

Effect of graphene nanoplatelets as nanofiller in plasticized poly(lactic acid) nanocomposites: thermal properties and mechanical properties

ABSTRACT

Plasticized PLA-based nanocomposites were prepared by melt blending of the matrix with 5 mass% of epoxidized palm oils (EPO) and different amount of graphene nanoplatelets (xGnP). Plasticized PLA (p-PLA) reinforced with 0.3 mass% xGnP resulted in an increase of up to 26.5 and 60.6 % in the tensile strength and elongation at break of the nanocomposites, respectively. Thermogravimetric analysis (TG) and differential scanning calorimetry (DSC) were performed to study the thermal behavior of the prepared nanocomposites. p-PLA reinforced with xGnP shows that increasing the xGnP content triggers a substantial increase in thermal stability. Crystallinity of the nanocomposites as well as cold crystallization and melting temperature did not show any significant changes upon addition of xGnP. However, there is a significant decrease of glass transition temperature up to 0.3 mass% of xGnP incorporation.

Keyword: Nanofiller; Graphene nanoplatelets; Plasticized poly (lactic acid)