

عنوان مقاله:

Mechanical, morphological and water absorption properties of polyethylene/olive pomace Flour bio-composites

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خلاصه مقاله:

Mechanical and physical properties of various weigh percentages (۰% - ۴۰%) of olive pomace flour (OPF)-loaded linear low density polyethylene (LLDPE) in the presence of ۰%, ۵% and ۱۰% coupling agent (C) were formulated and studied. Extrusion and hot press processing techniques were used to fabricate OPF/LLDPE composites. Tensile stress at yield increased by ۲۰% with the increasing of the filler loading up to ۲۰%; and marginally increased in the presence of the C. Whereas, the decline in the tensile strain at yield of the polymer composite improved with the increase in the C content. The modulus increased from ۶۳۱ MPa for the neat LLDPE to ۶۸۰, ۸۰۸ and ۷۰۰ MPa for the composites filled by ۵%, ۱۰% and ۲۰% filler content, respectively. Whereas, a decrease in the given modulus (۵۵۰ MPa) was observed at ۴۰% filler loading. The modulus has shown a successive improvement upon the addition of the C with values not less than ۸۰۰ MPa. The impact strength decreased with the increase in filler loading from ۱۱۹ kJ/m^۲ for the neat LLDPE to ۸۱, ۴۳, ۲۷ and ۱۶ kJ/m^۲ for the ۵%, ۱۰%, ۲۰% and ۴۰% OPF/LLDPE samples, respectively. On the contrary, ۱۰% C addition improved the impact strength of the composite by two folds in the case of ۱۰ - ۴۰% filler inclusion. The scanning electron microscopy (SEM) illustrations proved the mechanical performance of various bio-composite formulations. Water absorption of the bio-composite increased with the OPF loading, from ۰.۷۳% for the neat LLDPE to ۲.۶% for ۴۰% OPF-filled polymer composite, and decreased upon increasing the C content with an average of ۱.۴% for all composites. Formulated by mixing cellulosic-based material OPF and LLDPE, the bio-composite demonstrated compatible physical properties and can be used as an already available cellulosic filler for the bio-composite materials.

کلمات کلیدی:

Olive pomace flour, LLDPE, Coupling Agent, bio-composite, mechanical & physical properties

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