

Battery Upgrades Unlocked

From new materials to alternative techniques, and even outside the box strategies, innovators are looking for updated approaches to mobile power solutions.

BY LOUISE POIRIER

The pursuit of more powerful, longer lasting, and sustainable batteries is an ongoing effort, fueled by the quest for cleaner energy sources.

According to the International Energy Agency's Global EV Outlook 2022, electric vehicle (EV) sales doubled in 2021 over 2020 to a record 6.6 million, versus 120,000 electric cars sold worldwide in 2012.

On top of that, public spending on EV subsidies and incentives nearly doubled in 2021 to \$30 billion, according to IEA. In the United States, the Department of Energy (DOE) issued two notices of intent in February 2022 under the Bipartisan Infrastructure Law to provide \$2.91 billion to increase production of advanced batteries for clean energy industries, including electric vehicles and energy storage.

Faster charging, new materials, and even new approaches to mobile power are all solutions that companies, innovators, and researchers are pursuing. Here's a snapshot of four such up-and-coming innovations.

LITHIUM-SULFUR EV BATTERIES



San Jose, Calif.-based Lyten Inc. has developed a lithium-sulfur EV battery that doesn't use nickel, cobalt, or manganese. This translates into an estimated 60 percent lower carbon footprint than other batteries currently on the market, the company claims. The battery uses an alternative, non-nickel-manganese-cobalt cathode solution. It also uses Lyten's proprietary 3D graphene, which keeps sulfur in place during charging and discharging (an issue called polysulfide shuttling), leading to a higher-performance battery with more than twice the energy density.

Although 3D graphene is similar to 2D graphene, it's more chemically and electrically reactive while also being highly tunable because of its morphology, according to Lyten. The company plans to start delivering lithium-sulfur batteries and 3D Graphene-infused composites to specialty markets in 2023.

Photo: Lyten Inc.

3D BATTERY CHARGES IN MINUTES

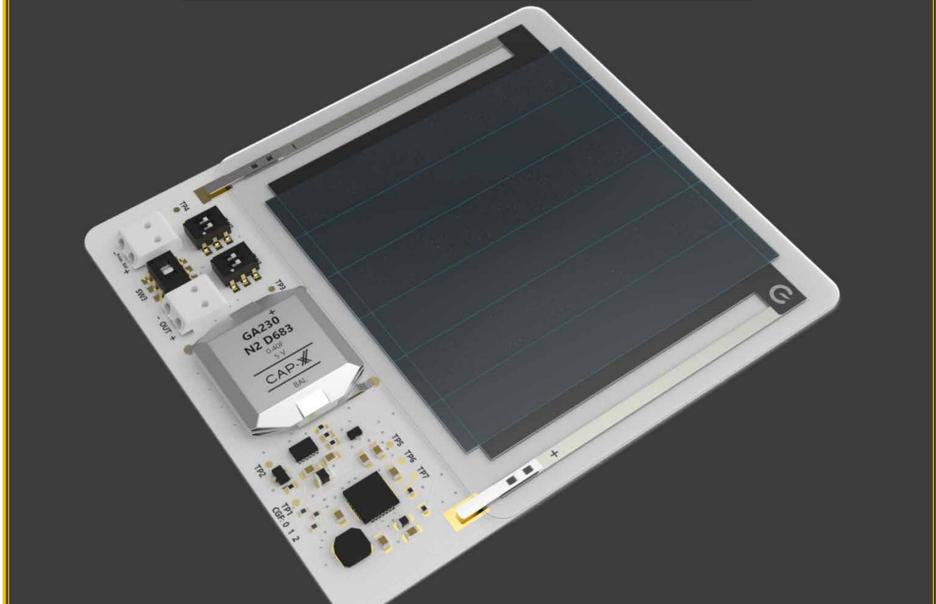


Prieto Battery, Inc., Fort Collins, Colo., has developed a 3D interdigitated lithium-ion battery that can charge in just three minutes. Designed to have five times the power density and three times the energy density as conventional batteries, the Prieto battery's charge ability comes from its 3D architecture. The batteries can achieve 50 percent charge in 90 seconds, and both operate and charge at wide temperature ranges, from -30 °C (-22 °F) to 100 °C (212 °F).

