Replacement for lithium ion batteries

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Lithium-ion batteries have taken over the world. Tesla has bet big on them and built a Gigafactory that is now knocking out Tesla car batteries, as well as Powerwall and Powerpacks for homes and business. many other manufacturers are working on their own supply chains of lithium-ion batteries.

But battery tech is cutting-edge. We are one breakthrough away from one of the multitude of lithium-ion battery alternatives taking over. Lithium-ion batteries could be yesterday"s news and take their place next to the floppy disk in the dust bin of history.

So what are the likely contenders for the title of power source of the future? Here are our picks for the top lithium-ion alternatives, but bear in mind it could be a combination or a development of any one of these technologies that could eventually win the race to replace lithium-ion.

Toyota is still plugging away with hydrogen fuel cell cars and it isn"t the only one working to find a solution. Why? Well, burning hydrogen only produces water as a byproduct, it"s exceptionally efficient and it"s much cleaner than lithium, when it comes to producing it and recycling it at the end of the car"s life.

Right now we simply cannot manufacture enough hydrogen without turning to fossil fuels, which kind of defeats the point. Researchers around the world are working with genetically modified algae and other methods to convert water into hydrogen, but right now hydrogen just isn"t cost-effective to produce.

There are issues, as the electrodes degrade too fast for commercial applications right now, but a number of institutions are working on a solution for this stumbling block. Lithium-sulfur might be a halfway-house replacement for lithium-ion, rather than a radical successor, but it is on the way and it will be a significant improvement.

Batteries could disappear more or less overnight if we can finally master nanotechnology and produce a stable and usable version of graphene. Of course, that could mean we get better batteries, too, but graphene supercapacitors should be a better option.

Supercapacitors can charge and discharge much more efficiently than a battery. So although they hold less energy per unit of volume, they can do a much better job of actually supplying power and recharging. If we can actually produce them from graphene, we"ll get the energy density back through weight saving and improved packaging.

Graphene holds the key to a massive quantum leap forward for mankind. Once we can make it commercially, it will change the world of material science, wearable tech and much more. We"ve been trying to crack the graphene riddle for more than a decade and some of the world"s brightest minds have come up short so far.

They"ll get there, we"re sure of that, but we don"t know when we’ll have commercially available graphene sheets.

This battery is the future, according to the Department of Energy"s Pacific Northwest National Laboratory, and it"s hard to argue against this new dual-liquid battery’s potential. But this is an arms race and literally anything can happen.

They are squarely aimed at the Powerpack market and could store energy from wind and solar farms. If they can offer up to four times the lifespan and much greater storage, renewable energy sources should be able to provide remote communities with constant power and replace electrical sub-stations.

They could also propel a car up to 1,000 miles on a single charge and make them faster, although we"re starting to hit the limits of real world performance in any case. So redox flow batteries could, instead, offer the chance to strip weight from the electric cars of tomorrow and offer similar levels of performance and a much larger range.

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