TITLE	STUDY OF POLY (LACTIC ACID)/PINEAPPLE LEAF FIBER BIOCOMPOSITES
AUTHOR	TREECHADA NUMPANON
DEGREE	MASTER OF SCIENCE PROGRAM IN POLYMER SCIENCE AND TECHNOLOGY
FACULTY	FACULTY OF SCIENCE

ABSTRACT Fully bio-based composites were prepared from pineapple leaf fibers (PALF) and poly (lactic acid) (PLA). The composites were prepared by melt processing on a two roll mill with different PALF contents up to 20 wt%. In this work, effects of PALF reinforcement on PLA matrix were studied. Composites with PLA matrix in two different cooling methods (i.e. quench by ice bath and slow cool at room temperature) which included oven dried and undried PLA matrix were prepared. X-ray diffraction analysis (XRD) was performed to evaluate the crystallinity of composites, and gel permeation chromatography (GPC) was studied to determine the distribution of the molecular weight of the polymer. Effects of fabrication methods, i.e. compression molding and injection molding, were studied. Moreover, PALF length after processing, orientation of PALF, and adhesion between PALF and PLA matrix were determined with scanning electron microscope (SEM) and optical microscope (OM). PALF modified with sodium hydroxide (NaOH) and (3-aminopropyl) trimethoxysilane were also used. Mechanical properties of the composites were determined from tensile, flexural and impact testing. It was found that the addition of PALF, orientation of PALF, and PALF length after processing, including molecular weight, affected mechanical properties; especially impact strength. Storage modulus determined from dynamic mechanical analysis (DMA), and heat deflection temperature (HDT) increased. However, the addition of PALF slightly increased degree of crystallinity which differential scanning calorimetry analysis (DSC) revealed that PLA matrix in the composites started to crystallize sooner. At 20 wt% PALF, it was found that the cooling method and the moisture content (oven dried and undried PLA) did not affect the mechanical and thermal properties of the composites. In addition, surface modification of PALF resulted in composites with lower mechanical and thermal properties due to poor adhesion between the fiber and PLA matrix.