BATTERY MATERIALS

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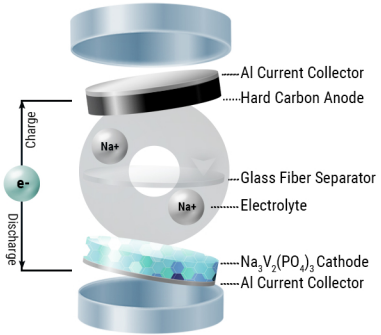
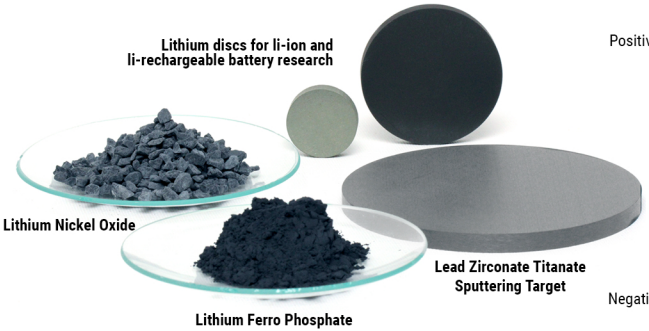
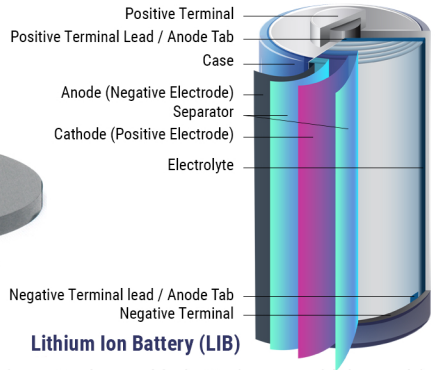


Sodium Ion battery (SIB)





Lithium Ion Battery (LIB)

Advancements in technology made us utilize batteries in electric vehicles and all portable electronic devices. Rechargeable batteries are widely used in various applications, including consumer electronics, electric vehicles (EVs), and energy storage systems. They have gained significant attention and become the preferred choice due to their high energy density, long cycle life, and relatively low self-discharge rate.

LTS Research Laboratories, Inc. supply a large selection of anodes, cathodes, and solid-state electrolyte for energy storage devices in powder, granules, disc, foils, targets, and custom forms. Above are our most requested lines for cathodes and anodes, however, we welcome an inquiry for other specifications.

WHEN EVALUATING BATTERY MATERIALS, THE FACTORS OF IMPORTANCE ARE AS FOLLOWS

ENERGY DENSITY
The amount of energy stored per unit weight or sometimes per volume

SPECIFIC POWER
The speed you can deliver that energy

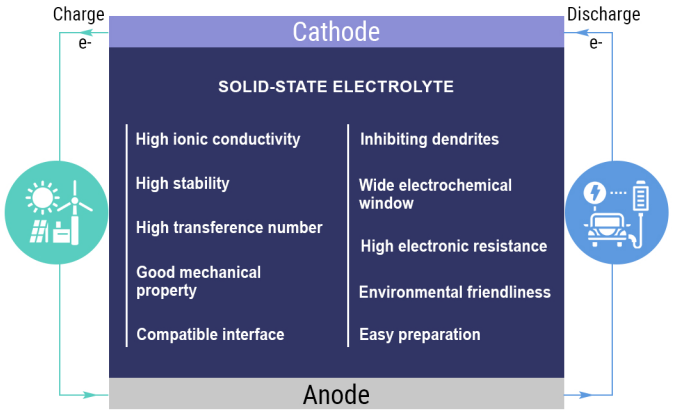
LIFESPAN
How many charge-discharge cycles can the battery sustain before chemical changes render it too weak to function.

COST
Self explanatory

SAFETY
We should also consider Safety since lithium has a tendency to cause fires

DURABILITY
Against high and low temperatures and idle time

RECHARGE RATE
Unit battery experts use to measure the speed at which a battery is fully charged or discharged



BATTERY MATERIALS

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LTS Research Laboratories, Inc. produces all types of oxides, sulfides, halides-based electrodes (cathode & anode), and next-generation solid-state electrolytes for high-performance energy storage devices (Batteries & Supercapacitors). All our products are supplied with a certificate of analysis that includes structural, optical, and morphological data to ensure that each material fulfills product specifications. Please see our below list for our common lines but we welcome the opportunity to collaborate on custom R&D projects.

