TiO_2 nanotubes-rGO composites as negative electrode materials for sodium ion batteries

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Due to the rich reserves and uniform distribution of sodium element, sodium ion battery has been regarded as an ideal substitute to lithium ion battery [1]. Among various negative electrode materials for sodium ion batteries, TiO_2 gains increasing attention due to its low cost, natural abundance and non-toxicity[2]. Yet TiO_2 presents low electron conductivity and slow kinetic properties, which lead to poor electrochemical performance, such as rate capability and cycle stability.

In this contribution, we present reduced graphene oxides supported TiO_2 nanotubes (rGO@TiO_2) as negative electrode materials for sodium ion batteires, in which the rGO could enhance the electron conductivity of the composites. By further introducing oxygen deficiency in TiO_2 through hydrogen treatment, the rate capabilities of the rGO@TiO_2 is improved. When the current density is 5 A g^{-1}, a specific capacity of 89 mAh g^{-1} can be achieved. An excellent cycling stability can be obtained with a capacity of 93 mA h g^{-1} at 500 mA g^{-1} after 1000 cycles.

We also present that heat treatment of TiO_2 plays an important role in tuning its eletrochemical performance, in terms of specific capacity and rate performance.

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