Synthesis and characterization of the electrical conductivity of reduced graphene oxide based polycaprolactone membranes

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Over the past few years, there has been a growing relevance for graphene-based polycaprolactone composites, due to the combination of the unique properties of these materials and its potential for many applications, such as flexible supercapacitors and scaffolds for tissue engineering [1]. In this work, polycaprolactone (PCL) membranes were produced by rotary jet spinning (RJS), a low cost and high productivity production technique [2]. Herein, a simple and scalable manufacturing route for obtaining a conductive PCL-rGO composite was proposed, in which the graphene oxide (GO) was synthesized by modified Hummers' method, and then deposited by dip-coating over PCL membranes. The prepared PCL-GO samples were initially electrical insulators (resistance in the range of 1 – 5 MΩ), and in order to turn it into electrically conductive, thermal reduction of GO was performed using a hot plate, a green, simple and cheap reduction route. A significant decrease in the resistance of the samples (to values in the range 100 – 200kΩ) has been observed even for only 5 minutes of reduction, with the hot plate settled at 200 or 225°C, being reached the optimal reduction degree (around 10kΩ), when the PCL-GO was reduced for 90 minutes at 225°C. The reduction degree was also verified by the x-ray diffraction (XRD) technique, through the evolution of the *full width at half-maximum*(FWHM) of the (110) plane, in which the lower the electrical resistance, the lower its FWHM value.

Acknowledgments:

This project is being carried out with the support of CAPES; grant nº: 88887.51359/2020-00, and the CNPq, grant nº 406514/2021-6.

References:

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