Materials For Lithium/Sodium - Ion Batteries

CATHODES

- Lithium Iron Phosphate (Li_3PO_4) (LIPON)
- Lithium Cobalt Oxide ($LiCoO_2$)
- Lithium Manganese Oxide ($LiMn_2O_4$)
- Lithium Nickel Cobalt Aluminum Oxide ($LiNi_{0.8}Co_{0.15}Al_{0.05}O_2$)
- Lithium Manganese Nickel Oxide ($LiMn_{1.5}Ni_{0.5}O_4$)
- Lithium Foil (Li)
- Sulfur Powder (S)

- Sodium Vanadium Phosphate ($Na_3V_2(PO_4)_3$)
- NASICON ($Na_2Fe_2(SO_4)_3$)
- Sodium Iron Phosphate ($NaFePO_4$)
- Sodium Nickel Phosphate ($NaNiPO_4$)
- Sodium Chromium Oxide ($NaCrO_2$)

ANODES

- Lithium Titanium Oxide ($Li_4Ti_5O_{12}$)
- Germanium Oxide (GeO_2)
- Natural Graphite
- Silicon Oxide (SiO_2)

- Sodium Titanate ($Na_2Ti_3O_7$)
- Sodium titanium phosphate ($NaTi_2(PO_4)_3$)
- Bismuth (Bi)
- Tin Phosphide (Sn_4P_3)

ELECTROLYTES

- Lithium Tin Phosphorous Sulfide ($Li_{10}SnP_2S_{12}$)
- Lithium Phosphorus Sulfide (Li_3PS_4)
- Lithium Germanium Phosphorus Sulfide (LiGePS)
- Lithium Germanium Phosphorus Sulfur Chloride ($Li_{10}GeP_2S_{12}Cl$)
- Lithium Phosphorus Sulfur Bromide (Li_6S_5Br)
- Lithium Phosphorus Sulfur Chloride (Li_6PS_5Cl)
- Lithium Phosphorus Sulfur Iodide (Li_6PS_5I)
- Lithium Phosphorus Tellurium Bromide (Li_6PTe_5Br)
- Lithium Phosphorus Tellurium Chloride (Li_6PTe_5Cl)
- Lithium Phosphorus Tellurium Iodide (Li_6PTe_5I)
- Aluminum doped Lithium Lanthanum Zirconium Oxide ($Li_{7-3x}Al_xLa_3Zr_2O_{12}$)
- Lithium Lanthanum Tantalum Oxide ($Li_7La_3Zr_{2-x}Ta_2O_{12}$)
- Lithium Lanthanum Titanium Oxide ($LiLaTiO_3$)
- Lithium Aluminum Germanium Phosphate ($LiAlGeP_3O_{12}$)
- Lithium Silicate (Li_2SiO_3)
- Lithium Phosphate (Li_3PO_4)
- Germanium Sulfide (GeS_2)
- Lithium Sulfide (LiS_2)
- Lithium Nitride (Li_3N)

- Sodium Thioantimonate (Na_3SbS_4)
- Sodium Hexafluorophoshate ($NaPF_6$)
- Sodium Manganese Phosphate ($NaMnPO_4$)
- Sodium Manganese Oxide ($Na_{0.44}MnO_2$)

LTS can developed customized Cathode, Anode & Electrolytes materials including but not limited to:

- Unique compositions for Cathode, Anode and Solid electrolytes
- Materials can be customized for Lithium-Ion & Sodium-Ion batteries.
- Particle size and morphology can be modified.
- Production of high yield products from gram to kilogram.
- Enhance or modify the existing material properties.

For more information on our products and services, please visit our website at **www.ltschem.com** or post your queries at **sales@ltschem.com**

Corporate Office
37 Ramland Road
Orangeburg, NY 10962

R&D / Distribution center
2001 Oaks Parkway
Belmont, NC 28012

+1 (845) 293 0587
(845) 818 3593
info@ltschem.com