

Abstract

Poly(lactic acid) (PLA) is an environment friendly biodegradable thermoplastic produced by micro organism synthesis through the fermentation of starch. It can be used in the manufacture of thermoplastic films used to produce packaging material in place of those produced from fossil fuels. Its introduction in the production of packaging material will reduce the consumption of petroleum, which releases Carbon (IV) Oxide, a greenhouse emission, unburned carbon fragments and other compounds that give rise to smog and air pollution on burning. It is also compostable, aiding solid waste management. In this study the mechanical properties of PLA were determined over a temperature and amplitude range in order to establish whether it can be used in the production of packaging material for single use purposes and of disposable items. The storage ($(\omega)' E$) and loss ($(\omega)'' E$) moduli as well as the Loss Tangent ($\tan\delta$) and the Glass Transition Temperature (T_g) of PLA films were determined using the Dynamic mechanical analyzer (DMA) model 2980, used in the Multistrain mode. The storage modulus of PLA at $C^\circ 50$ and amplitude of $10 \mu m$ was found to be 2220.00 MPa. The loss modulus for PLA was found to be 112.90 MPa at the same temperature and amplitude. Consequently, the elastic modulus E of PLA was found to be 2222.87 MPa. This indicates that PLA is strong and tough at this temperature. From the peak of the loss modulus graph the T_g of PLA was found to be $C^\circ 65$. T_g from the variation of loss tangent with temperature occurred at $C^\circ 3.74$.