

Comparative study of the electro spun pan nanofiber reinforced with CNT and CNF: effect on morphology, thermal stability and electroconductivity properties

ABSTRACT

Reinforced electrospun PAN nanofibers with carbon nanotubes and carbon nanofibers were produced via electrospinning technique. The spinning was carried out in a ratio of 6 and 10 wt. % of CNT and CNF to PAN slurry, respectively. The applied voltage was 10.0 kV and the spuns had undergone three stages of thermal treatments namely, stabilization, carbonization, and graphitization. This study indicated that the nanofiber diameter, thermal stability and electric conductivity properties of the PAN electrospun were greatly affected by the ratio of the nanoparticles. The morphological study revealed that the fiber diameters of the PAN/CNT electrospun were between 0.62 and 0.70 μm , and the PAN/CNF fiber diameters were between 1.03 and 1.20 μm , respectively. For the thermal stability study, it was observed that the thermal degradation of the PAN polymer increased as the CNT and CNF ratios were increased. The electroconductivity study also revealed that addition of CNT had increased the conductivity of the PAN polymer until $5.4 \times 10^{-4} \text{ Scm}^{-1}$. CNF increased the electrical resistivity of PAN from 2.49×10^{-5} to $1690.2 \Omega \text{ cm}^{-1}$.