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B. Kaczmarek, A. Sionkowska, J. Skopinska-Wisniewska



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## Influence of glycosaminoglycans on the properties of thin films based on chitosan/collagen blends

B. Kaczmarek, A. Sionkowska, J. Skopinska-Wisniewska

Department of Chemistry of Biomaterials and Cosmetics, Faculty of Chemistry, Nicolaus Copernicus University, Toruń, Poland

### Abstract

Thin films based on chitosan, collagen, and glycosaminoglycans isolated from fish skin were obtained by solvent evaporation. The films were characterized by different analyses, e.g. surface free energy determination, swelling tests, roughness, mechanical and thermal measurements. Moreover, the degradation studies were carried out by the film treatment with collagenase. The results showed that the properties of the films based on chitosan and collagen can be modified by the glycosaminoglycans addition. It was noticed that the addition of glycosaminoglycans enhances the surface hydrophilicity and reduces surface free energy. Surfaces of films modified by glycosaminoglycans (GAGs) show more roughness which inhibits the risk of biofilm formation. The highest films swelling was obtained after 2h immersion in phosphate-buffered saline (PBS). After their immersion in PBS, the films were more elastic, which was assumed on the basis of the elongation at break values higher than in the case of films on a dry surface. The proposed films can create biocompatible coatings for biomedical applications.

Keywords: thin films, chitosan, collagen, glycosaminoglycans

### Introduction

Materials existing in the form of thin films can be obtained from natural or synthetic polymers [1-3]. To improve the compatibility of metallic implants with their surrounding environment after implantation into the human body, they can be covered by a thin layer of e.g. natural polymers [4]. It is beneficial to use them in order to obtain such a layer due to its biocompatibility.

Collagen and chitosan can be used to obtain thin films for biomedical applications because they present significant biocompatibility. Moreover, they are miscible in different ratios [5]. Materials obtained from collagen and chitosan mixed in the 50/50 weight ratio exhibit the most appropriate properties for biomedical applications. Previous chitosan and

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