Flexible Free-standing PEDOT:PSS/MnO₂ Films as Electrode Material for Supercapacitors

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A free-standing and flexible film is desired for wearable energy devices in the future. MnO₂ has attracted wide interest as a promising electrode material for high energy density supercapacitors. However, it suffers from the poor electron transfer and film-forming properties. On the contrary, the excellent conducting polymer poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) has a high electrical conductivity with poor specific capacitance. Herein, we designed and fabricated a composite film by combining PEDOT:PSS and MnO₂ nanoparticles (NPs) via a facile dilution-filtration. MnO₂ NPs were prepared by a simple and environmental friendly method. PEDOT:PSS plays a significant role on the formation of free-standing and flexible composite film. Meanwhile, it enhances the electron transfer property of MnO₂ NPs due to the high electrical conductivity of PEDOT:PSS. The as-prepared PEDOT:PSS/MnO₂ composite films show enhanced electrochemical performance and specific capacitance, which is three times higher than PEDOT:PSS films. This facile composite method provide a potential application in future flexible supercapacitor.

Keywords: Free-standing films; flexible supercapacitor; PEDOT:PSS; MnO₂

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