Bicontinuous Spider Network Architecture of Free-Standing $MnCoO_X$@NCNF Anode for Li-Ion Battery

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A smart strategy is proposed to tailor unique interwoven nanocable architecture consisting of $MnCoO_x$ nanoparticles embedded in 1-dimensional (1D) mesoporous N-doped carbon nanofibers by using electrospinning technique [1]. The as-prepared network mat of N-doped carbon nanofibers with embedded $MnCoO_x$ nanoparticles ($MnCoO_x$@NCNFs) is tested as a current collector-free and binder-free flexible anode, which eliminates slurry preparation process during electrode fabrication in Li-ion battery (LIB) [2,3]. The $MnCoO_x$@NCNFs possess versatile structural characteristics which can address simultaneously different issues such as poor conductivity, low cycling stability, volume variation, flexibility, and binder issue associate with the metal oxide. The free-standing mat electrode shows not only high initial discharge and charge capacities but also reversible discharge cycling stability of almost 80 % retention up to 100 cycles and 60 % retention up to 500 cycles at 1.0 A/g. Such high Li storage capacity and excellent cycling stability are attributed to the unique flexible and free-standing spider network-like architecture of 1D $MnCoO_x$@NCNFs, which provides the platform to bicontinuous electron/ion pathways for superior electrochemical performance [4]. Along with excellent electrochemical performance, simple synthesis procedure of unique binder-free $MnCoO_x$@NCNFs can achieve cost-effective scalable mass production for practical use in flexible mode, not merely in LIBs but also in a wide spectrum of energy storage fields.

References:

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