Incorporation of MnO₂ into Egg Yolk Derived P, N, O-Tridoped Carbon for Supercapacitors with Excellent Cycling Stability

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The design of novel electrode materials is still challenging in the development of high-performance supercapacitors. To tackle such difficulties, a potentially feasible strategy is recently emerged via the incorporation of pseudocapacitive transition metals into biomass-derived carbon electrodes, in which pseudo-capacity mainly derived from transition metals is efficiently stabilized by the heteroatom doped carbon hosts. In this work, a MnO₂-decorated P, N, O-tridoped porous carbon electrode has been developed via a simple hydrothermal reaction by mixing KMnO₄ with biomass egg yolk under mild conditions. The as-obtained MnPNC (MnO₂ decorated P, N, O-tridoped Porous Carbon) is composed of MnO₂ nanosheets wrapped by porous carbon, exhibiting a high specific capacitance of 341 F/g at a current density of 1 A/g in 6 M KOH and an outstanding long-term cycling stability of 15000 cycles. These results indicate that the carbon protecting layer is able to promote the stability of MnO₂ during charging/discharging processes.

Keywords: biomass derived, heteroatom doped carbon, supercapacitors, cycling stability, manganese dioxide

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