LITHIUM TITANATE (LTO) BATTERIES

interberg batteries



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Lithium-Titanate (LTO) Batteries

What is Lithium-Titanate?

Lithium titanate (full name lithium metatitanate) is a compound containing lithium and titanium. It is an off-white powder at room temperature and has the chemical formula Li2TiO3. It is the anode component of the fast recharging lithium-titanate battery. Li₂TiO₃ is used in the cathode of some lithium-ion batteries, along with an aqueous binder and a conducting agent. Li₂TiO₃ is used because it is capable of stabilizing the high capacity cathode conducting agents; LiMO₂ (M=Fe, Mn, Cr, Ni). Li₂TiO₃ and the conduction agents (LiMO₂) are layered in order to create the cathode material. These layers allow for the occurrence of lithium diffusion.

The Lithium Titanate Battery

The lithium-titanate battery is a rechargeable battery that is much faster to charge than other lithium-ion batteries. It differs from other lithium-ion batteries because it uses lithiumtitanate on the anode surface rather than carbon. This is advantageous because it does not create an SEI layer (Solid Electrolyte Interface), which acts as a barrier to the ingress and egress of Li-ion to and from the anode. This allows lithium-titanate batteries to be recharged more quickly and provide higher currents when necessary. A disadvantage of the lithium-titanate battery is a much lower capacity and voltage than the conventional lithium-ion battery. The lithium-titanate battery is currently being used in battery electric vehicles and other specialist applications.



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How Lithium Titanate Batteries Work

Lithium titanate (LTO) based batteries rely on a promising new technology that employs nanostructured materials to improve the performance, quality, and lifetime of these batteries.

The battery consists of the three main parts: an anode, a cathode, and electrolyte solution. However, the anode in these batteries is covered with nano-structured lithium-titanate instead of carbon (in the case of Li-ion batteries). This new technology increases the electrode's active surface area and allows electrical charges to move more easily and quickly. The high currents can then provide fast charging and discharging rates, long cycle life, and the ability to withstand diverse environmental and temperature conditions.

Advantages of Lithium Titanate Batteries (LTO)

The advantages of Lithium Titanate battery technology are significant and a gamechanger for the entire battery industry and is incorporating a number of economical as well as ecological aspects which are sure to be the future of renewable energy sources. The demand for smaller, more efficient and more eco-friendly renewable energy sources is growing everyday as we engage in moving our planet towards a greener and more sustainable future.

With applications in many sectors, with a primary focus on vehicles, Lithium Titanate technology is the future of battery-powered technology. Let's take a closer look at the benefits and advantages of LTO battery technology.

The Lithium Titanate Battery Technology

In order to understand how Li-Titanate technology benefits the consumers and the planet at large, it helps to view it simply as a more efficient advancement form Lithium-Ion batteries, commonly referred to as Li-Ion.

In essence, it is a rechargeable battery based on the, or modified from, the Li-Ion battery technology. Li-titanate replaces graphite in the anode of the typical Li-Ion battery and forms the materials into a spinel structure. Having a nominal a cell voltage of 2.40V, it releases a high current discharge current that is 10 times the capacity of Li-Ion batteries. Instead of using carbon particles on its surface as Li-ion batteries do, Lithium Titanate utilizes lithium-titanate nanocrystals.

The effect and benefit of this alteration and inclusion of lithium-titanate nanocrystals is that the surface area of the anode of the Lithium-Titanate battery is about 100 square meters per gram in contrast to the only 3 square meters per gram that Li-Ion batteries hold. The result of the lithium-titanate nanocrystals with their enlarged surface area is that electrons are able to enter and leave the anode much more rapidly, leading to fast recharging and enhanced lifetimes of the battery.



Advantages of Lithium Titanate Battery Technology

Given the basic scientific advantages of the high-tech nanotechnology involved in producing Lithium Titanate batteries, it is of special interest to see just how this influences the product positively for the consumer and for sustainability. Lithium Titanate batteries' benefits range from long lifetime to enhanced safety, low-temperature performance and large potential for integration with wind power.

