Facile Synthesis of Cross-Linked Carbon Nanofiber Derived from PAN/Thiourea/Aluminum acetate as Supercapacitor Electrode

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Supercapacitors (SCs) have been considered promising devices in novel energy storage systems because of their high-power density and long life cycle life [1–3]. As a crucial part of SCs, the properties of electrode materials significantly affect the performance. To develop free-standing supercapacitor electrodes, cross-linked carbon nanofibers (CNFs) are good candidates for electrode materials. By using PAN, thiourea, and aluminum acetate as precursors were electrospun. The addition of thiourea and aluminum salt increased the surface characteristics and the conductivity of the CNFs by the decomposition of additives during thermal treatment. Carbon nanofibers were also synthesized for comparison from pure PAN and a solution of PAN/Thiourea. The results showed that the CNFs obtained from PAN, thiourea, and aluminum triacetate showed a good specific capacitance in alkaline aqueous electrolyte and it remained its rate capability at high current densities. The enhanced electrochemical performance is expected as a consequence of the synergistic effect of additives and cross-linked structure. The cross-linked structure promotes a fast transfer of electrons on the carbon nanofiber structure, which is conducive to charge storage. This method offers a new preparation approach for synthesizing high-performance CNFs with free-standing and cross-linked fibers.

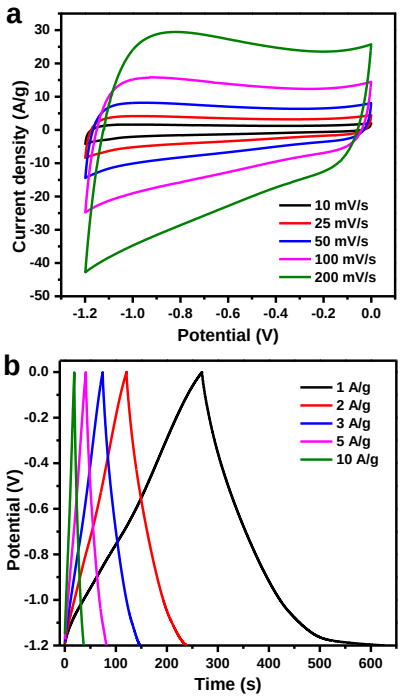

Figure 1. (a) CV curves at different scan rates and (b) GCD curves at different current densities.

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References

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