Faster charging batteries

Faster charging batteries

That"s faster than virtually all EV charging today, and CATL claims the new cells, which it plans to produce commercially by the end of 2023, will "open up an era of EV superfast charging." That is, if the finished product can meet the company"s promises for battery capacity, lifetime, and cost.

EVs are making up a growing fraction of global new-vehicle sales--14% in 2022. But many drivers still have concerns about limited range of current battery technology and are put off by the need to stop to charge for upwards of half an hour, even at fast-charging stations. Innovation in battery materials, if matched with progress in charging infrastructure, could help mimic the convenience of gas-powered cars and encourage adoption of EVs.

CATL, whose name is an acronym for Contemporary Amperex Technology Co. Limited, is the world"s biggest EV battery manufacturer. The company supplies cells to major automakers like Tesla, Mercedes, and Volkswagen.

Last week"s announcement is the latest piece of high-profile technology news from the company this year. Among other things, it plans to build high-energy-density condensed-matter batteries for airplanes and to mass-produce new EV batteries built from sodium instead of lithium.

CATL"s new fast-charging batteries would be twice as fast as competitors, says Jiayan Shi, an analyst for BNEF, an energy research firm. Tesla"s fast charging adds up to roughly 320 kilometers, or 200 miles, of range in 15 minutes.

Some commercially available batteries can already hit the speeds announced by CATL last week, says David Schroeder, chief technical officer of Volta Energy Technologies, a venture capital firm focused on battery and energy storage technology. But those batteries are used in products like stationary energy storage. CATL would be the first to put these fast-charging cells in electric vehicles.

With lithium-ion batteries, there tends to be a stiff trade-off between how much energy they can store and how quickly they can charge. These batteries can generally be split into two categories: "energy cells" and "power cells." Energy cells prioritize packing in as much energy as possible, which is helpful in extending the range of an electric vehicle without adding too much bulk. Power cells, on the other hand, tend to prioritize charging and discharging quickly, which is helpful for uses like the stationary energy storage that stabilizes the power grid.

Power cells today can reach fast charging speeds, but they can be too bulky to use in a car and probably wouldn"t last for hundreds of thousands of miles. Batteries that can charge quickly while also being small, light, and long-lasting would be a step forward.

Faster charging batteries

The trade-off between high capacity and fast charging comes down to the way charged molecules called ions move around in batteries. As a battery charges, an electric current pushes lithium ions from one side of the cell to the other. The ions can then nestle into spaces in part of the battery called the anode, where they wait. Eventually, they"ll rush back, releasing stored electricity when someone uses the battery to power a device.

Materials innovations could help get around this trade-off. In CATL"s announcement about its fast-charging battery, the company mentions several changes to the anode, including modifications to the graphite"s surface and a multi-layer design to help shorten the path for ions and speed charging.

But it"s not just the anode--every part of the battery seems to be contributing faster charging speeds, says Kevin Shang, a senior research analyst at Wood Mackenzie, an energy consultancy. The company"s release also credits a new electrolyte (the liquid that ions move through in a battery) that improves conductivity, for example. With their new products, battery giants like CATL aren"t necessarily banking on any one innovation, but adding up a host of research and development efforts and combining them into one product, Shang says.

Yet questions remain about this battery and what it will mean for vehicles, Shang says. By saying that the batteries could be used in a vehicle with a range of 700 kilometers (430 miles), CATL"s announcement implies high energy density. But it"s not clear how large the vehicle and battery will need to be to deliver that kind of range.