1. Long Lifetime

As discussed above, the advanced nanotechnology consisting of lithium-titanate nanocrystals and their increased surface area are especially designed to enhance the lifetime of these batteries. With an over 30 times larger surface area, this technology is able to recharge substantially faster than its more traditional alternative, the Li-Ion battery. The cycle count of a Lithium Titanate battery is 20,000 in comparison of only 400 in a regular Li-ion battery, marking a revolutionary approach to energy storage.

For the consumer, this means that less electricity and power is needed in order to sustain the battery power. These batteries can be safely charged between six and ten minutes in contrast to the 8 hours required for other rechargeable batteries.

On top of that, the recharge efficiency exceeds an entire 98%, a record-breaking advancement in the field of renewable energy. Furthermore, the charging cycles are much shorter in comparison with other energy sources.

Therefore, vehicles powered by Lithium Titanate batteries require much less energy than other models and have a much higher lifetime potential. This is not only much better for the environment and reduces the concerns about environmental harm caused by vehicles on a large-scale but also allows for a higher level of efficiency for the vehicles themselves.

2. Rapid Battery Charging

Lithium titanate batteries (LTO) are advanced modified lithium-ion battery that employ nano-technology in the form of lithium titanate nanocrystals instead of normal carbon material on its surface. The advantage of this is that the anode has a surface area of about 100 square meters per gram of material - which certainly stands out as a lot more when compared with the 3 square meters per gram for normal carbon material.

This allows the electrons to enter and exit the anode faster, thus making it possible to charge the battery very rapidly.

3. Enhanced Safety

In addition to the enhanced efficiency and energy-conserving qualities of Lithium Titanate batteries, this technology is known for its high level of safety when used in comparison to alternative options. Due to the lower operating voltage of this technology, there are significant safety advantages for the consumer and the environment. As Lithium Titanate





batteries are entirely free of carbon, they avoid thermal runaway or overheating which is a main cause of fires in traditional energy storage systems.

Without the risk of fires or explosions, Lithium Titanate technology allows for safe, userfriendly and low-risk energy storage in any application.

4. Low-Temperature Performance

Another advantage of using Lithium Titanate batteries is that due to the nanotechnology employed, these batteries have a much better low-temperature performance in comparison to other battery technologies.

Due to these low-temperature discharge characteristics, it is able to obtain up to 80% of its full capacity at a mere -30°C.

This is of particular benefit to those companies employing Lithium Titanate technologies at lower temperatures or in colder winters.

5. Integration with Wind Power

Last but most certainly not least, Lithium Titanate is bridging the gap between battery energy storage and wind power.

With an increasing importance of renewable energy options, the possibilities of Lithium Titanate batteries allow for a synergy between wind power and battery storage. Energy storage based on Lithium titanate has the potential to contribute greatly to power system stabilization, with vast potential in creating a renewable energy source that is more sustainable than any other previous alternatives.

The future of sustainable and renewable energy sources depends on technologies like the Lithium Titanate battery that through long lifetime and high efficiency, enhanced safety, low-temperature performance capability, and vast potential of integration with wind power are opening up a world of opportunities with particular focus on vehicles and mobile energy usage.



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The performance advantage of LTO battery



Excellent rate c-rates performance





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Long Cycle Life



Specifications of LTO cell

Model	TKLD-2.4V/16Ah	TKLD-2.4V/25Ah	TKLD-2.4V/26Ah
Material	LMO/LTO	LMO/LTO	LMO/LTO
Nominal capacity	16Ah	25Ah	26Ah
Nominal voltage	2.4V	2.4V	2.4V
Weight	650g±10	880g±10	$1080 extrm{g} \pm 10$
Dimensions	110*13.1*216mm	135*14*218mm	115.5*32.6*170mm
Operating temperature	-30°C-55°C	-30°C-55°C	-30°C-55°C

Pictures of LTO cell



2.4V/16Ah





2.4V/26Ah

Pictures of battery modules



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Energy storage battery system



UPS UPS power supply



power supply

Micro grid energy storage system



Photo-voltaic energy storage system

Power battery system

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Photo-voltaic energy storage inverter



Product applications

TKLTO-24/48 series LTO battery energy storage inverter system is the power supply product of interberg developed according to the general user family home storage load power and electricity, power frequency, suitable for general household electric power supply system or install photo-voltaic, wind power generation electricity system.

