BIODEGRADABLAS MODIFICĒTA PHB SISTĒMAS

BIODEGRADABLE MODIFIED PHB SYSTEMS

L.Aņiščenko, Mārcis Dzenis, Dace Ērkšķe, Velta Tupureina, Riga Technical University
Ludmila Savenkova, University of Latvia
Sandra Muižniece –Brasava, Latvia University of Agriculture

Compositions as well as production technology of ecologically sound biodegradable multicomponent polymer systems were developed. Our objective was to design some bioplastic based composites with required mechanical properties and biodegradability intended for use as biodegradable packaging. Biopolymers produced from various renewable sources were provided as matrices for biocomposite production. Among them microbiologically synthesized thermoplastic high molecular weight polyester polyhydroxybutyrate (PHB), some industrial produced PHB and local raw material – native starch.

Several PHB based matrices containing low molecular plasticizing agents were worked out and evaluated in terms of application as food packaging films and coatings. Incorporation of commercial non-toxic plasticizers (oxypropylated glycerols, esters etc.) upon the plasticizers content about 20% w/w assured acceptable strength-deformation characteristics and decrease of processing temperatures.

Matrices of plasticized PHB were used for elaboration of heterogenous composite systems containing disperse potatoes starch as filler. The chemical nature of plasticizing agents or filler, their resistance against action of microorganisms as well as compatibility with PHB essentially affect the rate of biodegradation of PHB matrices.

Significant characteristics required for food packaging such as barrier properties (water and oxygen permeability) and influence of γ-radiation on the structure and changes of main characteristics of some modified PHB matrices was evaluated. It was found that barrier properties were plasticizers chemical nature and sterilization with γ-radiation dependent and were comparable with corresponding values of typical polymeric packaging films. Low γ-radiation levels (25 kGy) can be recommended as an effective sterilization method of PHB based packaging materials.

Purposely designed bioplastic packaging may provide an alternative to traditional synthetic packaging materials without reducing the comfort of the end-user due to specific qualities of PHB – biodegradability, biocompatibility and hydrophobic nature.