World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:13, No:06, 2019

Morphological and Electrical Characterization of Polyacrylonitrile Nanofibers Synthesized Using Electrospinning Method for Electrical Application

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Abstract : Electrospinning is the most widely utilized method to create nanofibers because of the direct setup, the capacity to mass-deliver consistent nanofibers from different polymers, and the ability to produce ultrathin fibers with controllable diameters. Smooth and much arranged ultrafine Polyacrylonitrile (PAN) nanofibers with diameters going from submicron to nanometer were delivered utilizing Electrospinning technique. PAN powder was used as a precursor to prepare the solution utilized as a part of this process. At the point when the electrostatic repulsion contradicted surface tension, a charged stream of polymer solution was shot out from the head of the spinneret and along these lines ultrathin nonwoven fibers were created. The effect of electrospinning parameter such as applied voltage, feed rate, concentration of polymer solution and tip to collector distance on the morphology of electrospun PAN nanofibers were investigated. The nanofibers were heat treated for carbonization to examine the changes in properties and composition to make for electrical application. Scanning Electron Microscopy (SEM) was performed before and after carbonization to study electrical conductivity and morphological characterization. The SEM images have shown the uniform fiber diameter and no beads formation. The average diameter of the PAN fiber observed 365nm and 280nm for flat plat and rotating drum collector respectively. The four probe strategy was utilized to inspect the electrical conductivity of the nanofibers and the electrical conductivity is significantly improved with increase in oxidation temperature exposed.

Keywords : electrospinning, polyacrylonitrile carbon nanofibres, heat treatment, electrical conductivity
Conference Title : ICRANNN 2019 : International Conference on Recent Advances in Nanosciences, Nanomaterials and Nanodevices
Conference Location : New York, United States
Conference Dates : June 04-05, 2019