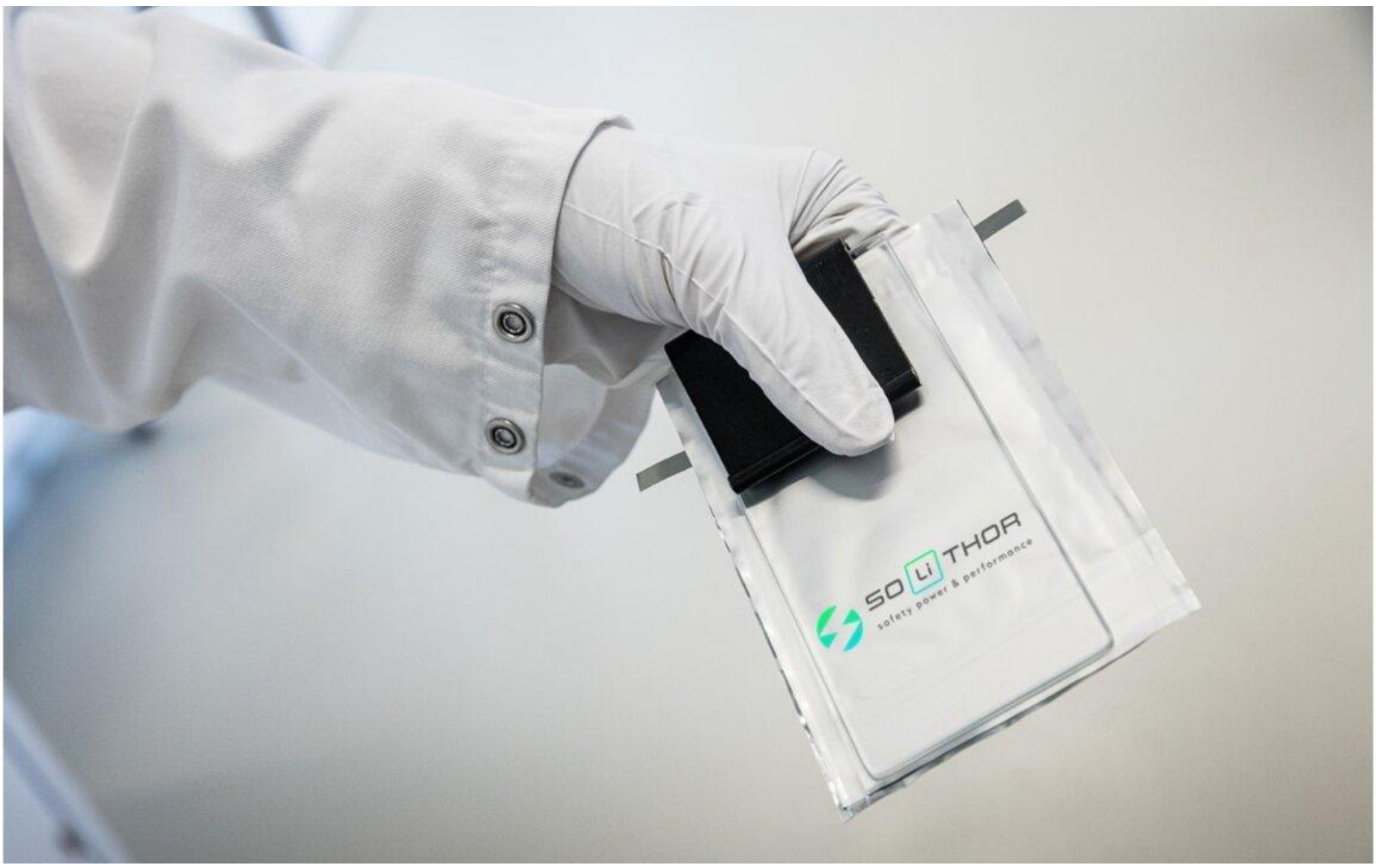
Startup Spotlight: Solithor

Graham Warwick March 21, 2023



Solithor plans to produce large-format, solid-state, lithium-metal pouch cells.

Credit: Solithor

Battery startup Solithor and aerostructures specialist Sonaca, both Belgian companies, are talking to aircraft developers to capture requirements for energy storage in electric aircraft as they pursue plans to commercialize high energy-density, solid-state, lithium-metal battery technology.

