What is the difference between sodium-ion batteries and lead-acid batteries?

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Great improvement in charging speed

Lead-acid batteries usually take several hours to charge, which limits the convenience of electric vehicles to a certain extent. Sodium batteries have a faster charging speed and can provide enough power for electric vehicles in a short time. This means that electric vehicle users can complete charging in a shorter time, improving the efficiency of electric vehicles.

Increased range Sodium batteries have a higher energy density, which means that they can store more electrical energy at the same weight and volume. Therefore, compared with lead-acid batteries, sodium batteries can provide a longer driving range and meet the longer driving needs of electric vehicle users.

Extended battery life

Lead-acid batteries have a relatively short cycle life, and their performance usually degrades significantly after hundreds of charge and discharge cycles. Sodium-ion batteries, on the other hand, have a longer cycle life and can maintain stable performance after multiple charge and discharge cycles. This reduces the frequency and cost of battery replacement for users and improves the economic efficiency of electric vehicles.

Improvement of security

Lead-acid batteries may produce hydrogen during charging and discharging, which may cause explosion. Sodium-ion batteries are safer, with higher thermal stability and no potential for thermal runaway. Sodium-ion cells can discharge to near zero volts w/o damage with higher 16V voltage range for charging safety, harder to overcharge.

Environmental improvement

Lead-acid batteries cause some pollution to the environment during production and recycling. The production process of sodium batteries is relatively more environmentally friendly, and the materials used are also more environmentally friendly. In addition, sodium-ion batteries are more convenient in recycling and disposal, which is conducive to reducing environmental pollution.

Lighter battery weight

Compared with lead-acid batteries, sodium batteries have a higher energy density, so they are lighter under the premise of providing the same amount of power. This will reduce the overall weight of electric vehicles, not only improving the vehicle's handling, but also reducing energy consumption, further increasing the range of electric vehicles.

Lower maintenance costs

Lead-acid flooded batteries require regular maintenance, including watering and cleaning, AGM’s are very sensitive to over-discharging thus reducing life cycles. Sodium-ion batteries have a longer service life and more stable performance, reducing the frequency and cost of maintenance. In addition, sodium batteries will not suddenly brick your car as an AGM would without warning, thus the cost of replacing batteries is also reduced.

Wider applicable temperature

The performance of lead-acid batteries will significantly decline in low temperature environments, resulting in a shorter range of electric vehicles. However, sodium-ion batteries can still maintain good performance in low temperature environments, allowing electric vehicles to maintain a stable range in winter. This is an important advantage for electric vehicles used in cold regions.

Greater flexibility

Because sodium-ion batteries have higher energy density and lighter weight, electric vehicle designers can have greater flexibility when designing vehicles. They can more freely adjust the vehicle's layout and weight distribution to optimize vehicle handling and comfort.

Promote technological innovation

As sodium battery technology continues to mature and costs decrease, more and more electric vehicle manufacturers may choose to use sodium batteries as a power source. This will intensify competition in the electric vehicle market and promote continuous innovation and progress in electric vehicle technology.

Summary: Sodium-ion batteries compared to lead-acid batteries will not only bring about technical performance improvements in two-wheeled electric vehicles, but will also have a profound impact on the maintenance, use and market competition of electric vehicles. We will closely monitor market trends, coordinate the development of upstream and downstream industrial chains, reduce costs, improve production efficiency, and further promote the development and popularization of electric vehicles and other related industries.

Typical Values Energy Density Various Chemistries

- 325 Wh/kg Lithium Sulphur (ALISE 2018)
- 271 Wh/kg Panasonic NCR2170-M
- 263 Wh/kg LG Chem M50 21700
- 260 Wh/kg Panasonic NCA 21700 (Tesla Model 3 2019)
- 241 Wh/kg Murata 18650VTC6 (Formula E 2019-21)
- 240 Wh/kg Panasonic NCA 1
- 169 Wh/kg XALT 53Ah HE NMC (Formula E 2014-18)
- 160 Wh/kg Lithium Iron Phosphate battery
- 100-150 Wh/kg Sodium Ion battery
- 70–100 Wh/kg Nickel Metal Hydride (NiMH) battery
- 90 Wh/kg Sodium Nickel Chloride (Zebra) battery
- 80 Wh/kg Sony first ever production lithium ion cell (1991)
- 50-75 Wh/kg Nickel Cadmium (NiCd) battery
- 35-45 Wh/kg Lead Acid battery