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Polylactic acid effectively reinforced with reduced graphitic oxide
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Abstract
The present study was developed to reinforce a thermoplastic matrix with carbonaceous material to improve its thermal and mechanical properties. Composite materials formed from the homogenization of polylactic acid (PLA) and reduced graphitic oxide (RGO) were synthesized and characterized, reinforcement of the polymer's thermomechanical properties and the adequate homogeneity ratio in the dispersion of the composite material were studied. Graphitic oxide (GO) was synthesized by the modified Hummers method, followed by thermal exfoliation. The chemical composition and the structure of RGO were studied by infrared (FT-IR) and Raman spectroscopies, respectively. PLA composites with different RGO contents (2 and 3% by weight) were prepared and compared in terms of distribution of RGO in the matrix and morphology, using scanning electron microscopy. The thermal stability of the composites was determined through thermogravimetric analysis. Torque of the different composites was measured, which increased at 21%; the tensile test showed an improvement in the mechanical parameters of the composites because the RGO favors the rigidity of the composite. In addition, the oxygenated functional groups present in the RGO allowed a more significant interaction with the PLA matrix, which results in an effective reinforcement of the mechanical properties of the composite material. © 2022 Walter de Gruyter GmbH, Berlin/Boston.

Index Keywords
Composite materials, Polyesters, Polymer blends, Scanning electron microscopy, Tensile testing, Thermodynamic stability, Thermogravimetric analysis; A: thermoplastics, Carbonaceous materials, Composites material, matrix, Polylactic acid, Reduced graphitic oxide, Synthesised, Thermal and mechanical properties, Thermomechanical properties, Thermoplastic matrix; Reinforcement

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