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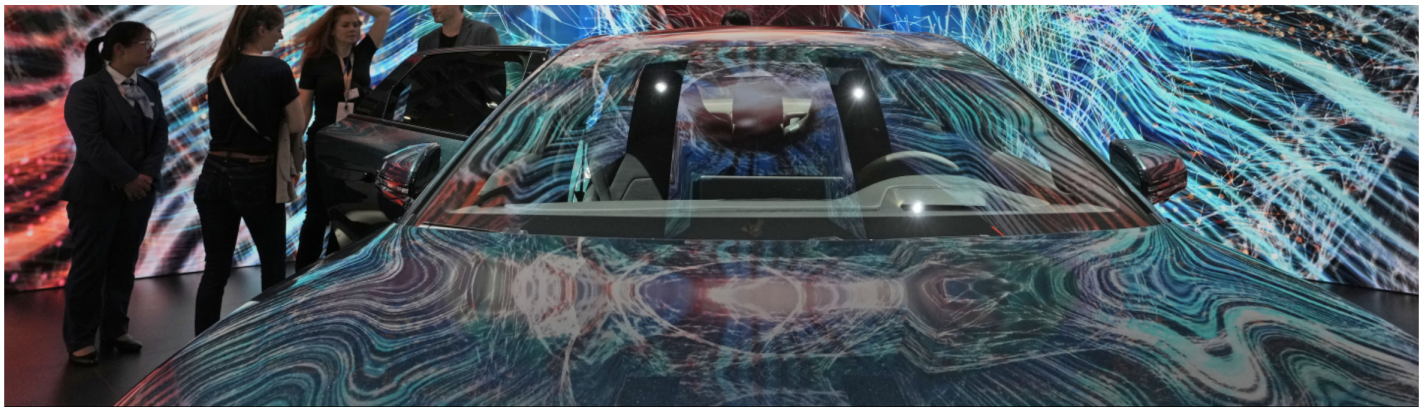

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Batteries and Solar Products Need American Silicon Metal

By Eugen Iladi

August 01, 2023

The global battery market is on the verge of a breakthrough and the U.S. needs to improve its supply chain to get ready for the coming boom.

Electric vehicles require better batteries to go farther. Scientists say that batteries made with silicon instead of graphite – or at least more silicon – can charge faster and increase vehicle range. The innovation is set to launch the battery industry into the trillion-dollar stratosphere, but U.S. authorities need to help get it there by encouraging more production of silicon metal, a vital component.

Demand for a better battery is enormous and is driven by the global imperative to combat climate change. According to a study by the consulting firm McKinsey & Co., lithium-ion battery demand is expected to grow by about 33 percent annually over the next seven years. At least 120 and as many as 150 new battery factories will be needed between now and 2030 to keep pace with worldwide demand.

The U.S. has not been a leader in battery production. It also has lagged in the production of silicon metal, most of which is produced in China. This creates a supply chain vulnerability, especially if batteries transition from graphite to more silicon. China is also taking advantage of silicon batteries more than any other country. The nation could account for 45 percent of total lithium-ion demand in 2025 and 40 percent in 2030, and their battery production chain is already more mature. Growth is needed in the U.S.

Batteries made with silicon will revolutionize the industry, and that's not all. Silicon metal, the component added to lithium-ion batteries to increase their so-called energy density, is also key to the production of other cutting-edge products. These include semiconductors and solar panels. As a result, demand for silicon metal is growing even if batteries don't switch to silicon right away. Experts predict that demand for silicon metal will grow 21 percent each year until 2032, according to McKinsey.

The new silicon anodes in lithium-ion batteries have 10 times the capacity in lithium-ion batteries compared to graphite anodes, which have dominated the market for decades. They also can charge to 80 percent in less than six minutes. According to experts, electric vehicles with silicon anode batteries will go 50 percent farther. What's more, they could enable the electrification of air travel and heavy trucks.

The U.S. commercial rivalry with China is increasing. Battery production is already a hot arena and will get even more intense as silicon replaces graphite. China is the world's largest producer of silicon metal with an estimated 4.5 million metric tons annually. Indeed, 70 percent of the world's refined silicon metal is produced in Chinese foundries, which poses a significant risk to the global supply chain and the U.S.'s ability to compete in global manufacturing and defense industries.

Conflict in the South China Sea could cut off silicon metal import lines overnight, as was seen in January 2022 when the Chinese Communist Party issued an energy reduction edict. It led to a "brownout" in the supply chain. Keeping the bulk of silicon metal production in the hands of U.S. adversaries is becoming more and more dangerous.

If the U.S. wants to remain a global technological superpower and take advantage of the innovations that silicon anode batteries offer, it must support domestic silicon metal production. Currently, only two domestic silicon metal producers exist: Globe Metallurgical, Inc. and Mississippi Silicon, Inc. Building a silicon metal foundry can cost millions of dollars and take years. Access to capital and navigating the complicated environmental permitting process are significant obstacles to opening new U.S. facilities.

The government should incentivize domestic production of silicon metal and protect the industry through export controls and other trade-related measures. By supporting this vital component of renewable energy and technology, the U.S. can position itself as a global leader in sustainable energy and maintain a strong position in a battery market poised to take off.

Eugen Iladi writes about international business and development.

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