

The battery market is booming. One company believes it's made a key change to how they're made

By Pippa Stevens
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Batteries' role in daily life is becoming ever more prominent as they power watches to phones, computers, cars and entire homes. The large and growing total addressable market — as well as the many end uses — means companies and researchers around the world are vying to create devices that are more powerful and more efficient, all while keeping costs down.

One company believes its focus on a little-innovated part of the battery sets it apart. Enovix launched in 2007 with a mission to transform the basic architecture of

lithium-ion batteries. The company says its 3D stacking structure — as opposed to the winding structure typically seen in batteries — allows it to take advantage of the energy-rich nature of silicon, thereby creating more powerful batteries.

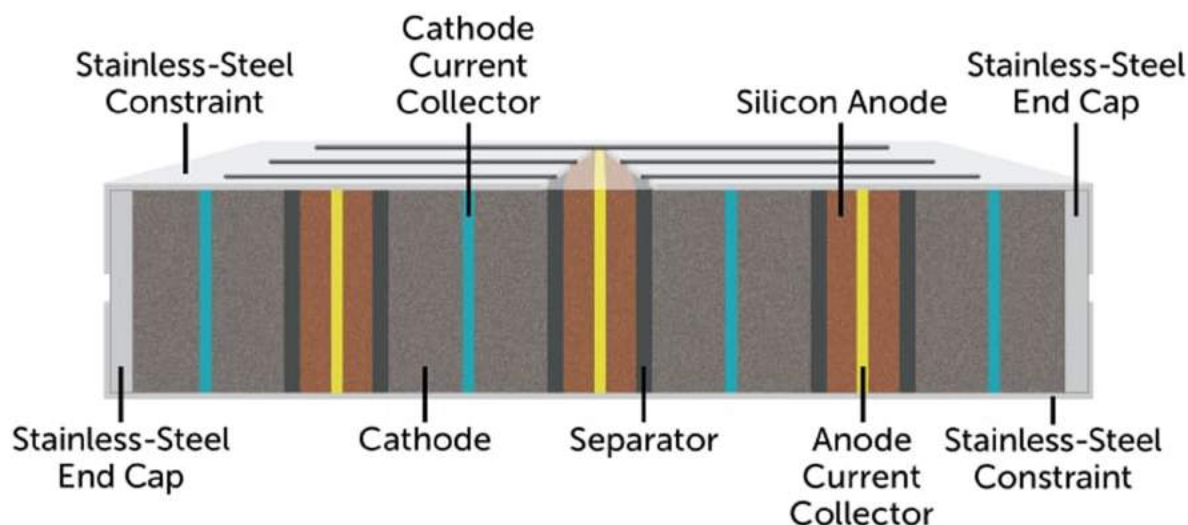
The company took advantage of the rise in special purpose acquisition companies, or SPACs, and earlier this year announced plans to merge with Rodgers Silicon Valley Acquisition Corp. in a deal valued at \$1.1 billion. With momentum behind the clean tech space, including from Washington, Enovix CEO Harrold Rust said the timing was right to take the company public.

“I think some of these things are just starting to time out now where now it’s time to actually commercialize,” he said.

Unconventional start leads to new architecture

As Rust tells it, Enovix was started by people who, at the time, “were not battery people.” Instead, the founders’ expertise lay in manufacturing three-dimensional architectures. Eager to apply their knowledge to a new field, they set their sights on the battery industry.

Sony was the first to commercialize lithium-ion batteries in 1991 for handheld camcorders. In the subsequent years and decades chemists and companies have explored ways to improve batteries’ metrics including storage and size, but much of this has focused on changing the raw materials inside the battery. The basic architecture of the battery hasn’t been fundamentally altered.



Enovix 3D Cell Illustration – electrodes, separators, and current collectors stacked side-by-side and enclosed in a stainless-steel constraint system

“We were, you know, either too stupid or too smart to say well maybe there’s a different way to make it,” Rust said.

Enovix makes batteries with electrodes and separators that are laser patterned and stacked into a 3D cell architecture, compared to the traditional structure which features wound electrodes.

