

Preparation of thermoplastic starch and biodegradable compositions on their base

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Tradition plasticizers for starch can exhibit substantial drawbacks when used in a preparation of thermoplastic starch (TPS). We have used the eutectic mixture choline chloride (2-hydroxy-N,N,N-trimethylethanaminium chloride) – sorbitol. Because eutectic mixture choline chloride – sorbitol is melting at 25 °C, the mixing with corn starch is carried out in liquid phase. In the present study, we use maleic anhydride (MAH) as the compatibilizer without and in the presence of dicumyl peroxide (DP). IR-spectra of maleinated starch are presented in Fig. The thermal plasticization of starch and its compatibilizing modification with MAH was accomplished in a double-screw extruder at 175 °C. In the presence of MAH-DP, the compatibility of thermal plasticized starch / low-density polyethylene (TPS-g-MAH/ LDPE) and TPS-g-MAH / PP blends using MAH as compatibilizer were investigated. It was found that with the

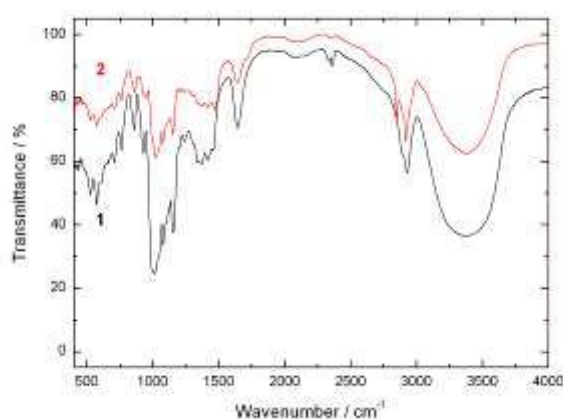


Fig. IR- spectra of maleinated starch: 1 – initial,
2 – with BP addition

addition of MAH, the blends have good interfacial adhesion and finely dispersed TPS and LDPE phases, which is reflected in the mechanical and thermal properties of the blends. The blends containing MAH showed higher tensile strength, elongation at break, and thermal stability than those of blends without MAH. The product in the form of strip is made by single-screw compounding in which a chemical coupling occurs between the starch and LLPE and PP matrix, which accounts for the material's excellent properties. Biopolymer PP-LDPE with TPS-g-MAH as prepared has higher homogeneity, strength, and heat resistance than no-maleinated plastic.