Controllable Preparation of V₂O₅ Hollow Microspheres as Cathode Materials for Lithium-Ion Batteries

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Hollow-structured vanadium oxides with tunable interiors have attracted significant attention in energy storage and conversion systems. In this work, we report the continuous structural engineering of VO₂ solid microspheres utilizing a second solvothermal solution under the driving force of an Ostwald-ripening mechanism. The VO₂ microspheres with diversified interior structures, such as yolk-shelled, double-shelled and complete hollow microspheres, were obtained by simply controlling the solvothermal duration in the new solvothermal solution. The obtained VO₂ microspheres were converted into V₂O₅ microspheres with good structural preservation after calcination. As a cathode material for lithium batteries, the V₂O₅ hollow microspheres exhibited high capability and good cycling stability. A high specific discharge capacity of 129.4 mA h g⁻¹ was obtained for the V₂O₅ hollow microsphere electrode, which retained 114.5 mA h g⁻¹ after 200 cycles. The superior electrochemical properties were attributed to the promising features of the hollow microspheres.

Keywords: Vanadium oxide; hollow microspheres; solvothermal synthesis; lithium batteries

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