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| Title | Electrochemical Zinc Intercalation in Lithium Vanadium Oxide: A High-Capacity Zinc-Ion Battery Cathod | | |
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| Abstract |  |
| Rechargeable zinc-ion batteries (ZIBs) with high energy densities appear promising to meet the increasing demand for safe and sustainable energy storage devices. However, electrode research on this low-cost and green system are faced with stiff challenges of identifying materials that permit divalent ion-intercalation/deintercalation. Herein, we present layered-type LiV3O8 (LVO) as a prospective intercalation cathode for zinc-ion batteries (ZIBs) with high storage capacities. The detailed phase evolution study during Zn intercalation using electrochemistry, in situ XRD, and simulation techniques reveals the large presence of a single-phase domain that proceeds via a stoichiometric ZnLiV3O8 phase to reversible solid–solution Zn*y*LiV3O8 (*y* > 1) phase. The unique behavior, which is different from the reaction with lithium, contributes to high specific capacities of 172 mAh g–1 and amounts to 75% retention of the maximum capacity achieved in 65 cycles with 100% Coulombic efficiency at a current density of 133 mA g–1. The remarkable performance makes the development of this low-cost and safe battery technology very promising, and this study also offers opportunities to enhance the understanding on electrochemically induced metastable phases for energy storage applications. | |