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Wider penetration of silicon anode technology in light vehicles will likely accelerate over the next 3 to 7 years: Rick Luebbe, CEO, Group14

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Source: Group14 Technologies

Among the several advanced battery technologies that are under development, Silicon anode technology is keenly followed. Silicon anodes could substantially increase battery energy density and charging speed compared to traditional graphite anodes, making them vital for next-generation electric vehicles. **S&P Global Mobility** spoke with **Rick Luebbe, CEO and co-founder of Group14 Technologies**, a fast-emerging company in this space, to understand more about the technology, its prospects and challenges, and to know more about the company's journey toward commercialization of its flagship silicon anode solution SCC55.

S&P Global Mobility: Can you give us a quick overview about the company and yourself?

Rick Luebbe: Group14 Technologies is a commercial manufacturer of advanced silicon battery materials designed to enable higher energy density and much faster charging. Batteries powered by SCC55®, our flagship product, deliver up to 50% more energy density than conventional lithium-ion batteries.

We operate multiple Battery Active Material (BAM) factories, two in the US and one in Sangju, South Korea, and we have a silane factory in Germany to secure a regional supply of a critical precursor material.

I co-founded Group14 with Dr. Rick Costantino. We have focused on making silicon material that is drop-in ready so OEMs and cell makers can adopt the material without retooling entire lines. SCC55 is also a replacement for graphite. Before Group14, I co-founded and led EnerG2, another energy storage material company, and also served as its CEO. I began my career as an Army aviation officer, led an aero scout platoon in Desert Storm, and later flew Apaches as commander of an Attack Helicopter Company.

How significant is this new funding for Group14 in the pursuit of expanding production capacity? What other areas of operations will this fund be used for?

This $463 million Series D raise is transformative — it accelerates SCC55 production in the US and South Korea and strengthens resilience against trade and policy headwinds. It gives us the scale and control we need to meet surging energy requirements. The energy demands of the next decade are staggering, as AI data centers, electric mobility and consumer electronics are increasingly integrated into our daily lives. And all of it needs high-performance batteries.

What was the thought behind acquiring the joint venture with SK Inc. and how do you see the future of this partnership?

Full ownership of the South Korea BAM factory gives us direct control over the manufacture of our material in the heart of the world's largest battery market. Owning it outright lets us move faster and align operations while still maintaining close ties with SK.

Group14 Technologies' recently acquired battery active material (BAM-3) plant in Sangju, South Korea.
Source: Group14 Technologies

Can you share the details about the latest breakthrough you have achieved with your SCC55 material? With this, you've managed to somewhat address one of the main disadvantages associated with silicon-based batteries, that of poor charge cycles. How important is it from the automotive industry perspective?

For years, the goal of the silicon battery industry has been to meet 1,000 charge cycles, which was the benchmark for high-performance lithium-ion batteries. The data we recently shared was gathered from more than 20 customers using SCC55, exceeding 1,500 cycles across a range of applications, while maintaining silicon batteries' key benefits: higher energy density and fast charging.

This customer data shows SCC55 cells delivering 1,500+ charge cycles, in some cases over 3,000. For automakers, that means longer-lasting packs, more range and faster charging without added cost or weight.

According to our conversations with some Chinese players, there are concerns that silicon anodes might have conductivity issues, making fast charging more challenging. How do you evaluate the fast-charging capability of SCC55?

SCC55 is a silicon-carbon composite, which was specifically engineered to address the conductivity challenges often associated with silicon anodes. Its proprietary conductive composite structure ensures efficient electron and ion transport, enabling extreme fast charging without compromising stability. Incorporating industry-standard conductive additives boosts the performance even more. Internal testing has shown that batteries with SCC55 can reach 0%-80% charge in just minutes while maintaining long cycle life, demonstrating that the material can support high-performance, high-throughput applications without the degradation issues seen in traditional silicon anodes.

You mention that your solution is chemistry agnostic. But how effective is your silicon

anode in LFP or LMFP cells in increasing energy density as cathode chemistry limits how much the energy density can be increased?

SCC55 is a drop-in graphite replacement compatible with all cathode chemistries. The energy-density gains depend on the cathode: high-nickel NMC cells see the largest improvements, while LFP and LMFP have lower theoretical limits. Even so, adding silicon to LFP or LMFP still delivers meaningful benefits, including faster charging, higher power output, better low-temperature performance, and longer range, without requiring a complete cell redesign.

