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ELECTROSPINING OF NANOFIBERS OF PA6/PANI-TSA BLENDS AND PA6/PANI/MWNT NANOCOMPOSITES: THERMAL STRUCTURAL AND MECHANICAL CHARACTERIZATION

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Nanofibers mats, based on polyamide 6 (PA6) blended with p-toluenesulfonic acid-doped polyaniline,PANi-TSA, and nanocomposites of PA6/PANi-TSA using multiwalled carbon nanotubes (MWNT) as nanofillers were successfully produced by the electrospinning technique. Polyaniline (PANi) is one of the most important conducting polymers because of its environmental stability in a conducting form, facility and low cost of synthesis. However, its major drawback is its insolubility in common organic solvents. Many approaches have been applied to improve the solubility and processability of PANi; however, solutions of PANi are produced only at very low concentrations, making the electrospinning difficult, due the lack of sufficient chain entanglements between the macromolecular chains. On the other hand the electro-spinnability of PANi can be improved by electrospinning with another electrospinnable polymer, forming a blend. PA6 was used to improve the spinnability of PANi, through the improvement of the chain entanglements between the chains. This polymer was chosen because it is one of the most used commercial polymers in the form of fibers with a wide range of applications. Non-woven mats of nanocomposites using multi walled carbon nanotubes (MWNT) as nanofillers were also produced; the nanofibers had an improvement in mechanical, electrical, and thermal properties. The nanofibers mats´ morphology was analyzed by scanning electron microscopy (SEM), and transmission electron microscopy (TEM); the number-average nanofibers´ diameter and its distribution were calculated using the Image Pro-Plus software. The thermal behavior and the mechanical properties were evaluated by differential scanning calorimetry (DSC) and dynamical mechanical analyzer (DMA),respectively. With those characterizations was possible to explore the effects of electrospinning parameters on the properties of the mats of nanofibers.