Graphene-Enabled Improved Supercapacitor Performance of Polyaniline Nanofiber Composites

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Graphene/PANI nanofiber composites were synthesized by *in-situ* chemical oxidative polymerization of aniline in the presence of graphene oxide (GO) followed by chemical reduction of GO. The as-synthesized composite was carefully characterized by the combination of the microscopy and spectroscopy techniques. The supercapacitor performance of graphene/PANI nanofiber composite was further investigated. As expected, the synergistic interactions between graphene and PANI enable the as-fabricated electrode with greatly improved electrochemical performance. The specific capacitance of graphene/PANI was calculated to be 952 F/g at 1 A/g, much higher than those of graphene (236 F/g) and PANI (621 F/g) counterparts. The specific capacitance maintains 645 F/g at 10 A/g with 68% retention of original capacitance after a 10-fold increase in the current density. Moreover, the graphene/PANI electrode remains 88% retention of initial capacitance over 1000 cycles, while PANI only gives 73% of original capacitance. These data clearly suggest that large capacitance, high rate capability, and good cycling stability can be synchronously achieved by doping PANI nanofibers with graphene sheets.

Keywords: Graphene, polyaniline, nanocomposites, supercapacitors

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