THE INFLUENCE OF SURFACTANTS IN THE CONTEXT OF NOVEL BIOTECHNOLOGIES FOR ELASTIN MEMBRANE PREPARATION

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The influence of a classic and new surfactants: palmitoyl-glycylglycine and new bola amphiphilic: bis[2-butyl(sodium bis-thioacetate) sodium dicarboxylate 1,10 decanediyl ester] upon the elastin membrane preparation was studied by: UV-VIS and FT/IR-ATR spectroscopy, dynamic light scattering, optical and scanning electron microscopy, contact angle and microbiological tests.

In this paper, the biomembranes were produced by novel biotechnology concepts, based on casting-solvent evaporation technique. The elastin powder was dissolved in a water- acetic acid (80:20 v/v) solution with and without plasticizer: glycerol and surfactant (classic or bola), under continuous stirring for 4-6 hrs. at 60ºC, then degassed the solution for 2 hrs. The solution was poured and afterwards maintained in the oven at 40-50°C for 4-8 hrs. Biomembranes were obtained with different surfactants which influenced the performances of membranes. Surfactants in the casting solution influence the size, as well as the density of pores and the roughness of elastin membranes surface. SEM images analyse of the surface elastin membranes allow to understand the influence of surfactants on surface characteristics like porosity and smoothness. The surface of the elastin membranes processed with new surfactants showed ***"finger"-like*** *micro-substructure with size of 2-50μm/pore (*fig.1c-d) as compared to classical membranes [1-3], without porous morphology (fig.1a).

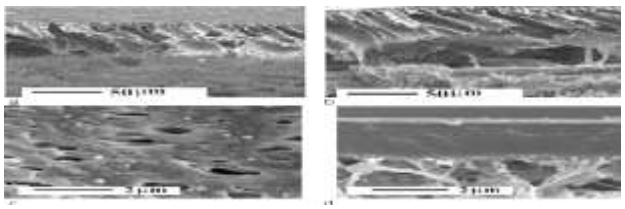

Figure 1.. SEM images of cross-sections for elastin membranes: a)-elastin membrane without plasticizer and surfactant; b)-elastin membrane with plasticizer; c)-elastin membrane with plasticizer and bola surfactant; d)-elastin membrane with plasticizer and classic surfactant

FT/IR-ATR spectroscopy showed that elastin molecules from solutions are structured and form intermolecular bonds without any cross-linking agent. Ecological biomembranes are obtained from a biodegradable biopolymer and can be successfully used in medical and pharmaceutic applications, as transdermal membranes and masks against pollutants and microbiological attack because they have very small pores.

Key requirements: surfactants, elastin membranes, novel biotechnologies

REFERENCES

[1] P.L.M. Barreto, A.T.N. Pires, V. Soldi, Polym. Degrad. Stab. 79 (2003) 147–152.

[2] S.S. Sohail, B.W. Wang, M.S. Biswas, J.H. Oh, J. Food Sci. 71 (2006) 255–259.

[3] D.Simion, M.Radu, F.Radu, F.Biziru, C.Alecu, A.Piscureanu, D.Vărăşteanu, E.Chican, Patent "Bolaamphiphilic material with ester structure and the process for obtaining it", No. 122542/2009, Of.de state and inventions,Part 1, No.541/08.08.2007

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