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Carbon Coated Mixed-Metal Selenide Microrod: Bimetal-Organic-Framework Derivation Approach and Applications for Lithium-Ion Batteries

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Abstract

Transitional metal selenides can be explored as a class of candidate electrodes for lithium-ion batteries, because of their large lithium storage ability, wide availability, and good safety. Besides, hybridization with carbonaceous materials, as well as the design of porous or hollow structure, would be effective approaches to improve the cycling stability and rate performance of transitional metal selenide electrodes. By a facile bimetal-organic-framework approach, a carbon-coated bimetal selenide microrod composite (Co-Zn-Se@C) is fabricated for the first time in this work. On account of the MOF-derived porous particle-assembled structure, along with the buffering effect between two metal components, the Co-Zn-Se@C electrode manifests extremely large reversible capacity of 949 mAh g^{-1} after 500 cycles with good high-rate capability for lithium ion batteries. It would extend the synthesis and application of metal selenides in the field of energy storage.

Keywords: lithium-ion battery; cobalt selenide; zinc selenide; microrod; metal-organic framework