The altered structure means that the anode — one of two electrodes in a battery — can be all silicon, versus standard anodes which are predominantly graphite.

Silicon is a desirable material since it is more energy efficient than graphite. But it comes with its own problems, including that it swells, which creates pressure in the battery and can lead to cracks.

Enovix says its proprietary design manages the silicon’s swelling, leading to batteries that have as much as 110% better energy density. The altered structure also creates high cycle life — or the number of charge and discharge cycles a battery can complete before it loses efficiency.

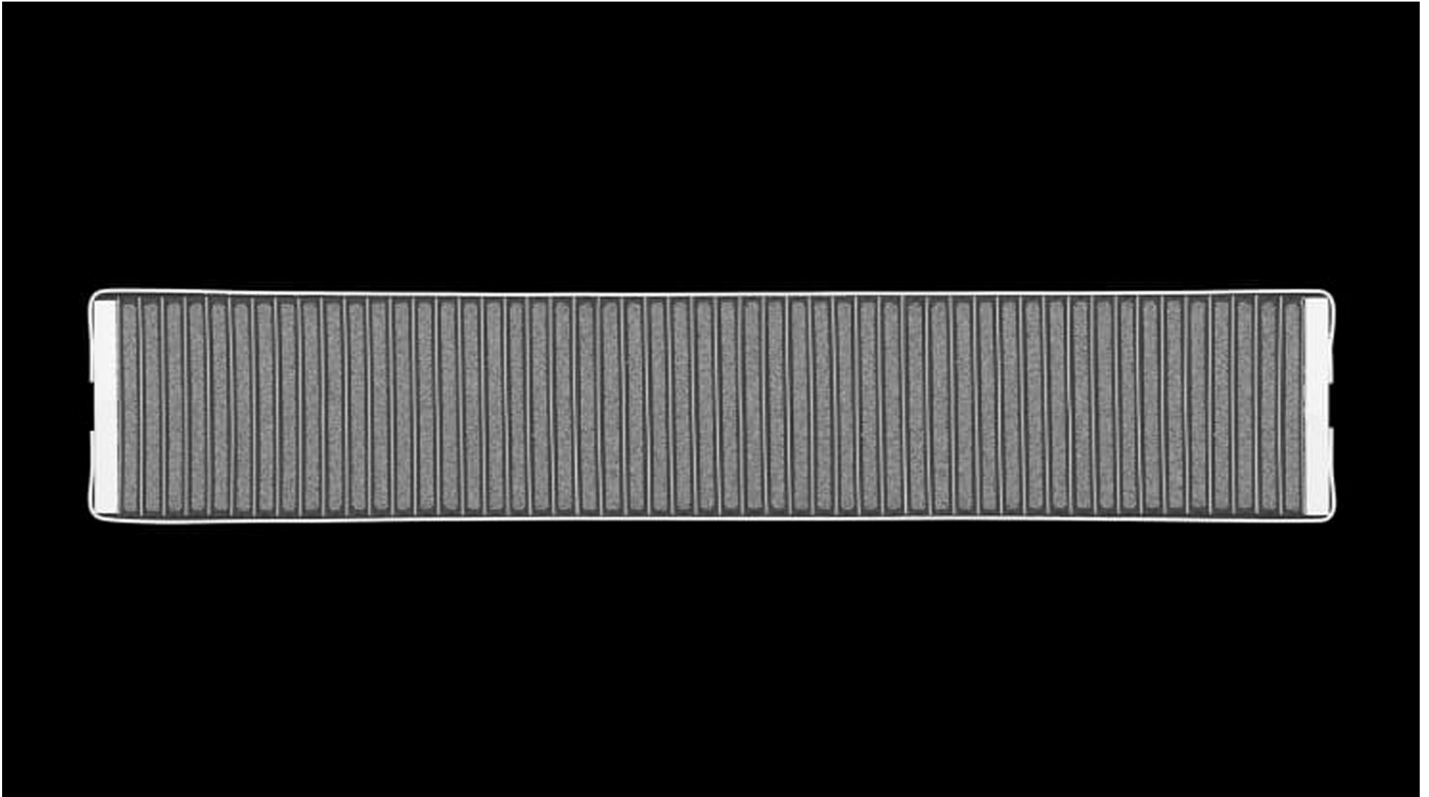
The act of putting silicon in the battery is not in and of itself revolutionary, and many companies already use some silicon in their anodes. But Enovix says its proprietary design, which enables an all-silicon anode, sets it apart.

