Nanocomposites and nanomaterials

Synthesis of [MgF_2/C] nanocomposite and its application as cathode in lithium-ion batteries

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For effective using of lithium power sources of intercalation type the cathode should be organized as a conductive matrix system, two main components of which are solving the mutually-competing problems. The matrix component provides the existence of separate often polycrystalline highly dispersed grains with suitable for intercalation of Li^+ channels. The conductive additive serves as a transport environment for conductive electrons, which means serves as environment of contact both between individual grains of the matrix and with current outlet electrodes.

Nanodispersive magnesium fluoride was synthesized by chemical precipitation. The suspension was prepared from the synthesized powders and dissolved in distilled water glucose to achieve a uniform coating of magnesium fluoride crystals with a thin layer of amorphous carbon. The resulting suspension was burned at 500°C in a stream of inert gas (argon) for 1 hour. As a result we've obtained the composite of nanodispersive particles of magnesium fluoride, the contact between which were provided by the amorphous carbon.

We generated models of lithium power sources based on MgF_2/C nanocomposite. The specific capacitance of electrochemical systems reaches the value ~ 300 A·h/kg, which is 25% higher value compared the system of traditionally established cathode [1]. We attribute such improve of the performance with a closer contact between carbon additive and surface of grain. It allows using in the lithium intercalation process almost all volume of MgF_2 grains. And, the decrease of specific content of carbon and the absence of aggregating additive increase the specific content of the "useful" intercalation matrix.

1. *Gasyuk I., Sichka M., Jakubovsky P.* Electrochemical intercalation-deintercalation of lithium into the structure of ultradispersive MgF_2 // J Problems of Chemistry and Chemical Technology-2011.-**4**, N 1.-P. 121-123.