

ABSTRACT:

The objective of the study is to develop a novel toughened polylactic acid (PLA) nanocomposite. The effects of linear low density polyethylene (LLDPE) and organophilic modified montmorillonite (MMT) on mechanical, thermal and morphological properties of PLA were investigated. LLDPE toughened PLA nanocomposites consisting of PLA/LLDPE blends, of composition 100/0 and 90/10 with MMT content of 2 phr and 4 phr were prepared. The Young's and flexural modulus improved with increasing content of MMT indicating that MMT is effective in increasing stiffness of LLDPE toughened PLA nanocomposite even at low content. LLDPE improved the impact strength of PLA nanocomposites with a sacrifice of tensile and flexural strength. The tensile and flexural strength also decreased with increasing content of MMT in PLA/LLDPE nanocomposites. The impact strength and elongation at break of LLDPE toughened PLA nanocomposites also declined steadily with increasing loadings of MMT. The crystallization temperature and glass transition temperature dropped gradually while the thermal stability of PLA improved with addition of MMT in PLA/LLDPE nanocomposites. The storage modulus of PLA/LLDPE nanocomposites below glass transition temperature increased with increasing content of MMT. X-ray diffraction and transmission electron microscope studies revealed that an intercalated LLDPE toughened PLA nanocomposite was successfully prepared at 2 phr MMT content.