

A Degradation Study of Poly(3-Hydroxybutyrate-Co-3-Hydroxyvalerate)/ Olive Husk Flour Biocomposites Under Marine Environment

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Abstract

Biodegradable polymers are expected to be alternative materials to solve the environmental pollution caused by plastics wastes derived from fossil resources [1]. However, the use of biodegradable polymers as functional materials requires the knowledge of their resistance to weathering [2]. In this context, polyhydroxyalcanoates (PHA) are the most well-known marine biodegradable biopolymers, which are suited to reducing the long-term of ocean plastics wastes [3]. Although, the main publications have focused on PHA biodegradation in various environmental conditions including compost, soil, river water or marine [3], there is however a few literature data on the biodegradation of PHA-based biocomposites in marine environments. In this work, the main objective was to investigate the effect of olive husk flour (OHF) on the marine biodegradability of PHBV biocomposites up to 6 months of immersion in sea water at 25 and 40°C. The biocomposite films were prepared by melt compounding using PHBV as matrix filled with 20 wt% of OHF, which is an agricultural byproduct of olive oil extraction. The study revealed through FTIR-ATR spectra significant changes in the chemical structure of PHBV with time, being more pronounced in the PHBV-based biocomposite samples, especially at 40°C. As observed by scanning electron microscope, the degraded samples exhibited eroded and cracked surfaces, however more pronounced in the biocomposite sample. A decohesion at the filler/matrix interface was observed at 40 °C.

References

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