(Research Article 2)

"Growing ordered CuO nanorods on 2D Cu/g-C3N4 nanosheets as stable freestanding anode for outstanding lithium storage"

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Abstract:
Two dimensional (2D) nanostructures are promising to provide a new hierarchical architecture for transition metal oxides (TMOs) with outstanding lithium storage. In this work, we grew ordered CuO nanorods on 2D Cu/g-C_3N_4 nanosheets to form the hierarchical CuO@Cu/g-C_3N_4 nanorods film as freestanding anode for advanced lithium storage. This assembled freestanding film demonstrates a high discharge specific capacity at 726 $mAhg^{-1}$ after 200 cycles at 0.1C and a discharge specific capacity of 457 $mAhg^{-1}$ after 625 cycles at 1C, among the best performance in CuO and CuO based nanostructures for lithium storage. Its outstanding stability and cyclic performance are ascribed to the following aspects during the reaction process: (i) the unique 2D nanostructure provides large exposed area for Li^+ insertion, (ii) the ordered CuO nanorods provide interior spaces to accommodate the volume change and offer more paths for charges and Li^+ transfer, (iii) the existence of Cu nanosheets increases the electrons transport and (iv) the porous g-C_3N_4 nanosheets endow the prepared structure more active sites for facilitating Li^+ transport and accommodating volume change. Our strategy on growing ordered nanostructures on 2D nanosheets will be an effective way to modify TMOs for advanced lithium-ion batteries.