ANTIMICROBIAL PACKAGING
ANTIMIKROBIĀLAIS IEPAKOJUMS

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Summary: The increasing amount of household waste is one of the serious driving forces to develop innovative packaging materials, which differ from the well-known conventional ones and could guarantee novel qualities. Prospective ideas of the development active food packaging, especially antimicrobial, are summarized. Antimicrobial packaging seems to be promising form of active packaging. Various antimicrobial substances added to packaging materials may slow down or even prevent microbial growth and hence prolong shelf life of the product and could help to maintain food safety as well.
Biodegradable polymer films and paper based layered composites containing various antimicrobial agents incorporated into the polymer were prepared. Antimicrobial activity and other characteristics regarding different micro-organisms were studied. Observed results certificate a number of synthetic and natural antimicrobial substances as perspective for further studies and potential practical use.

One of the feasibility to decrease the amount of food packaging in household waste is utilization of active packaging. Packaging is considered as active, when it performs some desired functions other than solely to provide an inert barrier between the product and outside environment. The main distinction of active packaging is that one or more forms of interaction are intended and quality of the product is maintained for a longer period. It could be achieved by incorporation of certain active ingredients in the packaging system or by use of particular active functional polymers.

Active packaging is chosen with the aim to enhance the ability of conventional packaging to help deliver the product to the user in a desired state. The decision to use some of the active packaging forms is based on several considerations: safety assurance, quality maintenance, extension of shelf life and lower packaging material costs.

The most promising active packaging systems are oxygen scavengers and antimicrobial (AM) packaging. When AM agents are incorporated into a polymer, the material is able to kill pathogenic micro-organisms contaminating food products or to inhibit their impact on the product. An experimental work was made and first results in this field were gained at the Institute of Polymer Materials, RTU.

It was ascertained, that AM packaging and packaging with proper permeability for gaseous environment may be perspective, especially, if it is made on the base of biodegradable materials. Polyhydroxybutyrate (PHB) and polyvinylalcohol (PVA), both biodegradable polymers, with incorporated AM agents were used as substrates.

Various incorporation methods of AM substances of different origin (synthetic or natural) in PHB and PVA systems depending on solubility in different solvents were tested - from direct mixing into solution to applying of AM substance to paper base.

Activity evaluation of a number of AM samples against various microbes - *Sphingomonas paucimobilis, Escherichia coli, Pseudomonas aeruginosa, Bacillus cereus, Staphylococcus aureus* indicates, that none AM substance can work on all tested bacteria cultures. The highest AM activity was found for samples containing kanamycine sulfate, except against *Pseudomonas aeruginosa* for PHB films.

Experimental results testify that in many cases antimicrobial activity of synthetic and natural substances is similar. Natural AM substances are preferable should be investigated in details. Gained results allow recognize a number of synthetic AM chemicals (EDTA, sorbitol) and products derived from natural substances (provitamin pasta, Silbiol, propolis, calendula etc.) as perspective for further research and eventual practical use.

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