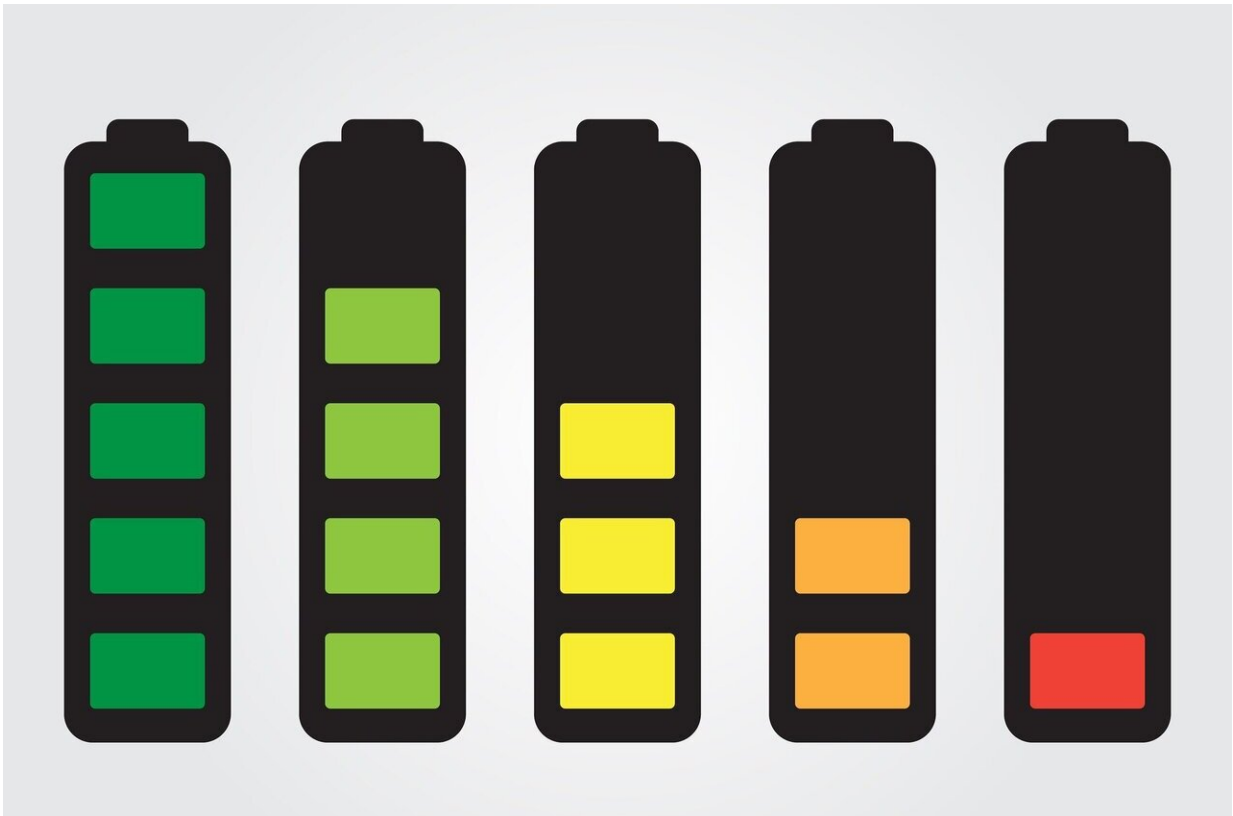


# Rechargeable batteries in your favorite devices can ignite and burn down your house

November 20 2019, by Ron Hurtibise

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Credit: CC0 Public Domain

We're all playing Russian roulette with devices powered by lithium ion batteries.

Chances are you have dozens of lithium ion-powered devices inside your home right now. Some are probably hooked up to chargers—and that's when they are most likely to ignite and cause a destructive fire.

But we accept the risks in exchange for the rewards. The good news: Scientists are working to make them non-flammable.

First marketed for commercial use nearly 30 years ago, lithium ion batteries deliver far more power for longer periods between charges than traditional wet cell batteries. They've spawned dramatic improvements to countless products we use every day, like smartphones, tablets, high-definition cameras, [laptop computers](#), scooters, hoverboards, [electric bikes](#), compact lights, electric cars and whole-house solar energy systems.

But thousands are recalled each year as fire hazards—able to ignite without warning in homes and garages, cars and buses, factories and repair shops. Recalled batteries are both large and small, and while combustion is rare, it can be devastating when it happens.