Product configuration and characteristics

This product is composed of LTO battery system, inverter system and other components, it has high safety, high rate charge / discharge performance, low temperature performance and long cycle life.

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Model	TKLTO-24/48	Frequency	50Hz±10
Battery material	LTO	Output voltage	AC220V±5%
Electricity	User customization	Frequency	50Hz±0.5
Power	1-10kW	Working temperature	0—40°C
Battery voltage	DC24/48V	Communication interface	RS232/USB
Input voltage	AC220V±35%		
Protection function	Overload, short circuit, high, battery high/low voltage protection, AC power high/lower voltage protection		

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LTO battery energy storage system





Product applications

TKLTO-4850 series LTO battery energy storage system is industrial application power supply products of interberg developed according to a variety of micro grid energy storage products of indoor (outdoor) places, suitable for wind/ photovoltaic power generation system.

Product configuration and characteristics

The product is made of LTO battery, BMS module, DC power module, relay and other series of electrical parts, fan, monitor and display module, plastic spraying case, it has low temperature performance, long cycle life, high security, high rate charge/discharge performance.

Model	TKLTO-4850	Nominal voltage	48V
Battery material	LTO	Working voltage range (DC)	40V-54V
Electricity	2.5kWh	Dimensions (L*W*H)	570×510×210mm
Cell model	2.4V/26Ah	Working temperature	-20 — 55℃
Nominal capacity	50Ah	Thermal management mode	Forced air cooling

Technical parameters

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Backup power supply of LTO battery





Product applications

TKLTO-4850 series LTO battery back-up power supply is the standby power supply products of interberg, developed according to various of Indoor (outdoor) communication base station storage equipment power supply, suitable for various communication equipment of mobile corporation, telecommunication corporation and the other places of application.

Product configuration and characteristics

This product is composed of LTO battery module, protection board, the relevant control of electrical components, SUS304 case etc., it has high safety, high rate charge / discharge performance, low temperature performance and long cycle life.

Model	TKLTO-4850	Nominal voltage	48V
Battery material	LTO	Working voltage range (DC)	40V-54V
Electricity	2.5kWh	Dimensions (L*W*H)	795×290×190mm
Cell model	2.4V/26Ah	Working temperature	-20 — 55℃
Nominal capacity	50Ah	Thermal management mode	Natural cooling

Technical parameters

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LTO battery for high voltage DC power supply





Product applications

TKLTO-21650 series high voltage DC LTO standby power supply is developed by interberg according to the application requirements of a variety of indoor high-voltage power supply equipment, applicable to machine room, high voltage distribution room etc of all enterprises and institutions.

Product configuration and characteristics

This product is mainly composed of LTO battery and high voltage DC equipment, it has high safety, high charge / discharge rates performance, low temperature performance and long cycle life.

TKLTO-21650 216V Nominal voltage Model 180V-243V LTO Battery material Working voltage range (DC) 10.8kWh 800×625×2200mm Electricity Dimensions (L*W*H) 2.4V/26Ah -20 — 55℃ Working temperature Cell model 50Ah Nominal capacity Thermal management mode Forced air cooling

Technical parameters

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Household energy storage system LTO battery





Product applications

TKLTO - 24026 - 10 series household energy storage system of LTO battery is developed by interberg according to the requirements of power and electricity of user home load, suitable for general home with electric power supply system and installed photo-voltaic / wind power generation system.

Product configuration and characteristics

This product is composed of LTO battery module, BMS module, related electrical parts, power control and display module, inverter system, plastic spraying case and other components, it has low temperature performance, long cycle life, high security, high rate discharge performance.

TKLTO-24026-10 240V Model Nominal voltage 200V-270V LTO Working voltage range (DC) Battery material 6.24kWh AC220V 50HZ Electricity Output voltage 1130×455×1035mm 10kVA Dimensions (L*W*H) Power 2.4V/26Ah -20 - 55°C Working temperature Cell model 26Ah Nominal capacity Thermal management mode Natural cooling

Technical parameters

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LTO battery modules for energy storage





Product applications

TKLTO-28128 series LTO battery energy storage module is the power supply products developed by interberg according to the powering requirements for a variety of micro-grid energy storage, suitable for application in electric / wind / photo-voltaic power generation power system.

