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Effect of nanostructured carbon additives on the functional characteristics of electrodes of lithium-ion batteries

Currently, lithium-ion batteries are the most commonly used as chemical current sources. Considering the evolution of modern electronic devices, there is a clear trend towards their miniaturization and enhancement of functionality. This leads to a significant increase in energy consumption, which requires the creation of more efficient and compact energy sources (accumulators).
Publications of recent years indicate that the use of various carbon nano-structures, such as graphene and nanotubes, as conductive additives, can significantly improve the specific parameters of the electrodes of lithium-ion batteries. This effect is due to the higher electronic conductivity of carbon nanotubes and graphene compared to traditional soot. In addition, the introduction of quasi-one-dimensional (nanotubes) and quasi-two-dimensional (graphene) structures into the electrode makes it possible to ensure a more intimate contact of active substance particles with a current collector. This helps to reduce the mass fraction of the conductive additive in the electrode structure and increase its specific parameters.

Summary

The use of graphene and carbon nanotubes as conductive additives instead of traditional soot makes it possible to substantially increase the specific characteristics of positive electrodes in lithium-ion batteries. Such an effect can be explained by an increase in the transport kinetics of lithium ions within the active material due to the higher conductivity of nanotubes and graphene and more dense contact with crystals.

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