



## Role of Nanotechnology in Fabrication Nanosized Electrode Materials for Lithium-ion Batteries

**Ahmed Hashem\***

*Inorganic Chemistry Department, National Research Centre, 33 El Bohouth St., (former El Tahrir St.), Egypt*

**\*Corresponding Author:** Ahmed Hashem, Inorganic Chemistry Department, National Research Centre, 33 El Bohouth St., (former El Tahrir St.), Egypt.

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Design a rechargeable lithium-ion battery (LIBs) with high efficiency, good long life, and high specific capacity to play a critical role in today's world of mobile communications, portable electronics, and electric vehicle became a must. This technique has advantages that overcame the limitations of the other traditional rechargeable batteries e.g. Nickel-Cadmium (Ni-Cd) and Nickel metal hydride (NiMH) which are less efficient than lithium ion batteries. The use of nanosized electrode materials not only improves the power density but also facilitates Li-ions insertion/extraction in/out of the storage materials, which improves the cycle life of lithium batteries. Nanotechnology has the potential to deliver the next generation rechargeable batteries, especially lithium-ion batteries, with improved performance, durability and safety at an acceptable cost. Synthesis and characterization of nanostructural cathode materials that adopt this kind of rechargeable batteries will lead to batteries with high energy densities and allows reduction of the size of battery packs to power the same equipment. What can nanotechnology offer for lithium -ion batteries? Nanosized electrode materials such as cathode and anode for lithium -ion batteries can offer; large surface area, shorter distance for Li diffusion, good strain relaxation, interface control, continuous electron transport pathway and higher specific capacity and better rate capability than the large size particles. So, these nanosized materials will give the following advantages for Li-ion batteries; faster charging and long discharging time, longer battery life, higher power, operation in extreme temperature conditions and ultra-safe characteristics. These advantages candidate lithium-ion batteries to be

the best choice for electric vehicles which can decrease the rely on fossil fuel, improve the quality of air and develop the transportation system. Electric vehicles are low- or zero-emission electric cars which operated by lithium- ion have continued to grow over the past few decades.