Product configuration and characteristics

This product is composed of LTO battery, BMS, AC fan, plastic spraying case etc. It has high safety, high rate charge / discharge performance, low temperature performance and long cycle life.

28.8V TKLTO-28176 Model Nominal voltage LTO 24V-32.4V **Battery** material Working voltage range (DC) 5kWh 697×572×282mm Dimensions (L*W*H) Electricity 2.4V/16Ah -20 - 55°C Cell model Working temperature 176Ah Nominal capacity Thermal management mode Forced air cooling

Technical parameters

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LTO battery energy storage system





Product applications

TKLTO-648130 series of LTO battery energy storage system is the energy storage power supply products developed by interberg according to off-grid and on-grid power system of user various indoor places (machine room, power distribution room etc.) and outdoor places, it is applicable to the general power grid, photo-voltaic power generation system and wind power generation system.

Product configuration and characteristics

This product is composed of LTO battery module, BMS module, related control electric parts, plastic spraying case & cabinet and other components, it has low temperature performance, long cycle life, high security, high rate charge / discharge performance.

Technical parameters

Model	TKLTO-648130	Nominal voltage	648V
Battery material	LTO	Working voltage range (DC)	540V-729V
Electricity	84.24kWh	Dimensions (L*W*H)	2400*705*1928mm
Cell model	2.4V/26Ah	Working temperature	-20 — 55℃
Nominal capacity	130Ah	Thermal management mode	Air cooling

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LTO battery for UPS







Product applications

TKLTO-192100 series LTO power supply is the LTO battery backup power supply products developed by interberg according to the uninterrupted power supply equipment of various of indoor places (machine room, power distribution room etc.,) it is applicable to all enterprises and institutions, offices, hospitals and other network room.

Product configuration and characteristics

This product is composed of LTO battery module, relevant control electric parts, plastic spraying case and UPS master, it has high safety, high rate charge/discharge performance, low temperature performance and long cycle life.

Technical parameters

Model	TKLTO-192100	Nominal voltage	192V
Battery material	LTO	Working voltage range (DC)	160V-216V
Electricity	19.2kWh	Dimensions (L*W*H)	940×735×1160mm
Cell model	2.4V/26Ah	Working temperature	-20 — 55℃
Nominal capacity	100Ah	Thermal management mode	Natural cooling





LTO battery for electric bus





Product applications

TKLTO-624200 series electric bus LTO battery system is the high power battery products developed by interberg according to the load power and fast charging demands of 12 meters electric bus, it is applicable to many kinds of electric bus as their length is 6-12 meters(ANKAI pure electric bus etc).

Product configuration and characteristics

This product is composed of LTO battery module, BMS, related control electric parts fan, fast charging port, case etc, it has high safety, low temperature performance, long cycle life, high security, high rate charge/discharge performance.

Technical parameters

Model	TKLTO-624200	Nominal voltage	624V
Battery material	LTO	Working voltage range (DC)	520V-702V
Electricity	124.8kWh	Quantity of battery box	11PCS
Cell model	2.4V/16Ah	Working temperature	-20 — 55℃
Nominal capacity	200Ah	Thermal management mode	Forced air cooling





LTO battery system for special engineering vehicle





Product applications

TKLTO-576108 series LTO power battery system is the high power battery products developed by interberg according to the special application condition requirements of user special engineering vehicles (heavy truck, tramcar etc.), it is applicable to subway engineering, highspeed rail engineering, heavy transport vehicles, and RTG application.

Product configuration and characteristics

This product is composed of LTO battery module, BMS module, related control electrical parts, high voltage control box, DC charging port, DC fan, MSD, spray-painted case, it has high safety, high rate charge/discharge performance, low temperature performance and long cycle life.

Model	TKLTO-576108	Maximum discharge current	400A
Battery material	LTO	Working voltage range (DC)	430V-648V
Electricity	62kWh	Dimensions (L*W*H)	2775*1475*1085mm
Nominal capacity	108Ah	Total weight	约3.5吨
Nominal voltage	576V	Working temperature	-20 — 55℃
Maximum charge current	300A	Thermal management mode	Forced air cooling

Technical parameters

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