Preparation and Electrochemical Performances of Cellulose Nanofiber/Graphene Nanosheet/Polyaniline Composite Film via in-Situ Polymerization

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This study demonstrates that green and renewable cellulose nanofiber can be applied in the production of electrode materials for energy-storage supercapacitors. We prepared cellulose nanofiber/graphene nanosheet/polyaniline (CGP) composite films through in-situ polymerization and vacuum filtration and studied the effect of aniline amounts on the electrochemical properties of CGP films. The composite films were characterized using FT-IR, XRD, XPS, Raman, SEM, and EDX, and the results show that their specific capacitance initially increased and then decreased as the amount of aniline increased. Among the films studied, the CGP_{1:15} (1 : 15 is the mass ratio of GNS to aniline in the feedstock) films achieved a specific capacitance of 430.78 F/g at a current density of 1 A/g and a charge transfer resistance of 1.65 Ω. After 1000 charge-discharge cycles, 79.33% of the specific capacitance was maintained at 5 A/g.

Keywords: cellulose nanofiber, graphene nanosheet, polyaniline, electrochemical performance

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