

PROPERTIES OF POLY (LACTIC ACID) AND THERMOPLASTIC STARCH BLENDS

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Blending starch with poly (lactic acid) (PLA) is one of the most promising efforts because starch is an abundant and cheap biopolymer and PLA is biodegradable with good mechanical properties. Different plasticizers are used and compared which made it possible to choose the starch plastification method. Polymer blends of poly (lactic acid) (PLA) and plasticized wheat starch at various ratios are prepared by using a laboratory-scale twin screw extruder and compression molding. The blends are characterized by thermal transitions, mechanical properties and microscopic studies of the two polymer interface. Starch and PLA are immiscible polymers. Copolymer of Amylose-g-PLA is prepared ex-situ and added to improve the properties of the blends. The grafting polymerization of PLA on amylose is done in three steps. In the first step in order to limit and control the number of grafting chains, amylose is partially silylated. The second step consists of ring opening polymerization of Lactide on the remaining OH groups of amylose and finally the deprotection step by removing the silyl ether groups. The effect of number and chain length of the grafted PLA on the compatibilisation power of the copolymer is studied by testing three different structures: 1. limited number but long chains of PLA grafts 2. higher numbers but shorter chains of PLA grafts (the number and the length of the grafts are chosen in a way to have the same mass fraction of PLA in these two copolymers) 3. High grafting percentage of amylose and long chains of PLA. The compatibilization effect of PLA-grafted amylose and the influence of the copolymer structure are studied.