DEVELOPMENT OF MODIFIED PLA SYSTEMS
MODIFICĒTU PLA SISTĒMU IZVEIDE

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Summary. Modified poly (lactic acid) (PLA) biocomposites were developed and influence of some low molecular plasticizer (polyethylene glycol, dioctylsebacate and new commercial Danisco plasticizer) and other biodegradable polyester polyhydroxybutyrate (PHB) on the changes of thermal, mechanical characteristics and biodegradation rate of PLA films were evaluated. Blends of PLA/PHB were found to be immiscible. Efficiency of plasticizers used was demonstrated.

Biobased materials are not expected to replace convention materials on a short term basis. However, due to their renewable origin and biodegradability, they are indeed the materials of future [1].

Poly (lactic acid) (PLA) has received much attention as promising biodegradable polymer offering partial solution for the plastic waste problem.

The main goal of present research was development of modified PLA biocomposites through blending with low molecular plasticizers and/or other biodegradable polyester – microbiologically produced polyhydroxybutyrate (PHB) and assessment of some characteristics of acquired polymer films [2]. Plasticized PHB films were prepared by conventional solution casting technique from 1…2 % chloroform solution incorporating respective plasticizers: polyethylene glycol 300 (PEG), dioctylsebacate (DOS) and new Danisco produced biodegradable plasticizer under brand name Grinsted Soft-N-Safe (GSS). Blends of PLA and PHB were prepared at the same manner. The properties of obtained PLA systems were characterized through thermal analysis (DSC method), mechanical testing and biodegradation tests in soil and phosphate buffer solution (PBS). Thermal analyses demonstrated the efficiency of all plasticizers used.

It was found that melting and glass transition temperatures decreased upon plasticizer content ~ 15…20 wt%. Incorporation of low molecular plasticizers facilitates essential rise of elasticity and increase of biodegradation process of modified PLA films.

Solution casted films of PLA/PHB blends show structure heterogeneousness and were found to be immiscible (DSC results). Post heat treatment promotes development of uniform films as a result of formation different crystal structure for solution casted and melt processed films.

Summary of obtained results so far testify that plasticized PLA systems and blends could be considered as perspective and ecological material and need to be studied in future research.

References

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