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Structural studies of the $LiFeP_2O_7$ obtained by extraction-pyrolytic method

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Batteries with lithiated iron phosphate are the most likely candidate for replacing traditional of cathode materials. An increase in the specific surface area of materials associated with the crushing of crystallites is likely to increase the activity of cathode materials. Therefore, the use of nanotechnology will allow the creation of materials with high performance characteristics. We used for the synthesis of cathode materials the wet method of extraction and pyrolysis that allows us to use secondary products as raw materials and reduce the temperature and time parameters of synthesis of complex oxides, as well as to eliminate the agglomeration of particles. To obtain the target Fe-Li-P-O in the extract of the extractant, di-2-ethylhexyl phosphoric acid (Di2EGPA) was used. The obtained extracts of iron and lithium were mixed in stoichiometric proportions and the solution was concentrated in a crucible to a paste state and then annealed in an oven at 500-700°C until the oxide powders were formed. The results of x-ray photoelectron spectroscopy (XPS) showed the presence of Fe 2p and 3p hybridization degrees of atoms and P 2p, O 1s hybridization degrees atoms. X-ray patterns of samples of the Li-Fe-P-O system obtained by the extraction-pyrolytic method using the extractant di-2 EGFK are presented in Fig.1. After annealing at 500°C, the powder has an amorphous structure. Annealing the powder at 700°C led to the formation of the crystalline product $LiFeP_2O_7$.

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