Of course, new designs can also come with their own problems, and there’s currently billions of dollars being thrown at improving the incumbent winding structure.

Starting small

At present Enovix is focused on the consumer electronics market. These are high-value products that, according to Rust, are “dying” for an improvement. While nowhere near the size of the electric vehicle market, the consumer electronics market is still projected to be worth \$13 billion by 2025. Energy density is a limiting factor in many devices, meaning companies are willing to pay up for batteries that have higher performance standards. Certification for consumer electronics is also much faster than for car batteries.

“We’re using that as a stepping stone to grow the business, and at the same time work on some of these much, much larger markets like EVs,” said Rust.



Enovix 3D Cell Cross-Section Photomicrograph

The company is currently building its first factory in Fremont, California, and has plans to go into volume production in the early part of 2022. The company is targeting the second quarter of 2022 as its first quarter with revenue, although it doesn't anticipate turning a profit until 2023 at the earliest. By 2023, Enovix wants to build a second factory, while also retrofitting existing factories, thereby making use of capital that's already in the ground.

The company has successfully sampled its battery to more than 20 customers across a range of products including laptops, wearables, augmented reality and virtual reality.

"Our approach, even from the beginning, was let's start in consumer electronics where they really value energy ... then in parallel work on the technology for the larger EV cells, and then use our success in the consumer space, both from a technology and a manufacturing standpoint, to then move into the EV space. And so you can be a company that's profitable years ahead of where you would be if you're just going to jump into EVs right at the start," said Rust.

Choosing a SPAC

The company was initially planning to grow organically and eventually go public

through a traditional IPO. But then came the special purpose acquisition company or SPAC boom, and Enovix opted for a reverse merger.

“I viewed it as an opportunity to accelerate the growth rate of the company, and to not just organically grow and become profitable and build a factory too, but actually kind of move forward with things more in parallel,” Rust said. “In our case, you know, technical risk was kind of behind us and so now it makes total sense to kind of grow as fast as you can.”

The expertise of the chosen SPAC — Rodgers Silicon Valley Acquisition Corp. — was also appealing. T.J. Rodgers is chairman and CEO of the fund, and also sits on Enovix’s board of directors. The deal was announced on Feb. 22, and is expected to close by the end of the second quarter.

The stock, which trades under the ticker RSVA, jumped to a high of \$28.50 the day the deal was announced, but has since retreated to around \$12.40. The pullback mirrors recent weakness in the broader SPAC market, where new issuances have slowed after a flurry of activity in 2020 and into the first quarter of 2021. The CNBC SPAC Post Deal Index, which tracks large SPACs that have announced targets or completed a merger in the last two years, has declined more than 16% this year. In 2020, the index rose 31%.

Big plans

Enovix is far from the only company working on battery innovations, or the only company seeking to maximize silicon’s energy-rich properties.



Enovix 3D Silicon Lithium-ion Battery

Given batteries' integral role in our daily lives as well as the crucial part they play in the larger energy transition, some have called the U.S.' dependence on foreign nations as a national security concern. President Joe Biden has called for bringing some of the production and manufacturing back to U.S. soil, including earmarking \$174 billion for electric vehicle development in his recently unveiled infrastructure bill.

"Batteries are so critical for so many industries in so many markets in the U.S. and in the world that having the U.S. have advantage and innovation in that space is super valuable," Rust said.

"I actually think we're kind of in some ways a poster child for what the Biden administration would like to do — you know sponsor innovation that brings back technology prowess and manufacturing in this country."