## **Battery fires are rare but devastating**

Two of the most widely publicized and tragic fires involving lithium ion batteries occurred in South Florida and involved Tesla Model S [electric cars](#). In May 2018, two teens died after their car crashed and burst into flames in Fort Lauderdale. Last May, a doctor died when his car became engulfed after a crash in Davie.

Tesla Model S sedans are powered by arrays of more than 7,000 lithium ion cells, slightly larger than standard AA batteries, encased below the cars' cabins.

A Lake Worth Beach family received a sobering lesson of the batteries'

destructive power in November 2018 after Elijah Oliphant disconnected a battery from the Monmouth electric bicycle he bought that June and set it on the floor of a bedroom he used for his office, intending to connect it to its charger.

"His wife then asked him to help her get their child ready for bed," according to a report by Palm Beach County Fire Rescue. "He walked away from the battery and it began to smoke and hum."

Before Oliphant could retrieve water to try to douse the battery, it burst into flames, the report said. As smoke filled the house, Oliphant and his wife escaped with their two small children but, according to a GoFundMe campaign created by Oliphant's sister Melinda, "lost their entire house and all its belongings."

A year later, the couple's insurer, Fort Lauderdale-based Universal Property & Casualty, filed a federal lawsuit against the China-based manufacturer of the battery's cells, plus Panasonic, which assembled the battery, and the California-based retailer, California EBike LLC, which sold it to the eBay retailer that sold it to Oliphant. Universal is seeking to recover \$212,000 it paid the family, plus legal fees.

Reached via text message, Oliphant's wife, Sharon Oliphant, wrote, "We are definitely leery of lithium ion now!"

Whether the rest of us are as leery as we should be is subject to debate.

The battery model identified in the lawsuit and the fire investigation report remains widely available via e-commerce websites.

The report blamed the blaze on "an unspecified electrical malfunction" of the battery.

Officials from Panasonic and the Chinese cell manufacturer did not immediately respond to requests for comment. But an online search for the battery model cited as causing the blaze turned up no information suggesting it has been recalled or was blamed for other fires.

A spokesman for Universal Property & Casualty Corp. said the Oliphants' fire was the company's first claim involving an exploded [lithium ion battery](#). Officials of Heritage Property & Casualty, and Citizens Property Insurance Group, said the companies have had no battery-related house fire claims.

## **The more devices, the bigger the threat**

Fort Lauderdale's assistant fire marshal, Stephen Gollan, said his department has not seen a noticeable increase in battery-related fires.

But Tom Fucci, Palm Beach County Fire Rescue's chief in charge of investigations, said lithium battery fires have emerged as an increasingly serious concern over the past decade "because people have more devices inside their homes."

Most memorable were a pair of fires caused by charging scooter batteries about a decade ago, and a recent fire in a Boca Raton warehouse caused by e-cigarette batteries igniting as they were connected to their chargers.

Meanwhile, batteries that power electric bicycles, scooters and hoverboards have emerged as a growing threat around the world over the last few years.

In January, a 79-year-old man suffered burns and was hospitalized after the battery powering his electric bicycle ignited, the website [Bicycling.com](#) reported.

In August, a Reddit user uploaded a recording of the spontaneous combustion and explosion of a battery hooked up to a shared e-bike in Seattle. A representative of the bike-sharing service, Lime, blamed the fire on vandalism, the website GeekWire.com reported. Yet it happened during the same week a fire broke out in one of the bike-sharing service's warehouses, the site said.

In June, the Rockaway Times website posted a video of a burning Lime bike in Rockaway Beach, New York, adding that someone was riding it when it caught fire and experienced minor burns.

A Seattle Fire Department spokesman told the site the department is seeing increases in fires due to "the overall proliferation of more devices, whether they be portable or household devices, that utilize lithium-ion batteries."

Citing a report by the Dutch Association of Insurers, the website, NLTimes.nl, reported that lithium ion batteries caused 100 fires in The Netherlands in 2018, compared to 72 the previous year. Spare or separate batteries or chargers caused about 40% of the fires, followed by electric bicycles at 16%, mobile phones at 14%, and then toys, computers and power tools. Two% occurred in electric vehicles while another 11% were caused buy other electric transportation products, including electric unicycles.

## **Thousands of batteries recalled every year**

In the United States, the Consumer Product Safety Commission's website lists 54 products recalled in recent years because of fire hazards caused by their lithium ion batteries.

