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Characterization of Electrospun Carbon Nanofiber Doped Polymer Composites

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Abstract : Ceramic, polymer and composite nanofibers are nowadays begun to be utilized in many fields of nanotechnology. By the means of dimensions, these fibers are as small as nano scale but because of having large surface area and microstructural characteristics, they provide unique mechanic, optical, magnetic, electronic and chemical properties. In terms of nanofiber production, electrospinning has been the most widely used technique in recent years. In this study, carbon nanofibers have been synthesized from solutions of Polyacrylonitrile (PAN)/ N,N-dimethylformamide (DMF) by electrospinning method. The carbon nanofibers have been stabilized by oxidation at 250 °C for 2 h in air and carbonized at 750 °C for 1 h in H2/N2. Images of carbon nanofibers have been taken with scanning electron microscopy (SEM). The images have been analyzed to study the fiber morphology and to determine the distribution of the fiber diameter using FibraQuant 1.3 software. Then polymer composites have been produced from mixture of carbon nanofibers and silicone polymer. The final polymer composites have been characterized by X-ray diffraction method and scanning electron microscopy (SEM) energy dispersive X-ray (EDX) measurements. These results have been reported and discussed. At result, homogeneous carbon nanofibers with 100-167 nm of diameter were obtained with optimized electrospinning conditions.

Keywords : electrospinning, characterization, composites, nanofiber
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