Every battery involves balancing chemistry, cost and performance. Silicon anodes provide a practical, scalable path to boost energy density and overall performance across chemistries, unlike lithium-metal alternatives that require more complex integration.

As per your reports, you have tested SCC55-based cells with nearly 20 customers, many of whom are auto. The results show that the projected cycles range from 1600 km to 3000 km and the capacity retention varies from 80% to as high as 95%. Can you throw some light on these results?

These numbers reflect different use cases. Some cells are optimized for maximum energy, others for cycle life. The common thread is that SCC55 consistently delivers well beyond today's graphite baselines, with retention ranging from 80%-95%. This variation is consistent with how cycle-life is reported across different power/energy tradeoffs: high-energy, high-capacity designs may exhibit lower retention at identical cycle counts compared with lower-stress power cells optimized for longevity.

Which industry are you focusing on while developing the solutions? Who are the automotive OEMs you are working with? Will we see your technology in a mass-market car in the near future?

We're working with major automotive OEMs and their cell partners, and while timing depends on qualification cycles, SCC55 is already in customer cells headed toward vehicle programs. Group14 targets a broad set of battery-dominated markets: EVs, eVTOL, AI data center storage, and consumer electronics. We announced in September 2024 that SCC55 was delivered to 100+ battery manufacturing customers, including cell makers that supply automotive OEMs. We also have strategic investor and partner relationships with players like Porsche and ATL (Amperex). Beyond that, we can't share due to non-disclosure agreements.

When SCC55 will appear in a given mass-market car depends on individual OEM qualification timelines, and public announcements of specific OEM production models would come from the OEMs once programs reach launch.

What are some of the challenges you faced while working with the automotive industry, and when do you think silicon-based batteries will become more common in the light vehicle segment?

Automotive adoption requires long validation, stable supply chains, and cost competitiveness. We've invested in multiple BAM factories and precursor capacity to meet those standards. As for timing, silicon-enabled anodes are already being adopted in niche and performance segments, including the McMurtry EV hypercar, and the Archer Midnight eVTOL, for example.

Wider penetration in light vehicles will likely accelerate over the next 3 to 7 years as cell makers finish qualification and scale production. The exact time frame will vary by OEM and market

segment.

What kind of silicon anode do you anticipate dominating the automotive market? For example, full silicon versus graphite with 5% or 10% silicon.

Both will coexist. Blends with a few percent silicon give incremental benefits, but silicon-dominant composites like SCC55 unlock the big range and fast-charge gains. Group14's strategy is the latter: a silicon-dominant, drop-in composite because it unlocks the largest energy density and fast-charge benefits while being manufacturable at scale. For mainstream, cost-sensitive models, lower-percentage silicon blends may remain attractive as interim steps; premium and performance programs (and applications where range or power matters most) will likely adopt silicon-dominant anodes faster.

We have noticed a trend among solid-state battery makers shifting their focus from lithium metal anodes to silicon. Do you have any comments on this trend?

Solid-state batteries promise higher energy densities and improved safety, but they still face significant challenges, including interface instability, low power output and scaling difficulties. Lithium metal is promising but difficult to scale safely. In contrast, silicon anodes are ready and available today, leveraging existing lithium-ion infrastructure. This makes silicon a practical, lower-risk path to higher energy density and faster charging. SCC55, while designed for liquid-based lithium-ion cells, also shows promise in solid-state designs, helping bridge the gap from prototype to real-world performance.

Silicon-carbon composite anodes that are drop-in compatible with current lithium-ion lines allow developers and OEMs to achieve near-term performance gains without fully re-architecting manufacturing. That's why many are prioritizing silicon as a scalable solution today while continuing to explore lithium metal and solid-state technologies for the longer term. Group14 provides a pragmatic route to unlock these benefits now.

What is your current production capacity?

Group14 operates BAM factories in the US and a 10-GWh plant in South Korea, with plans to keep expanding globally. Our Germany silane facility will further secure precursor supply.

Are you looking at raising more funds from the market or even looking at a public listing in the near future?

We maintain an active approach to capital formation as part of our strategic growth initiatives. Our capital strategy encompasses multiple avenues, all aligned with our goal to rapidly scale production capacity to serve our growing customer base of 100+ qualified customers representing 95% of global lithium-ion battery production.

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