

POLYHYDROXYBUTYRATE MICRO- AND NANOFIBERS AS BIODEGRADABLE MATERIAL FOR WATER DECONTAMINATION

BENESOVA Pavla, KUNDRAT Vojtech, MAROVA Ivana, MATOUSKOVA Petra,
OBRUCA Stanislav

Brno University of Technology, Brno, Czech Republic, EU

Abstract

Nanofibers represent an emerging material for filtration. They can be fabricated and collected randomly and transformed into a membrane or fibrous textile. Flexible nanofibers production technologies allowing to process variety of polymeric raw materials with many process parameters in cost effective manner are needed for the filter manufacturing. Nanofibrous membranes enable separation of bacteria, particles and also molecular filtration of risk compounds. Polyhydroxyalkanoates (PHA), namely polyhydroxybutyrate is microbial polymer produced biotechnologically by some bacteria. This polymer is very suitable for water filtration because of its hydrophobic character, water insolubility and full biodegradability. This work is focused on preparation and testing of modified PHA-based filters for water filtration and decontamination. Fibers were prepared by electrospinning and spin-coating techniques. PHA fibrous material was tested as high-volume microfibrinous and nanofibrous filter membrane. Several bacterial strains were filtered in model conditions and separation capacity of PHA membranes was evaluated. It can be summarized that PHA-based polymers are quite suitable for removing of both gramnegative and grampositive strains as well as yeasts. Further advantage of PHA based material is that after use the filter with separated microbial cells and other impurities can be composting. Under composting conditions the fibrous material can be fully biodegraded during several days or weeks.

Keywords: Polyhydroxyalkanoates, nanofibers, microbial decontamination, water

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