Electrospun Silicon Dioxide (SiO_2) and Polyvinylidene Fluoride (PVDF) Nanofibers for Supercapacitor Electrodes

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Silicon dioxide (SiO_2) has recently drew huge research interest as the electrode materials for supercapacitor due to ease fabrication and integration possibility [1]. On top of that, research had confirmed that SiO_2-containing supercapacitor offers high cycle stability and able to facilitate ion transfer by generating a structure with active sites [2].

This research highlights the study of electrochemical properties of 15% SiO_2-containing nanofibers made together with of polyvinylidene fluoride (PVDF) polymer prepared by electrospinning techniques.

Different scan rates were applied to 15% SiO_2-PVDF nanofiber electrode 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 39.54 Fg^{-1}. Then, long term charge-discharge measurements were applied with a 100 mVsec-1 up to 200 cycle and C_s value reached to 126.67 Fg^{-1}. We had achieved 220% increment, and this shows that if we proceed this for long term measurement up to 1000 cycle, we can achieve 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% SiO_2-PVDF nanofiber electrode at different scan rates.

Scan rate/ $mVsec^{-1}$	C_s/ Fg^{-1}
5	9.661620659
20	34.26090828
50	11.23775601
100	39.53695459
250	8.194122885

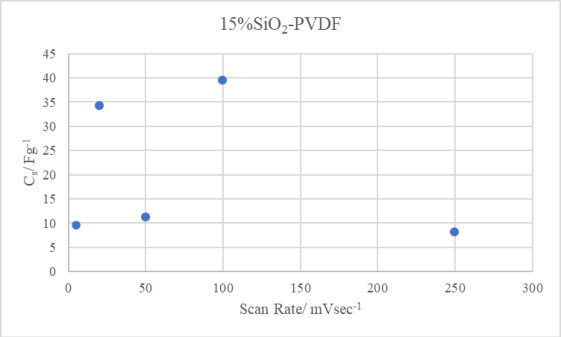

Figure 1. The C_s value plot of 15% SiO_2-PVDF nanofiber electrode at different scan rates.

Acknowledgements

The authors are grateful to the Scientific and Technological Research Council of Turkey (TUBITAK) (grant no. 221M075) for financial support. S. N. Abdul Halim would like to thank to TUBITAK 2221-Fellowships for Visiting Scientists and Scientists on Sabbatical Leave Support Program.

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