Abstract

This work deals with the valorization of waste jute fibers coming from carpet industries in the development of biocomposites based on blends of low-density polyethylene and poly lactic acid. First, low-density polyethylene /poly lactic acid blends of variable composition (100/0, 80/20, 50/50, 20/80, 0/100) were prepared. Their tensile properties and morphology were characterized. Tensile strength of the blends was lower compared to the pure poly lactic acid and the elongation decreased significantly with increasing poly lactic acid which is due to poor adhesion as evidenced by SEM analysis. These results indicated the incompatibility between low-density polyethylene and poly lactic acid. Thus, the aim of the second step was to find a relevant compatibilizer. For that purpose, five functionalized polyolefins were tested: poly(ethylene-co-glycidyl methacrylate) (8% glycidyl methacrylate) (PE-g-GMA), poly(propylene-co-ethylene-grafted maleic anhydride) (1.4% maleic anhydride) (PP-g-MA), poly(ethylene-co-acrylic-ester-co-glycidyl methacrylate) (E-AE-GMA) (8% glycidyl methacrylate, 24% methyl acrylate), polypropylene-grafted maleic anhydride (PP-g-MA) (high percentage maleic anhydride), poly(ethylene-co-butylacrylate-co-maleic anhydride) (E-BA-MAH) (6% butyl acrylate, 3% maleic anhydride). PE-g-GMA exhibited the best results in terms of tensile properties and morphology. Low-density polyethylene/poly lactic acid /PE-g-GMA (20/80/5) reinforced with 0-40-wt% jute fibers were prepared and characterized (tensile properties, charpy impact strength, morphology and thermal properties) in the last step. The results showed an improvement of tensile properties and a satisfactory interfacial adhesion between jute fibers and polymer blends. Furthermore, thermal stability was affected by the incorporation of 10% of jute fiber but varied very little with the increase in load