Preparation of Li$_4$Mn$_5$O$_{12}$-Li$_2$MnO$_3$ 1D Nanocomposite as Cathode for Lithium Ion Batteries

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The Li$_4$Mn$_5$O$_{12}$-Li$_2$MnO$_3$ 1D nanocomposite with 200−400nm diameter and 3−5μm length have been synthesized by MnOOH nanorods and LiOH·H$_2$O via a solid state reaction process. The electrochemical properties and the mechanism were studied by the galvanostatic charging/discharging test and cyclic voltammograms (CV) test. The initial discharge capacity values were 111 mAh·g$^{-1}$ at 0.5C rate and 88 mAh·g$^{-1}$ at 1C rate observed in the range of 3.3−2.3V. Benefit from the one-dimension structure, high crystallinity and the existence of Li$_2$MnO$_3$ layer, the Li$_4$Mn$_5$O$_{12}$-Li$_2$MnO$_3$ electrode exhibits excellent rate capability and cycling stability, with 92% and 99% capacity retention after 100 cycles at 0.5C and 1C rate, respectively.

Keywords: Li$_4$Mn$_5$O$_{12}$, Cathode materials, Electrochemical performance, Lithium-ion battery, 1D nanostructures

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