At the core is similar to a "thin copper sponge," so ions travel a fraction of the distance they do in traditional batteries, explained Amy Prieto, company founder and CTO, in a statement. The battery is made of low-cost, sustainable materials, using a water-based electroplating process at room temperature.

Photo: Prieto Battery, Inc.

SELF-POWERED BEACON

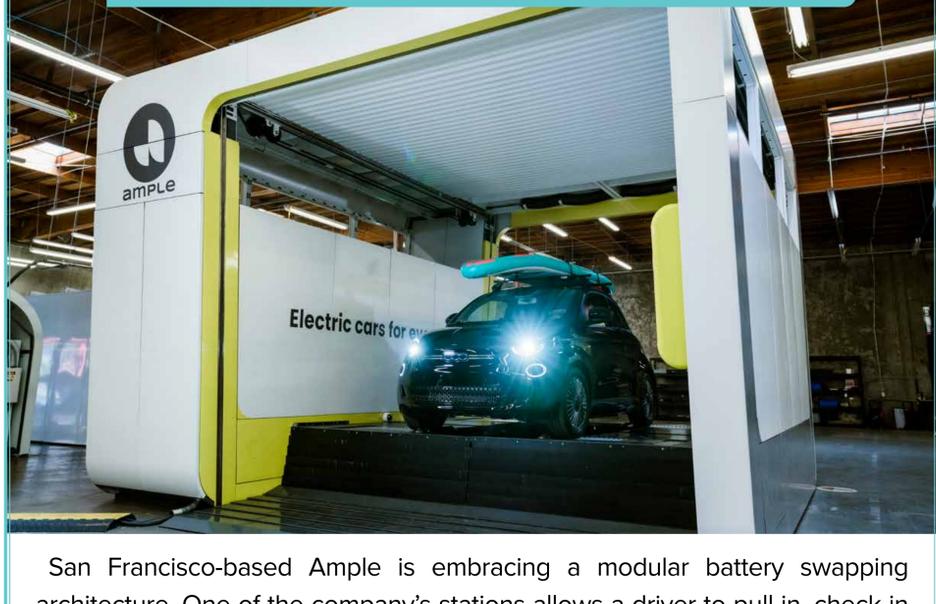


Sweden-based Epishine and U.S.-based Atmosic created an ultra-thin self-powered beacon that would dramatically reduce the power consumption of low-power electronics. When Atmosic's ATM3 Bluetooth system-on-chips (SoCs) are combined with Epishine's indoor solar cell, the beacon can harvest enough energy to operate without any batteries. The companies state that this will significantly reduce battery waste and help drive a more sustainable and battery-free Internet of Things.

Epishine's indoor solar cell is thin and flexible, and produced in a roll-to-roll process in Sweden. This ultra-low power solution provides for a wide range of connected devices, including asset trackers, beacons, remote controls, keyboards, mice, and wearables.

Photo: Epishine

MODULAR BATTERY SWAPPING



San Francisco-based Ample is embracing a modular battery swapping architecture. One of the company's stations allows a driver to pull in, check in on a phone, and then the robotics in the station will replace the depleted battery with a fully charged one within about five minutes. Ample claims the station is three to 10 times cheaper than a fast-charging station and can deliver energy at costs 10 percent to 20 percent cheaper than gas. These stations are pre-built and modular in nature as well, requiring just three days to install.

An Ample EV battery is comprised of building block-type battery modules that can accommodate any EV. Once swapped out, depleted batteries are charged for further reuse. Ample's stations are currently being tested by fleets such as Uber and Sally in the Bay Area.

Photo: Ample