Abstract

Nanofibres Obtained by Electrospinning from Thermoplastic Elastomer and Graphene Composites †

Bogdan Spurcaciu 1, Lorena Iancu 1,2,*, Ramona Elena Andrei 1, Rodica-Mariana Ion 1,2, Paul Ghioca 1, Ramona Grigorescu 1, Cristian Nicolae 1, Raluca Gabor 1, Maria Rapa 3 and Ecaterina Matei 3

1 The National Institute of Research and Development for Chemistry and Petrochemistry ICECHIM Bucharest, 202 Spl. Independentei, 6th district, 060021, Romania; bogdanssssss@hotmail.com (B.S.); andreiramona@hotmail.com (R.E.A.); rodica_ion2000@yahoo.co.uk (R.-M.I.); pghioca@yahoo.com (P.G.); rmgrigorescu@gmail.com (R.G.); ca_nicolae@yahoo.com (C.N.); ralucagabor@yahoo.com (R.G.)
2 Valahia University, Doctoral School of Materials Engineering Department, 13 Aleea Sinaia, Targoviste, 13004, Romania
3 University POLITEHNICA of Bucharest, Center for Research and Eco—Metallurgical Expertise, Bucharest, 313 Splaiul Independentei, 060042, Romania; rapa_m2002@yahoo.com (M.R.); ecaterinamatei@yahoo.com (E.M.)
* Correspondence: lorena.iancu@icechim.ro
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Graphene and its derivatives have attracted considerable attention in recent years as potential materials for various applications because of their unique physical-chemical properties [1]. The study aimed to obtain by electrospinning nanofibers using styrene-butadiene block-copolymers (SBS) and styrene-isoprene block-copolymers (SIS), as well as their composites with graphene, and to investigate their structural, thermal and mechanical properties. In the first step, styrene-butadiene block-copolymers (SBS) and styrene-isoprene block-copolymers (SIS) were obtained by anionic sequential polymerization. The reactions were carried out in cyclohexane solution through a three-stage process and were initiated with n-butyl lithium. In the second step, polymer composites were obtained, using the synthesized thermoplastic elastomers and graphene in tetrahydrofuran solution. The polymeric composites obtained from thermoplastic elastomers and graphene were used for the manufacture of nanofibers by electrospinning (Figure 1).

Figure 1. Electrospinning process scheme.
The polymer nanofibers obtained by electrospinning were characterized by ATR-FTIR analysis, Differential Scanning Calorimetry (DSC), and Thermo-gravimetric Analysis (TGA). The results indicated an improvement of thermal and chemical properties of nanofibers composites with graphene, compared to basic thermoplastic elastomers.

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References