One-step electrosynthesis of MnO_2/rGO nanocomposite and its enhanced electrochemical performance

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ABSTRACT

We present a facile one-step electrochemical approach to generate MnO_2/rGO nanocomposite from a mixture of Mn_3O_4 and graphene oxide (GO). The electrochemical conversion of Mn_3O_4 into MnO_2 through potential cycling is expedited in the presence of GO while the GO is reduced into reduced graphene oxide (rGO). The MnO_2 nanoparticles are evenly distributed on the rGO nanosheets and act as the spacer to prevent rGO nanosheets from restacking. This unique structure provides high electroactive surface area (1173 $m^2\ g^{-1}$) that improves ions diffusion within the MnO_2/rGO structure. As a result, the MnO_2/rGO nanocomposite exhibits high specific capacitance of 473 $F\ g^{-1}$ at 0.25 $A\ g^{-1}$, which is remarkably higher (3 times) than the Mn_3O_4/GO prior conversion. In addition, the electrosynthesized nanocomposite shows higher conductivity and excellent potential cycling stability of 95% at 2000 cycles.