

Lithium-ion battery charged to 60% in 5.6 minutes with ordered anode

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A team of researchers affiliated with multiple institutions in China has increased the speed of charging a lithium-ion battery by adding a copper coating and nanowires to its anode to improve ordering. Their study is published in the journal *Science Advances*.

Industry analysts have suggested one of the characteristics holding back

the widespread changeover from gas powered vehicles to those running on batteries is the time it takes to recharge the battery. A Tesla vehicle, for example, has been found to take nearly an hour to charge its battery from 40% to 80%. In this new effort, the researchers have looked into one of the main obstacles to faster charging and have modified a battery to solve the problem.

One of the major bottlenecks in speeding up charging is the battery's anode. Most are made of graphite and are constructed in a non-ordered slurry, which the researchers note, is not an efficient means of passing along [current](#). They also point out that in addition to the way the materials in them line up, there is the issue of the gap size between them.

To overcome this problem, they first ran particle-level theoretical models to optimize the spatial distributions of different sized particles and electrode porosity. They then took what they learned from the models to make changes to a standard [graphite anode](#). They coated it with copper and then added copper nanowires to the slurry. They then heated and then cooled the anode, which compressed the slurry into a more ordered material.

They affixed the anode to a standard lithium-ion battery and then measured the amount of time it took to charge. They found they were able to charge the battery to 60% in just 5.6 minutes (as opposed to 40% for a control battery with no alterations) and to 80% in just 11.4 minutes. They did not test how long it would take to charge to 100% because doing so is not recommended for such batteries. The researchers did not reveal if they had developed estimates for how much adding the copper to the anodes would add to the price of the batteries.

More information: Lei-Lei Lu et al, Extremely fast charging lithium ion battery enabled by dual gradient structure design, *Science Advances* (2022). [DOI: 10.1126/sciadv.abm6624](https://doi.org/10.1126/sciadv.abm6624).

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