Lithium iron phosphate battery for electric vehicle

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Vehicles powered by internal combustion engines use electrical, chemical, and mechanical processes to turn liquid fuel into kinetic energy. Electric vehicles are a bit simpler. The local power grid creates the energy they use on a much larger and more efficient scale. The car only needs to store enough of that energy to turn its wheels, illuminate its headlights, and power all the in-cabin necessities from AC to satellite radio.

So it"s simpler, but not simple. There are a lot of different ways to store that EV energy. One solution popping up more and more is lithium iron phosphate batteries. While these batteries aren"t an all-new technology, several recent developments and advancements are helping them gain ground in the EV market.

Lithium iron phosphate batteries are a type of rechargeable battery made with lithium-iron-phosphate cathodes. Since the full name is a bit of a mouthful, they"re commonly abbreviated to LFP batteries (the "F" is from its scientific name: Lithium ferrophosphate) or LiFePO4. They"re a particular type of lithium-ion batteries commonly used in everything from EVs to home powerbanks to cell phones.

Batteries currently account for about 30 to 40% of the total cost of an EV. That means any reduction in the expense required to source, process, and manufacture EV batteries could have a massive impact on how much the overall vehicle costs to build and buy.

While NMC batteries rely on comparatively rare and expensive resources such as nickel and cobalt, iron is the fourth most common element in the Earth"s crust. Phosphates are also relatively common. The more common components of lithium iron phosphate batteries mean they can be produced in greater quantities by more suppliers around the world, leading to reduced costs.

Since we have a good amount of iron and phosphates at our disposal, there is less danger of running out of these LFP battery components. There is less need to disrupt otherwise intact ecosystems to obtain them. And once an LFP battery reaches the end of its operational life, promising recycling initiatives may be able to put many of its components back into use.

On the flipside, the NMC batteries found in many EV batteries require more rare materials, meaning they"re in greater danger of running out. Since manufacturers have fewer options in sourcing these materials, they may also have more difficulty avoiding ecological and human rights problems in their supply chains.

One of the most significant advantages of this technology is the lithium iron phosphate battery lifespan. According to one study, LFP batteries can deliver nearly five times as many discharge cycles as NMC batteries over their operating life. They are also less vulnerable to degradation when charging faster, which means they may better handle the use of speedy Level 3 chargers over time.

It"s important to note that many different factors influence how long any given battery will operate at peak efficiency. That includes operating temperature, how much of the battery is discharged before being charged again, and how much energy demand the battery must handle at once. But taken overall, lithium iron phosphate battery lifespan remains remarkable compared to its EV alternatives.

While studies show that EVs are at least as safe as conventional vehicles, lithium iron phosphate batteries may make them even safer. This is because they are less vulnerable to thermal runaway--which can lead to fires--than NMC batteries when damaged or defective.

If nickel-cobalt batteries short circuit internally, they can begin to heat up and release oxygen. This oxygen then serves as a potential fuel source for fire, creating a self-sustaining reaction that is difficult to extinguish. LFP batteries contain no oxygen, meaning they are less likely to burn even if they do malfunction.

While LFP batteries have several advantages over other EV battery types, they aren"t perfect for all applications. Here are some of the most notable drawbacks of lithium iron phosphate batteries and how the EV industry is working to address them.

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