Electrospun Cellulose Acetate (CA) and Polyvinylidene Fluoride (PVDF) Nanofibers for Supercapacitor Applications

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Sustainable biomass has drawn great consideration in developing green renewable energy storage devices with low-cost, flexible, and lightweight properties. Therefore, cellulose has been counted as a candidate to meet the needs of sustainable energy storage devices due to its most abundant nature, renewability, hydrophilicity, and biodegradability. Particularly, cellulose-derived nanostructures (CNS) are more promising due to their low-density, high surface area, high aspect ratio, and excellent mechanical properties [1-2].

This research highlights the electrochemical properties of electrospun cellulose acetate (CA) and polyvinylidene fluoride (PVDF) nanofibers.

Different scan rates were applied to the sample 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 89.00 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 96.08 Fg^{-1}. We achieved 0.92% 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 cellulose acetate (CA) and polyvinylidene fluoride (PVDF) nanofiber electrode at different scan rates.

Scan rate/ $mVsec^{-1}$	C_s/ Fg^{-1}
5	13.21460374
20	12.91184328
50	2.787177204
100	89.00267142
250	19.16295637

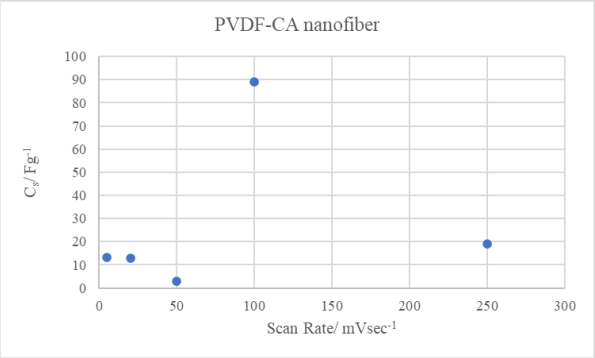

Figure 1. The C_s value plot of cellulose acetate (CA) and polyvinylidene fluoride (PVDF) nanofiber electrode at different scan rates.

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