Electrospun Activated Carbon (AC) and Polyacrylonitrile (PAN) Nanofibers for Supercapacitor Electrodes

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Activated carbon electrospun nanofibers have attracted much attention as supercapacitor electrodes due to their low cost and large-scale synthesis as well as their good mechanical properties [1-3]. Such nanofibers have been used as the supporting backbone for various pseudo-capacitive materials leading to the enhancement of the specific capacitance.

This research highlights the study of electrochemical properties of activated carbon (AC) nanofibers made together with different percentages of polyacrylonitrile (PAN) polymers (5, 10, and 15%) prepared by electrospinning techniques. The best C_s value was obtained from 15%AC of AC-PAN nanofibers.

Different scan rates were applied to 15%AC-PAN electrode nanofibers in the interval of 5, 20, 50 100, and 250 $mVsec^{-1,}$ and the best C_s value was obtained from 100 $mVsec^{-1}$ with 63.76 Fg^{-1}. Then, long-term charge-discharge measurements were applied with a 100 mVsec-1 up to 200 cycles and C_s value reached to 158.33 Fg^{-1}. We had achieved a 40% increment, and this shows that if we proceed with this for long-term measurement up to 1000 cycles, we can achieve a much better result: a higher C_s value. In conclusion, this shows that this is promising nanofiber material for energy storage.

Table 1. Table of C_s value of 15%AC-PAN nanofiber electrodes at different scan rates.

Scan rate/ $mVsec^{-1}$	C_s/ Fg^{-1}
5	15.76135352
20	12.59127337
50	0.224933215
100	63.75779163
250	11.21460374

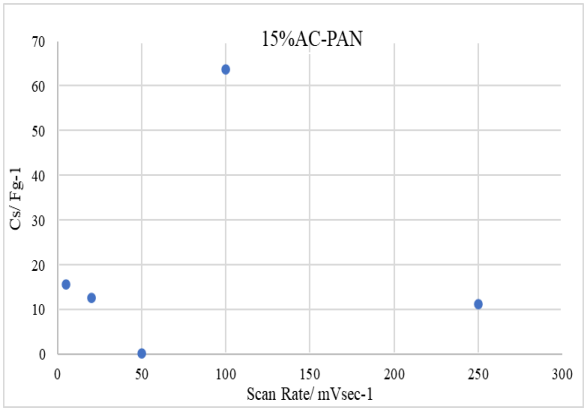

Figure 1. The C_s value plot of 15%AC-PAN nanofiber electrodes at different scan rates.

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