

Synthesis of cathode (LiFePO_4)/carbon and anode ($\text{Li}_4\text{Ti}_5\text{O}_{12}$) material for lithium ion battery

Lithium-ion batteries are one of the best energy storage systems due to their inherent safety, higher capacity and lower weight. In a lithium-ion battery, lithium ions migrate from the negative electrode to the positive electrode during discharge, and back on re-charging. These batteries have several advantages as:

- Lithium has very high electrochemical potential
- Lithium is a lighter element than other elements
- These batteries has high open circuit voltage & very low discharge rate (5-10%)

At present lithium cobalt oxide (LiCoO_2) is used as cathode. This cathode is costly and also it has environment impact. The carbon coated lithium iron phosphate (LiFePO_4) is better choice as cathode because of its low cost, thermal stability and environment friendliness.

At present carbon is used as anode material. However, large amount of materials is required as well as carbon become stresses upon electrochemical cycling. The lithium titanate ($\text{Li}_4\text{Ti}_5\text{O}_{12}$) is stress free anode to be used in modern lithium ion batteries. These two cost effective materials are useful for making electrodes in lithium ion battery.

SPECIFICATIONS

- Carbon coated lithium iron phosphate (LiFePO_4) is black in color.
- The particle size of powder is in nanometer range.
- The electronic conductivity of this material is in the range of 10^{-3} - 10^{-4} Ohm-1cm-1
- Lithium titanate ($\text{Li}_4\text{Ti}_5\text{O}_{12}$) is white in color and very stable in dry atmosphere.
- Particle size of these lithium titanate is in nanometer range.

SALIENT FEATURES

- These materials are presently imported by battery makers.
- Indian entrepreneurs can directly use these materials for battery production.
- Synthesized from readily available raw material sourced from local market.

APPLICATIONS

- These materials are electrodes materials to be used in Lithium- ion battery.
- These batteries can be very much useful in large scale industries like telecommunication, transport etc.
- These batteries would also be useful in other devices produced by small scale industries like power tools, portable electrical devices etc.

