Electrochemical Properties of Electrospun Metal-Organic Frameworks (MOFs) Nanofibers as New Hybrid Electrode Materials for Supercapacitor Applications

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A wide range of promising functional metal–organic frameworks (MOFs) nanofibers have been reported to date, and their potential use in various technological fields has been investigated [1-3].

This research highlights the study of electrochemical properties of polyvinylidene fluoride (PVDF) nanofibers made together with different percentages of UiO-66 (Zr-terephtalic acid MOF) and MOF-199 (Cu-trimesic acid MOF) metal-organic frameworks materials (5, 10 and 15%) prepared by electrospinning techniques. The best Csp value was obtained from 15% UiO-66 and MOF-199 MOF-PVDF nanofibers.

Different scan rates were applied to 15% percentage of both samples; UiO-66-PVDF and MOF-199-PVDF nanofiber electrodes 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 221.10 and 358.33 Fg^{-1} respectively. Then, long-term charge-discharge measurements were applied with a 100 $mVsec^{-1}$ up to 200 cycles and C_s value reached to 358.77 and 534.28 Fg^{-1} respectively.

We had achieved 62% and 49% increments from both MOFs-PVDF nanofibers, 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 electrode material for supercapacitor application.

Table 1. Table of C_s value of 15% MOFs-PVDF nanofibers at different scan rates.

Scan rate/ $mVsec^{-1}$	C_s/ Fg^{-1}	
	15% UiO66-PVDF	15% MOF199-PVDF
5	3.555654497	55.50311665
20	2.778272484	5.075690116
50	6.300089047	1.029385574
100	202.4487979	358.3259127
250	41.58504007	60.60552093

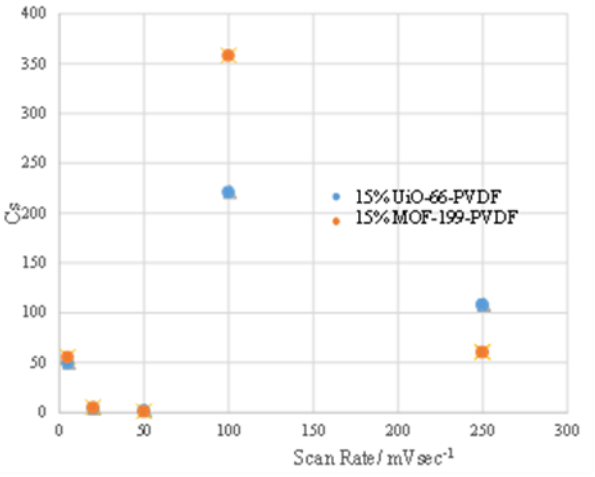

Figure 1. The C_s value plot of 15% MOFs-PVDF nanofibers at different scan rates.

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