

Hydrogels membranes obtained by modification in the volum

N.M. Baran, O.V. Suberlyak, O.M. Grytsenko

Department of Plastic Engineering, Lviv Polytechnic National University, Ukraine, Lviv, 12, St. Bandera str.,

E-mail: natabmk@ukr.net

Abstract. Synthesized composite hydrogel membranes based on copolymers of 2-hydroxyethyl methacrylate with polyvinylpyrrolidone, with simultaneous modification in volume with a solution of a mixture of polyamide-6 with polyvinylpyrrolidone, at different concentration of mass. The influence of water quantity on physical and mechanical properties and water absorption of the obtained membranes is investigated.

Keywords: hydrogel, hybrid, modification in the volume, 2-hydroxyethyl methacrylate, polyvinylpyrrolidone, polycaproamide.

Introduction

Due to the high water content and biocompatibility, nowadays the hydrogels attract a lot of attention and achieved a significant progress during the designing, synthesis and utilizing those materials for biological and biomedical application. The current studies include the development and synthesis of new hydrogels for their application in the tissue engineering, drug delivery and biotechnology.

2-hydroxyethyl methacrylate (HEMA) belongs to the basic raw materials for the hydrogels' formation. The high water content, biocompatibility and mechanical properties similar to the natural fabrics make the hydrogels especially attractive for the tissue engineering.

Results and Discussion

The composite membrane modification can be achieved in the surface layer and in the volume.

The membranes synthesized in the surface layer exhibit the improved strength, however, their obtaining method is toilful.

The forming of the homogeneous structure material is the most appealing method. The strengthening approach of the PVP/2-HEMA copolymeric matrix hydrogel by incorporating the PA-6/PVP polymeric matrix solution, which is characterized by the high strength, in the volume has been proposed.

The effect of the water amount in the initial reaction mixture on the physical mechanical properties and water content of the modified hybrid membranes, formed in the volume has been investigated.

Conclusions

It was defined that the deformation strengthening properties and water content of the synthesized hybrid membranes modified in the volume show the different physical mechanical properties, depend on the water amount in the initial composition. Additionally, in the majority cases those properties are higher than in the primary HEMA-PVP hydrogel films. It has been shown that the tension during the modified polymeric membranes pulling diminishes with the increase of the water amount in the reaction mixture, however, their elongation and water content rise.