

Physico-mechanical properties of poly(lactic acid) biocomposites reinforced with cow dung

ABSTRACT

The aim of this work is to investigate the reinforcing effects of cow dung (CD) on poly(lactic acid) (PLA) properties. The PLA/CD biocomposite blends with different CD ratios (0–50 wt.%) were prepared using an internal Brabender mixer followed by compression molding. The results showed an enhancement in flexural properties and an acceptable drop in tensile and impact strength with increasing CD loading. Incorporation of CD also led to an overall decline in thermal stability of the biocomposites. However, an improvement in dynamic mechanical properties of the biocomposites was recorded. For PLA based biocomposites, above T_g (60–65 °C), a difference in the dynamic modulus becomes more pronounced as the polymer shifts from glassy to rubbery state. SEM micrographs displayed an increase in the voids and surface roughness of biocomposites with increasing CD content. It was demonstrated that high strength, high modulus PLA/CD biocomposites can be fabricated with effective stress transfer even at 50 wt.% CD loading.

Keyword: Cow dung; Poly(lactic acid); Biocomposite; Mechanical properties; Thermal degradation; Water absorption