Defective ZnCo2O4 with Zn vacancies: Synthesis, property and electrochemical application

Through the liquid-phase co-precipitation and alkaline-tailored method, the defective ZnCo2O4 with Zn vacancies (Zn0.95Co2O4) has been synthesized, which is similar to the crystal phase, morphology, and particle size of the pure ZnCo2O4 before etched, except the enlarged BET specific surface. For the first time, the Zn0.95Co2O4 has been evaluated as an anode material for lithium-ion batteries. The Zn vacancies in defective ZnCo2O4 may decrease the probability of the reversible by-reaction between Zn and Li-Zn alloy by the cyclic voltammogram measurement. Compared to the traditional ZnCo2O4, the Zn vacancies in defective ZnCo2O4 can provide larger interface, activate more reaction sites and expand faster transport paths for both of Li-ions and electronics insertion/extraction, so the electrochemical performance of defective ZnCo2O4 has been enhanced highly. The discharge capacity retains at 652.2 mAh g\(^{-1}\) under 0.4 A g\(^{-1}\) after 200 cycles. When the rate returns to 0.4 A g\(^{-1}\), the average discharge capacity could be recovered to 748.9 mAh g\(^{-1}\) under the multiple-step high rates after many cycles.

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