STUDY OF BIODEGRADATION IN SOIL OF PHBV/GNS NANOCOMPOSITES

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Abstract: Due to intense development of new technologies for electronic products in an increasingly short time, these products are outdated very fast and can be disposed in inappropriate places, damaging the environment. Thus, the biodegradable polymers appeared in order to avoid this type of problem.The poly(hydroxybutyrate-*co*-hydroxybutyrate), PHBV, it is a natural copolymer of poly(3-hydroxybutyrate) - PHB, which belongs to the family of polyhydroxyalkanoates (PHA's) formed by hydroxybutyrate (HB) and hydroxyvalerate units (HV). The reinforcement of this polymer with graphite nanosheets (GNS), which is a low cost nanoparticle, has the purpose of improving the properties of the polymer, and thus serve as a substitute for conventional petroleum derived polymers.This study evaluated a biodegradation in soil of neat PHBV and PHBV nanocomposites containing different contents 0.10, 0.30 and 0.50 wt% of graphite nanosheets. PHBV/GNS nanocomposites used in this study were obtained by mixing in solution, followed by evaporation of solvent (casting). In the test of biodegradation in soil, the films of PHBV remained in contact of fresh soil and fine perlite for 33 days. The films of PHBV were characterized by the visual analysis, scanning electron microscopy (SEM), mineralization and contact angle. After biodegradation in soil test, it was possible to observe increased fragility of the films. By SEM micrographs, changes in the samples surface morphology were verified, showing an increasing in the roughness and irregularity of samples surface. PHBV/0.10 wt % GNS and PHBV/0.50 wt % GNS, with exception of PHBV/ 0.30 wt % GNS, showed higher mineralization values compared to neat PHBV. With respect to the contact angle, it was observed that neat PHBV and all PHBV/GNS nanocomposites showed a decreased in the value of contact angle after biodegradation in soil test, which can be associated with a reduction of the hydrophobicity and favoring a possible degradation of the PHBV films.

Keywords: Nanocomposites, Graphite nanosheets, Poly(hydroxybutyrate-*co*-hydroxybutyrate), Biodegradable polymers, Biodegradation in soil.