The technology was incubated by Imec, the Interuniversity Microelectronics Center in Belgium, which invested about €30 million ($32.3 million) over 10 years in the research. Solithor was spun off from Imec in May 2022 having raised €10 million in seed funding from Belgian federal and regional investment funds.

With a metallic lithium anode replacing the graphite anode used in conventional lithium-ion batteries, lithium-metal cells have the potential for higher specific energy and power. But lithium dendrites can form on the surface of the anode during change/discharge cycles, causing a short circuit and thermal runaway.

Solithor combines a nano-lithium anode with a nano-solid composite electrolyte. Replacing the flammable liquid electrolyte used in conventional lithium-ion cells, the solid electrolyte blocks the growth of dendrites and does not need a high operating temperature to reach high lithium-ion conductivity, the company says.

In February, Solithor signed a memorandum of understanding with Sonaca to jointly develop battery systems for regional aircraft and urban air mobility (UAM). The partnership is planned to expand to include satellites and defense systems. Solithor will be responsible for cell development, testing and production at its plant in Sint-Truiden and Sonaca will develop the battery packaging and battery management system (BMS) and certify the battery system at its plant in Charleroi.

“We’re hoping to solidify that collaboration this year, and discussions have already begun with European and U.S. aircraft manufacturers. We already have targeted clients that are ready to work with us and Sonaca,” says Solithor founder and CEO Huw Hampson-Jones. “I’m not going to build the BMS. I’ll manufacture the cells and ship those to Sonaca for integration into a pack, then integration of that with the BMS and the integration into the airframe, that’s the role of Sonaca.”

Solithor is in the early stages of scaling up its technology from laboratory research to the production of pouch cells for testing. “Twelve months after the seed round we are now producing cells in their hundreds and we are looking toward upscaling to several thousands over the next two to three years because we want to create demonstrator cells and deliver them to companies like Sonaca so we can start making changes, because we will I’m sure,” he says.

“We began work under the auspices of Imec, but we needed a factory where we could develop the technology in a swift manner without compromising quality. We took over full control of cell production in August last year and then I signed a contract for new dry rooms that we’re building in Sint-Truiden,” he says.

Solithor signed a 10-year contract in December with Belgian vehicle transmission supplier Punch Powertrain to establish the center of excellence for solid-state batteries in the former Volvo automotive plant in Sint-Truiden. “We will have nine test rooms. What that means is I can fail more quickly,” Hampson-Jones says.

“I know that may sound odd, but once it’s all up and running–the target is Aug. 1–we will be able to produce one day, test the next day and fail or succeed early,” he says. This will move the technology from a decade of pure research into applied research and begin the scaling up of production.

Solithor is targeting aerospace as its initial market. “I’m not interested in going after the automobile sector because there’s sufficient manufacturing capability there and that puts me at a competitive disadvantage, because there is no way I can get into an automobile this side of 2030 and compete at the price they would want,” Hampson-Jones says.

“The car industry is not the right approach. Let’s go where there is a desperate need to electrify, so regional aircraft,” he says. “I’m not excluding [urban] air mobility, but I’m still a bit skeptical about it. But in regional aircraft, where you want to fly 3-5 hr. and can take advantage of regional airports, we can see that companies want to move away from this heavy lithium-ion cylindrical-cell technology.”

As a first step into the aviation market, Solithor has begun talking to aircraft manufacturers to understand their requirements. “My experience of the last 13 years is that cells have been developed in a pure R&D, arguably academic, environment and they are designed around the nuances of the scientists involved in. I felt we should go out now and capture the statement of requirements for the aviation sector,” Hampson-Jones says.

“We go into the aircraft hangar. We look at what is being considered by the aircraft manufacturers and they tell us what they are looking for in the next generation of technology,” he says. “And we have signed off on a [technology] road map with Sonaca because we’re committed to pouch technology and we’re targeting long term. I’m projecting it forward to 20, 30, in excess of 40 amp-hour cells.”

Solithor plans to enter the market with large 10 amp-hour pouch cells. This compares with less than 4 amp-hours for 18650-standard cylindrical cells. “We’re targeting 10 amp-hours over the next two-three years for demonstration purposes,” Hampson-Jones says. “We’ll probably bypass 5 and go straight to 10 and then you can target 20, 25, 30 and so on.”

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