



QUALLION LLC Industry Overview

Lithium ion batteries, commonly used for portable electronics, have become popular for automotive, defense and aerospace applications due to their high energy density. In an effort to move away from dependency on foreign oil and reduce CO₂ emissions, lithium ion battery companies have put great emphasis on new technology in order to contribute to the goal.

Lithium ion battery basics

- In lithium ion batteries, a lithium ion moves between the anode and cathode. The lithium ion moves from the anode to cathode during discharge and in reverse when charging.
- Lithium ion batteries have a higher energy density than most other types of rechargeables.
- The batteries can be formed into a wide variety of shapes and sizes so as to efficiently fill available space in the devices they power.
- They do not suffer from the memory effect and have a low self-discharge rate of approximately 10% per month, compared with over 20% per month in common nickel metal hydride batteries and 20% per month in nickel cadmium batteries.

Lithium ion battery uses

- **Medical** – Lithium ion batteries are used for implantable medical devices, such as cochlear implants for the deaf, spinal-cord stimulators, glucose sensors, and cardiac rhythm management devices.
- **Military** – Lithium ion batteries have a wide use in military applications. This includes providing next generation military vehicles the ability to run in battery-only mode capable of operating with significantly reduced acoustic and thermal signatures; batteries for the assortment of electronic devices soldiers are required to carry; and replacing hydraulic, pneumatic, and mechanical subsystems in aircrafts with designs that are simpler, lighter and more reliable electric systems.
- **Space/Aviation** – Lithium ion batteries are being used as a power solution for small spacecraft, and in satellites can reduce mass by hundreds of pounds, allowing more strategic or revenue-producing payload; in both civil and military aircraft, Lithium ion batteries provide energy to emergency, ventilation, hydraulic, and back-up power systems; in shuttle launchers, batteries are used to provide the power supply for the main electrical equipment and to activate pyrotechnic devices – otherwise known as flight termination batteries.
- **HEV/EV/PHEV** – Hybrid and other electric vehicles have become a major market force due to increased fuel costs, concerns about climate change, national security and important developments in battery technology.
 - **Hybrid vehicles** – Batteries and a smaller-than-normal combustion engine work together to power an electric motor that propels the vehicle. This arrangement significantly reduces energy consumption and carbon emissions.
 - **Electric vehicles** – These zero-emissions cars and trucks produce no exhaust fumes. They are entirely powered by electric motors that depend upon rechargeable batteries to operate.
 - **Plug-in electric vehicles** – Hybrids equipped with additional battery capacity and the capability to be charged from a conventional electrical outlet allowing for expanded driving range (up to 100 mpg).