VoltEdge™

High-Performance Lithium-Ion batteries

"Power That Lasts."

Technology

The invention involves a sol-gel-based uniform carbon-coating process designed to create high-performance lithium-ion batteries. This process uses carbon nanotubes and an improved carbon-coating method that incorporates organic phosphoric acid as both a carbon and phosphorus source. This allows for the production of uniformly carbon-coated lithium-ion batteries with greatly enhanced ion diffusion and electrical conductivity. By overcoming the limitations of lithium iron phosphate ($LiFePO_4$) cathode materials, this technology addresses issues such as low capacity, low energy density, and poor cycle life that often lead to premature battery failure. The result is a new generation of lithium-ion batteries with longer lifespans, higher energy density, and better safety features, making them suitable for demanding applications such as electric vehicles (EVs), portable electronics, and grid energy storage.

Market need

The global shift toward electrification and renewable energy has intensified the demand for high-capacity, long-life, and safe lithium-ion batteries. Electric vehicles require power sources that deliver higher energy density, longer driving ranges, and extended lifespans without compromising safety, while consumer electronics continue to demand compact, fast charging, and reliable batteries amid concerns about overheating and fire risks. Similarly, grid energy storage systems depend on durable, long-cycle batteries to efficiently store renewable energy at scale. Although lithium iron phosphate ($LiFePO_4$) batteries are valued for their cost-effectiveness, environmental friendliness, and thermal stability, their limited ion diffusion and low electrical conductivity have hindered broader adoption. The proposed technology overcomes these challenges, enabling $LiFePO_4$ batteries to achieve the high performance and safety standards required for electric vehicles and large-scale energy storage applications.

Features

- Uniform carbon coating via sol-gel process
- Use of organic phosphoric acid, simplifying processing and improving efficiency.
- Integration of carbon nanotubes
- High-performance cathode material ($LiFePO_4$)
- Reduces reliance on external electronics for overcharge/short-circuit protection.

Benefits

- Extends run-time for devices and driving range for EVs.
- Greater rechargeability and durability, reducing replacement costs.
- Mitigates risks of overheating, fires, and explosions common in traditional lithium-ion batteries.
- Utilises $LiFePO_4$, which is non-toxic and environmentally sustainable.
- Reduces processing complexity while enabling large-scale, stable battery production.
- Suitable for EVs, consumer electronics, and large-scale energy storage.

Industry

Energy

Potential applications

- High-energy, long-life batteries for cars, buses, and two-wheelers.
- Smartphones, laptops, tablets, and wearable devices require high-performance, safe batteries.
- Large-scale renewable energy storage for solar, wind, and hybrid power systems.
- Reliable energy sources for factories, data centres, and critical infrastructure.
- Support for remote energy solutions, microgrids, and off-grid electrification projects.
- Lightweight, durable, high-capacity power systems for drones, satellites, and military devices.

Creators

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Stage of development

Prototype

Intellectual property

Patent Protection

Desired relationship

Co-development, Investors