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Cathodic materials for lithium-ion batteries based on spinels $Li_x Mn_{2-y} Me_y O_4$: Synthesis, phase composition, and structure of $Li_x Mn_{2-y} Cr_y O_4$ at $x = 1.0–1.2$ and $y = 0–0.5$

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Abstract

Extralithiated chromium-doped finely divided lithium-manganese spinels are synthesized as a result of a two-step solid-phase process with use made of the fusion-saturation method. The spinels are intended for application as cathodic materials in lithium-ion batteries. The phase composition and structural characteristics of samples of cathodic materials of the type $Li_x Mn_{2-y} Cr_y O_4$ are studied. The samples with $x = 1.0–1.2$ and $y = 0–0.5$ are characterized by phase purity and cubic syngony with parameter $a = 0.817–0.823$ nm and a disperseness equal to 1–2 nm. The maximum content of chromium and lithium in $Li_x Mn_{2-y} Cr_y O_4$ that does not lead to violation of cubic syngony

is determined. Lithium excess in the cathodic material that does not exceed 0.2 formula units may be used for compensating the irreversible capacity. Replacing some manganese atoms by chromium may facilitate retention of the structures's integrity in the course of cycling.

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