PMMA/P3HT Nanofibers: Electrical and Optical characterization

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Conjugated polymers are a class of materials that may exhibit behave as insulator, semiconductor or conductor materials, depending on its chain structure and doping levels. Polythiophenes derivatives are a class of conducting polymer that have been extensively studied due to their special properties like conductivity, luminescence and chromism, aiming at preparing solar cells and several types of sensors. Electrospinning is a technique used to produce nanofibers with controlled diameter and morphology, for application in various fields such as the development of new sensors and biosensors. The application of polythiophene derivatives in the development of sensors is one of the applications that has gained great attention in recent times. Such fact arises due to their optical, electrical and electrochemical, which allows their use in chemical sensing, converting physical and chemical information on qualitative and quantitative signals. In this work, we fabricated and characterized new polymeric nanofibers composed of poly (methyl methacrylate) (PMMA) as matrix and polythiophene derivative, poly (3-hexyl thiophene) (P3HT), as the dopant material. The neat nanofibers of PMMA have been previously reported in the literature [(1)]. PMMA is the matrix used for the nanofiber fabrication, because it is a cheap polymer, with properties of solubility similar of P3HT (chloroform) and can be easily obtained as electrospun nanofibers. We obtained homogeneous electrospun nanofibers with different concentrations of P3HT, which were characterized by Scanning Electronic Microscopy (SEM), thermogravimetric analyses (TGA and DSC), Infrared and Raman spectroscopic, absorbance and luminescence in UV-Vis.

[(1)] Roque A. P., et al. Journal of Polymer Science, Part B: Polymer Physics, 52, 1388–1394, 2014