08A04

Functional Finishing of Chitosan membranes Grafted with 2-(methacryloyloxy)-ethyl-2-(trimethylammonium) ethyl phosphate

M.K.Lee, M.S.Kim, E.Y.Kim* and S.M.Park

Dept. of Textile Eng. Pusan University
#30, Jang jun-dong, Kumjung-Ku, Pusan, 609-735, Korea
** Chang Shin Textile Co.LTD.*

Introduction

Chitosan, an unbranched (1-4)-linked-2-amino-2-deoxy-β-D-glucan, is prepared by chemical N-deacetylation of chitin, which is the main structure element of the cuticles of crab, shrimp, and insects, and is found in the cell walls of bacteria. It has the same main chain in its molecule like that of natural heparin. Heparin, an anionic polysaccharide, is the best of anticoagulants that have been found so far[1].

In this study, to improve the blood compatibility of chitosan, 2-(methacryloyloxy) -ethyl-2-(trimethylammonium)ethyl phosphate(MTP) with phospholipid polar groups was grafted on the chitosan membranes and the biochemical properties the MTP-grafted chitosan membranes were investigated.

Experimental

Vinyl monomer containing phospholipid, MTP was synthesized according to the procedures previously reported[2]. Grafting of MTP on chitosan membranes was carried using ammonium persulfate(APS) as an initiator at 50℃ for a hour. The grafted membrane was characterized using FT-IR spectroscopy.

A permeation experiment was carried out using the U-shaped glass cell at 36.5 ℃, and pH=7.4. Evaluation of nonthrombogenicity on the surface of the membrane was carried out using whole cell prepared from human body.

Results and Discussion

Permeability of biocomponents

The permeation behaviors of biocomponents, glucose(a), insuline(b), lysozyme(c), and albumin(d) were shown in Fig.1. Good permeability of glucose through the membrane was observed and the permeation coefficient decreases with increasing the molecular weight of biocomponents.

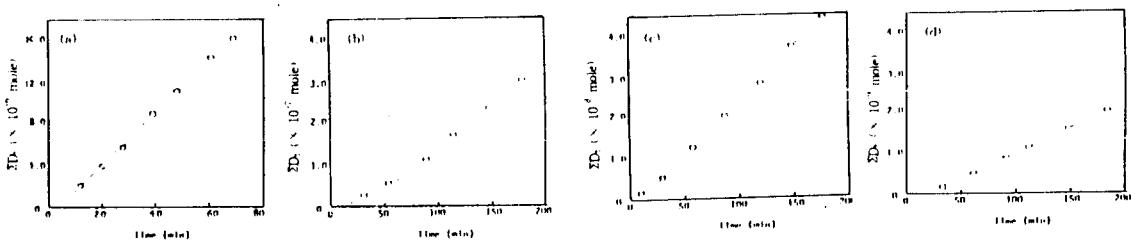

Fig.1. Permeation of glucose(a), insulin(b), lysozyme(c), and albumin(d) through MTP-grafted chitosan membranes at 36.5℃, and pH 7.4

Evaluation of whole cell adhesion

SEM pictures of MTP-grafted chitosan membrane after contact with whole cell were shown in Fig. 2. The whole cell adhesion induced by contacting membrane surface reduced with increase of MTP in feed. Thus, phospholipid moiety plays an important role for nonthrombogenicity of chitosan membranes. It is considered that the mechanism of an excellent nonthrombogenicity appeared on MTP is due to the formation of biomembrane like surface by graft and arrangement of phospholipid molecular from serum on the MTP-grafted membranes

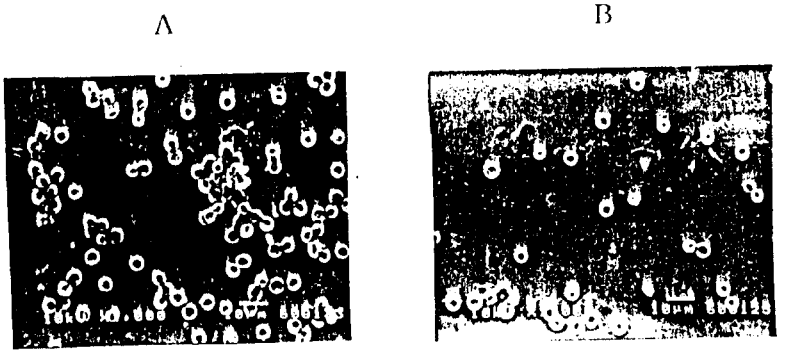

Fig.2. SEM pictures of MTP-grafted chitosan membrane after contacting whole cell for 1hr
A : chitosan membrane
B : MTP-grafted chitosan membrane

Reference

1) S.Tokura, *Kobunshi Kako*, 32, 18 (1983)
2) S.Park, *J.Kor.Fiber Soc.*, 29, 32 (1992)