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Electrochemical properties of $LiMn_{2-y}Me_yO_4$ (Me = Cr, Co, Ni) spinels as cathodic materials for lithium-ion batteries

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Abstract

A number of spinel phases with a general formula $LiMn_{2-y}Me_yO$ (Me = Cr, Co, Ni) was synthesized using the melt-impregnation and sol-gel methods. All synthesized materials were subjected to electrochemical testing of their suitability as cathodes in lithium-ion batteries. Cyclic voltammograms were used in the testing. The cathode materials prepared using the melt-impregnation method showed the highest initial discharge capacity (up to 120 mA h/g) and stable operation during the cycling. The partial substitution of chromium and cobalt atoms for manganese gives positive effect: the spinel structure is stabilized during the cycling. The double doping of the Li-Mn-O system with small

amounts of Co and Ni results in the stabilizing of the discharge capacity. An overstoichiometry excess of lithium in Co- or Cr-doped spinels also favors the increasing of the discharge capacity and slows down its decaying during the cycling.

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