

Production Of Polyacrylonitrile/ Boehmite Nanofibrous Composite Tubular Structures By Opposite-Charge Electrospinning With Enhanced Properties From A Low-Concentration Polymer Solution



Habib SA, Rajabi L and Dabirian F

University of Babylon, Iraq

Abstract

Polyacrylonitrile (PAN)/boehmite nanofibrous composite tubular structures were fabricated from dilute polymer solutions using an opposite-charge electrospinning method. The samples were characterized by X-ray diffraction, Differential scanning calorimetry, scanning electron microscopy, Fouriertransform infrared spectroscopy, fast Fourier transform, and tensile tests. The presence of boehmite nanoparticles in the electrospun PAN nanofibers prevented bead formation, resulting in uniform fibers with smaller diameters, and improved alignment from low-concentration PAN polymer solutions. 1 wt % boehmite-loaded nanofibrous composite tubular structure was selected as the optimal formulation to proceed with the crystallinity and tensile tests, which showed enhanced crystalline properties as well as an abrupt shift in tensile performance. The tensile properties of the nanofiber strongly depended on their crystalline properties. The strong intermolecular forces (hydrogen bonds) between the Al OH groups formed at the surface of boehmite nanoparticles and the polar CN groups along the polymer chains. In addition, the high electrical force between the two tips of the needles in the opposite charge set-up can contribute to the control of electrical jet deposition instability when using a low-concentration electrospinning solution, leading to enhanced properties.

Biography

Habib SA has completed his PhD at the age of 51 years from razi university, Iran. He is the assistant /professor of university of babylon, Iraq. He has over 15 publications that have been cited over 10 times, and his publication H-index is 2 and he supervised many masters students with a specialization of polymer nanocomposites and also was a member of many discussion committees for master's students in the above specialization.



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