Supercapacitor Performances of Activated Carbon Nano-Fiber Web from Electrospinning

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Supercapaciors are one of the energy storage devices with function of high power density rather than that with high energy density as batteries. The power density is dependent on the surface area from the pores with optimum sizes for enough ion accessibility. The maximum power density could be approached form the low bulk resistance of the electrode and low charge transfer resistance in the interface between electrode surface and electrolytes.

The electrospinning method is capable of producing a paper composed of nonwoven carbon nanofibers. The paper type can be easily used for electrodes of supercapacitor and secondary battery without further treatments and therefore should provide high performance due to their large specific surface area and the low electrical resistance.Some carbonizable materials were chosen for elctrospinning and appliedfor electrodes of super capacitors. The performances were discussed on the basis of the electrical resistance of the carbonized web and pore structures of the activated carbon web. The electrical conductivity was in the order of isotropic pitch based activated carbon nano-fiber web, polybenzimidazole(PBI), polyimide(PI), poly acrylronitrile (PAN) (Table 1). The resistance and surface area could be controlled by activation temperature and time. The performances were evaluated with capacitance and power density, i.e., the higher capacitance was obtained from the higher surface; and the higher power and lower the interfacial resistance were obtained from the lower the resistance and larger the pore sizes (Table 1) [1-3].

Table1. Capacitance and electrical conductivity of various carbon nanofiber webs.

Sample	Capacitance (F/g)	Electrical conductivity (S/cm)
PAN	160	2.0
PAN/MWCNT	220	3.6
PI	170	2.2
PBI	172	2.5
Pitch	120	6.5

References

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