

Fast-Charging Electric Vehicles Can Lead to Ruining Their Batteries

2 days ago by [Luke James](#)

A new study published by engineers from the University of California, Riverside (UCR) suggests that commercial fast-charging stations damage EV batteries by subjecting them to high temperatures and resistance.

According to the research team from UCR, the continuous use of high-powered fast-charging points can [decrease the life of EV batteries](#) by causing cells to crack, lease, and lose storage capacity. This news will come as a blow to time-crunched drivers of electric vehicles, for whom fast-charging points help to minimize time spent off the road.

It's not all bad news, though—the same team has developed a method for charging EV batteries at lower temperatures, which poses a lower risk of causing irreversible damage and subsequent loss of storage capacity.



An EV battery before and after undergoing fast charging. Image used courtesy of [O:kan Lab/University of California, Riverside](#).

A New Charging Method

To put EV batteries to the test, the UCR team charged one set of discharged Panasonic NCR 18650B cylindrical lithium-ion batteries—those found in Tesla’s vehicles—using the same fast-charging method found in fast chargers on the roadside and along freeways. These acted as a control group.

The team also charged another set of batteries using a new fast-charging algorithm-based protocol, which charges the batteries as quickly as possible but also accounts for the battery’s internal resistance. This resistance, according to the UCR engineers, can cause permanent damage to battery cells when charging if it is too high and goes unaddressed.

To prevent such damage, the team proposed a new charging method which automatically cuts out when internal resistance gets too high—in theory limiting battery cell damage.

“Our alternative adaptive fast charging algorithm reduced capacity fade and eliminated fractures and changes in composition in the commercial battery cells,” Cengiz Ozkan said.

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A lithium-ion EV battery that cracked after fast charging. Image used courtesy of [Ozkan Lab/University of California, Riverside](#).

Improving Battery Life

Using the standard fast-charging process, the researchers found that battery capacity was reduced by as much as 40% after only 40 charge cycles. After 60 charge cycles, the battery’s cells began to crack, dramatically reducing capacity and exposing its internal components. However, by using their internal resistance-based charging method, the UCR researchers recorded a reduced capacity loss to the tune of 20% by the 40th charge cycle.

“Industrial fast-charging affects the lifespan of lithium-ion batteries adversely because of the increase in the internal resistance of the batteries, which in turn results in heat generation,” doctoral student and co-author Tanner Zerrin said.

Given that an EV battery is considered as being at the “end-of-life” stage when it holds less than 80% of its original total capacity—around 25 fast charges—this will naturally be alarming for EV users.

The UCR team also pointed out that it is only commercial fast-charging stations that cause this type of damage—not home-based charging, for example. Other tips for prolonging EV battery life include recharging before the battery is totally empty and being careful not to overcharge.

The researchers have applied for a patent on the adaptive internal resistance fast-charging algorithm that could be licensed by battery and car manufacturers.

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“

What we usually consider as impossible are simply engineering problems... there's no law of physics preventing them.”

- Michio Kaku

