

Exploding smartphones: What's the silent danger lurking in our rechargeable devices?

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Dozens of dangerous gases are produced by the batteries found in billions of consumer devices, like smartphones and tablets, according to a new study. The research, published in Nano Energy, identified more than 100 toxic gases released by lithium batteries, including carbon monoxide.

The gases are potentially fatal, they can cause strong irritations to the skin, eyes and nasal passages, and harm the wider environment. The researchers behind the study, from the Institute of NBC Defence and Tsinghua University in China, say many people may be unaware of the dangers of overheating, damaging or using a disreputable charger for their rechargeable devices.

In the new study, the researchers investigated a type of rechargeable battery, known as a "lithium-ion" battery, which is placed in two billion consumer devices every year.

"Nowadays, lithium-ion batteries are being actively promoted by many governments all over the world as a viable energy solution to power everything from [electric vehicles](#) to mobile devices. The lithium-ion battery is used by millions of families, so it is imperative that the general public understand the risks behind this energy source," explained Dr. Jie Sun, lead author and professor at the Institute of NBC Defence.

The dangers of exploding batteries have led manufacturers to recall millions of devices: Dell recalled four million laptops in 2006 and

millions of Samsung Galaxy Note 7 devices were recalled this month after reports of battery fires. But the threats posed by toxic gas emissions and the source of these emissions are not well understood.

Dr. Sun and her colleagues identified several factors that can cause an increase in the concentration of the [toxic gases](#) emitted. A fully charged battery will release more toxic gases than a battery with 50 percent charge, for example. The chemicals contained in the batteries and their capacity to release charge also affected the concentrations and types of toxic gases released.

Identifying the gases produced and the reasons for their emission gives manufacturers a better understanding of how to reduce toxic emissions and protect the wider public, as lithium-ion batteries are used in a wide range of environments.

"Such dangerous substances, in particular [carbon monoxide](#), have the potential to cause serious harm within a short period of time if they leak inside a small, sealed environment, such as the interior of a car or an airplane compartment," Dr. Sun said.

Almost 20,000 lithium-ion batteries were heated to the point of combustion in the study, causing most devices to explode and all to emit a range of toxic gases. Batteries can be exposed to such temperature extremes in the real world, for example, if the battery overheats or is damaged in some way.

The researchers now plan to develop this detection technique to improve the safety of lithium-ion batteries so they can be used to power the electric vehicles of the future safely.

"We hope this research will allow the [lithium-ion battery](#) industry and electric vehicle sector to continue to expand and develop with a greater

understanding of the potential hazards and ways to combat these issues," Sun concluded.

More information: Jie Sun et al. Toxicity, a serious concern of thermal runaway from commercial Li-ion battery, *Nano Energy* (2016). [DOI: 10.1016/j.nanoen.2016.06.031](https://doi.org/10.1016/j.nanoen.2016.06.031)

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