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Molten salt-directed synthesis method for $LiMn_2O_4$ nanorods as a cathode material for a lithium-ion battery with superior cyclability

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ABSTRACT:

A molten salt synthesis technique has been used to prepare nanorods of Mn2O3 and single-crystal $LiMn_2O_4$ nanorods cathode material with superior capacity retention. The molten salt-directed synthesis involved the use of NaCl as the eutectic melt. The as-synthesized $LiMn_2O_4$ nanorods cathode material showed superior electrochemical performance compared to the $LiMn_2O_4$ sample obtained via the solid state method. The as-synthesized $LiMn_2O_4$ nanorods maintained more than 95% of the initial discharge capacity of 107 mA h g^{-1} over 100 cycles at a rate of 0.1 C, whereas the $LiMn_2O_4$ sample synthesized using the solid state reaction method maintained 88% of the initial discharge capacity of 98 mA h g^{-1} over 100 cycles at a rate of 0.1 C. Compared to the literature, the molten salt-directed method for the preparation of high-performance $LiMn_2O_4$ is simpler and less expensive, with greater potential for industrial scale-up.