GWL/Power Technical Document

FAQ: The difference between the LiCoO2 and LiFePO4 battery technology

GS Yuasa LiCoO2 li-on batteries used in some brands of electric vehicles

WINA LiFePO4 lithium batteries for all kinds of safe applications

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GWL POWER

http://www.ev-power.eu

The Summary of the properties

1. General information

LiFePO4 (Lithium Iron Phosphate) - is the most safe, longest cycle life, and more powerful then normal
Li-Polymer battery, but generally more expensive than normal Li-Polymer battery. (Normal Li-Polymer as used in notebooks, some of the hand tools and other battery powered devices)

LiCoO2 (Lithium Cobalt Oxide) battery containing lithium cobalt oxide, offers a genuinely viable option for electronics and digital applications. However, LiCoO2 is very expensive and un-safe for large capacity Li-ion battery.

LiFePO4 recently has been becoming "best-choice" solution in commercial Li-ion batteries for large capacity and high power applications like power tools, e-wheel chair, e-bike, e-car and e-bus.

LiFePO4 supports high rate charge (up to 3C) and high rate discharge with peaks up to 5C, 10C, 20C.

The advantages of large format Li-ion batteries containing **LiFePO4** are listed as below:

2. Faster charging and safer performance

The **LiFePO4** Battery has hybrid characteristics: as safe as lead-acid battery and as powerful as lithium ion cells.

During charging process, a conventional Li-ion Battery containing lithium cobalt oxide - **LiCoO2** needs two steps to be fully charged:

Step 1 is using constant current (CC) to get 60% State of Charge (SOC);
Step 2 takes place when charge voltage reaches 4.2V, upper limit of charging voltage, turning from CC to constant voltage (CV) while the charging current is taping down.
The *step 1* (60%SOC) needs two hours and the *step 2* (40%SOC) needs another two hours.

LiFePO4 battery can be charged by only one step of CC to reach 95% SOC or be charged by CC+CV to get 100% SOC. The total charging time will be two hours.

3. Large overcharge tolerance and safer performance.

LiCoO2 battery has a very narrow overcharge tolerance, about 0.1V over 4.2V of charging voltage plateau and upper limit of charge voltage. Continuous charging over 4.3V would either damage the battery performance, such as cycle life, or result in firing and explosion.

A **LiFePO4** battery has a much wider overcharge tolerance of about 0.7V from its charging voltage plateau 3.4V.

Exothermic heat of chemical reaction with electrolyte measured by DSC after overcharge is only 90J/g for LiFePO4 verse 1600J/g for **LiCoO2**. The more is the exothermic heat, the larger energy heating up the battery in its abusive condition, the more chance toward firing and explosion.

From viewpoint of large over charge tolerance and safety performance, the **LiFePO4** battery is similar to lead-acid battery.

4. Longer cycle life.

LiCoO2 battery has a nominal cycle life of 400 to 800 cycles, **LiFePO4** battery extends its cycle life up to 2000 cycles.

5. High temperature performance

It is detrimental to have a **LiCoO2** battery working at elevated temperature, such as 60°C. However, a **LiFePO4** battery runs better at elevated temperature, offering 10% more capacity, due to higher lithium ionic conductivity.

Additional information:
http://www.plugincars.com/what-does-boeing-dreamliner-li-ion-battery-fire-mean-evs-126186.html

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The high quality LiFePO4 cells are waiting for you!

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