Construction of carbon-based electrospun electrodes for an asymmetric supercapacitor

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Abstract
Electrospun carbon nanofibers (CNFs) have sparked increasing attention as novel electrodes which greatly affect the capacity, power density and energy density of supercapacitors [1-3]. Chemical doping is one of the most effective methods to tune the electronic properties of carbon nanofibers. An asymmetric supercapacitor (ASC) based on graphene oxide (GO) doped carbon nanofiber (CNF) and metal oxide doped CNF were successfully fabricated. Specifically, GO@CNF//CoFe@CNF electrodes were synthesized using electrospinning of GO-carbon precursor and metal salts-carbon precursor, separately followed by heat treatment to form binder-free and freestanding composite electrodes. Fig. 1 represents typical quasi-rectangular shape in basic electrolyte meaning a good rate performance. The asymmetric supercapacitor delivered a capacitance of 160 F/g at a current density of 0.5 A/g in 6M KOH electrolyte. Fig.2 presents the charge/discharge curves of symmetric and and asymmetric devices suggesting that the enhanced specific capacitance of ASC in aqueous electrolyte within 0-1.4V. In addition, the device possessed acceptable cycling stability indicating that the composite electrodes allowed rapid ion diffusion. The superior performance is attributed to easy electrolyte accessibility as well as porous fibrous carbon morphology. Importantly, this ASC will find wide applications in portable electronic devices and hybrid vehicles.

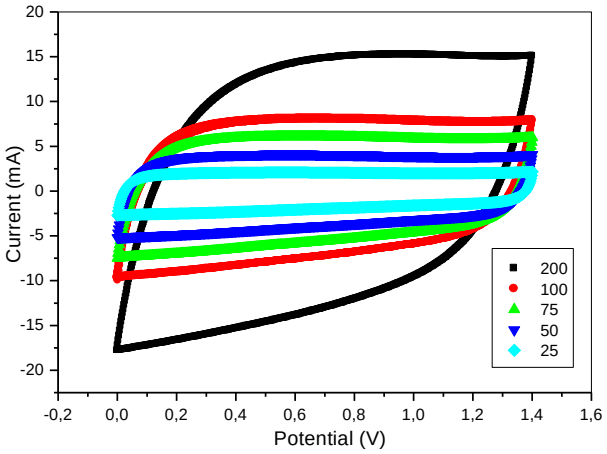

Figure 1: CV curves of ASC.

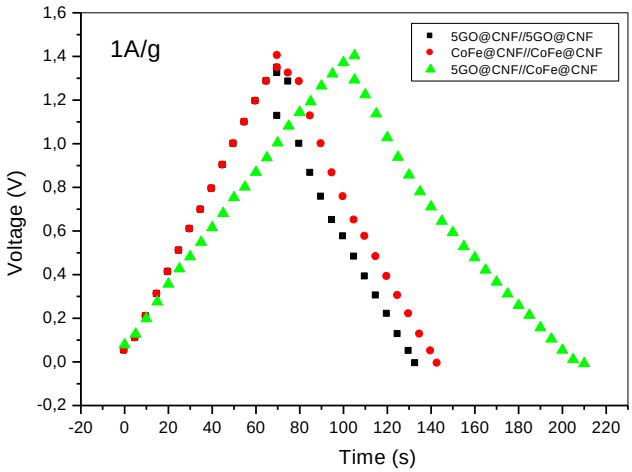

Figure 2: Galvanostatic charge/discharge curves of ASC.

References
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