Lithium-ion battery technology bridgetown

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As demand for lithium-ion batteries to power cars, laptops, and cell phones has soared in recent years, the world has engaged in a fevered rush to find the raw materials needed to make the batteries. An increasing demand for lithium -- along with its chemical partners, cobalt and nickel -- could be difficult to meet.

Enter the U.S. Department of Energy (DOE), six of its national laboratories, and eight university partners, including Virginia Tech. The DOE has awarded this group, known as the Low-cost Earth-abundant Na-ion Storage (LENS) consortium, $50 million over the next five years to look for alternatives.

The LENS consortium aims to develop high-energy, long-lasting sodium-ion batteries using safe, abundant, and inexpensive materials. This initiative addresses a critical need to reduce U.S. dependence on the limited and strategically important elements used in lithium-ion batteries, paving the way for a more sustainable future in electric-vehicle technology.

Feng Lin, professor of chemistry at Virginia Tech, will bring to the effort his expertise in finding the best combination of materials, chemistry, and manufacturing to make batteries more environmentally friendly and affordable.

"Our world is on the verge of a profound shift in how we power our everyday lives," Lin said. "With the combined expertise of the LENS consortium, we now have a unique opportunity to pioneer new battery technologies for electric vehicles and to train a new generation of scientists and engineers who will contribute to our domestic battery innovation and manufacturing."

Paul Kearns, director of Argonne National Laboratory, the lead agency, said the LENS consortium would "push sodium-ion battery technology forward and contribute to a clean-energy future for everyone. Our scientific expertise and dynamic collaborations in this important field will strengthen U.S. competitiveness."

At present, lithium-ion batteries dominate the global energy storage market, especially for vehicles. They power devices ranging from smartphones to electric vehicles and can store energy from renewable sources like solar and wind. However, producing more and more lithium-ion batteries to power our cars and devices is becoming difficult.

"I have been talking for years about the challenges of scaling up lithium-ion batteries," Lin said. "We don"t have enough access to the materials here at home and they are difficult to acquire internationally."

"The issue we need to solve is that sodium-ion batteries are heavier than lithium-ion batteries per unit of stored energy," Lin said. "But there"s so much potential: sodium-ion batteries could both reduce the cost of domestic

manufacturing as well as offer faster charging and some unique safety features."

Venkat Srinivasan, director of the LENS consortium and director of the Argonne Collaborative Center for Energy Storage Science, said: "The challenge ahead is improving sodium-ion energy density so that it first matches and then exceeds that of phosphate-based lithium-ion batteries while minimizing and eliminating the use of all critical elements. Importantly, any improvements must not compromise other performance metrics such as cycle life and safety."

To achieve this goal, Argonne has convened a world-class team of researchers from national laboratories and universities. Each participant brings deep experience studying sodium-ion batteries. Collectively, they will work to discover and develop high-energy electrode materials, improve electrolytes, and design, integrate and benchmark battery cells.

An advisory board comprising well-established and emerging companies will provide the consortium with valuable industry perspectives, with a goal of nurturing an ecosystem in the U.S. for sodium-ion batteries.

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