

Green Processing of PS/Nanoparticle Fibers and Studying Morphology and Properties

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Abstract : In this experiment Polystyrene/Zinc-oxide (PS/ZnO) nanocomposite fibers were produced by electrospinning technique using limonene as a green solvent. First, the morphology of electrospun pure polystyrene (PS) and PS/ZnO nanocomposite fibers investigated by SEM. Results showed the PS fiber diameter decreased by increasing concentration of Zinc Oxide nanoparticles (ZnO NPs). Thermo Gravimetric Analysis (TGA) results showed thermal stability of nanocomposites increased by increasing ZnO NPs in PS electrospun fibers. Considering Differential Scanning Calorimeter (DSC) thermograms for electrospun PS fibers indicated that introduction of ZnO NPs into fibers affects the glass transition temperature (T_g) by reducing it. Also, UV protection properties of nanocomposite fibers were increased by increasing ZnO concentration. Evaluating the effect of metal oxide NPs amount on mechanical properties of electrospun layer showed that tensile strength and elasticity modulus of the electrospun layer of PS increased by addition of ZnO NPs. X-ray diffraction (XRD) pattern of nanocomposite fibers confirmed the presence of NPs in the samples.

Keywords : electrospinning, nanoparticle, polystyrene, ZnO

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