They include wireless speakers, educational light cubes, motion systems, heated gloves and bicycle lights.

About 5,000 Pedego electric bicycle batteries were recalled in April 2015. About 2,500 batteries used in Limoss power recliners and lift chairs were recalled in December 2015 after at least one overheated and caused a fire.

Infamously, Samsung recalled 1.9 million Galaxy Note 7 smartphones in September and October 2016 after receiving 119 reports of batteries overheating, including 13 reports of burns and 47 reports of property damage.

Notebook computer maker Hewlett-Packard recalled more than 550,000 notebook computers in seven recalls spanning from May 2009 to March 2019, after numerous reports of the batteries overheating, melting, or charring.

In 2016, the commission announced recalls of 501,000 self-balancing scooters and hoverboards sold by 10 separate companies after at least 99 reports that their batteries overheated, sparked, smoked, caught fire and/or exploded. Some resulted in burn injuries and property damage. Eight more brands were recalled in 2017 after dozens more incidents, including a house fire that killed two young girls in Pennsylvania.

Hoverboard fires were blamed on the popularity of the products sparking a rush by Chinese manufacturers to keep up with demand. Their cheaply made batteries were more likely to be flawed, leading to more heat generation, rupturing of cell casings and then fire, a Carnegie Mellon University professor told Wired.com.

And as with electric bicycles and scooters, normal use of hoverboards can cause more damage—and increase the likelihood of failure—compared to products with less active uses, Wired's report said.

But cells have been recalled from reputable makers as well as so-called

no-name manufacturers, said Karla Crosswhite-Chigbue of the Consumer Product Safety Commission. No manufacturer or brand is exempt from potential safety issues if cells are not manufactured according to appropriate specifications and products aren't engineered to ensure proper charging and discharging, she said.

## **Why cells ignite**

Lithium ion batteries are dangerous because they contain highly flammable electrolytes, according to a report by Tufts University. Failure can be caused by puncture, overcharge, overheating, short circuit, internal cell failure and manufacturing deficiency.

When failure occurs, it creates a process called "thermal runaway," which is a reaction within the battery that causes internal temperature and pressure to rise at a quicker rate than can be dissipated, the report said.

"Once one battery cell goes into thermal runaway, it produces enough heat to cause adjacent battery cells to also go into thermal runaway," the report said. "This produces a fire that repeatedly flares up as each battery cell in turn ruptures and releases its contents."

Experts investigating the Tesla fires gave a similar explanation, saying those fires were particularly hard to extinguish as heat spread from one to another of thousands of battery cells.

Solutions could be just over the horizon. Recognizing that demand for lithium ion technology will only increase as 5G technology and the "Internet of Things" become more pervasive, scientists are working to develop non-flammable electrolytes.

Promising results have involved use of self-cooling and fire-retardant

materials as well as fluorinated carbonates and ionic liquids, according to a February 2019 report by scientists at Carnegie Mellon University in Pittsburgh. Researchers at the Chicago College of Engineering are looking at suppress fires by blocking the release of oxygen caused by decomposition of the batteries' electrolytes.

## Fire prevention guidelines

Batteries are becoming safer and will become more so as research continues, experts say. Still, consumers with lithium ion-powered devices should follow these safeguards from the Consumer Product Safety Commission and the Florida State Marshal's Office and [bicycling.com](http://bicycling.com):

If replacing batteries, make sure you purchase products recommended by the device manufacturer and avoid potentially counterfeit batteries often sold by some websites and secondhand dealers.

- Don't permit disconnected batteries to come into contact with metal objects, such as coins, keys or jewelry.
- Always follow the manufacturer's instructions.
- Only use the charging cord that came with the device.
- Do not crush, puncture or put a high degree of pressure on the battery, as this can cause an internal short circuit and result in overheating.
- Don't use laptop computers on carpets, blankets or other soft surfaces that can interfere with heat dissipation from underside vents.
- Don't charge a device under a pillow, on a sofa or on a bed.
- Avoid dropping devices powered by lithium ion batteries, and do not allow the devices to get very hot or wet.
- Keep batteries at room temperature.
- Don't keep all lithium ion battery powered items together. That way, if one catches fire, chances of the other catching [fire](#) are

reduced.

- Avoid overcharging batteries and don't leave devices on chargers unattended.
- Charge devices only on nonflammable surfaces.

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