

CHARACTERIZATION OF CHITOSAN, COLLAGEN, HYALURONIC ACID BLENDS CROSSLINKED BY TANNIC ACID ADDITION

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Introduction

Collagen, chitosan and hyaluronic acid are biopolymers widely used in biomaterials science [1]. Nevertheless materials obtained from them are not stable in aqueous environment and have to be cross-linked [2]. Moreover the modification of materials leads to the improvement of mechanical properties [3]. Tannic acid is a natural compound which can be used as cross-linking agent for the biomaterials properties modification [4].

Materials and Methods

Collagen (Coll) was isolated from rat tail tendons. Chitosan (CTS) and hyaluronic acid (HA) were purchased (Sigma-Aldrich, Poland). Collagen and chitosan were prepared as 1% solutions in acetic acid. Hyaluronic acid was dissolved in hydrochloric acid in 1% concentration. Coll and CTS were mixed in the weight ratio 50/50 and then 1, 2 and 5 wt% of hyaluronic acid was added. To the mixture 2, 5, 10 and 20 wt% of tannic acid was added as cross-linking agent. Mixtures were frozen in -80°C and lyophilized. Porous structures called scaffolds were obtained and characterized by mechanical testing and infrared spectroscopy. Moreover porosity and density were measured.

Results and Discussion

Results show that after the addition of tannic acid the properties of material are modified. Young modulus increases after the addition of tannic acid. The infrared spectroscopy analysis shows that after the addition of cross-linking agent characteristic peaks from Amide A, I, II and III are shifted. It suggests that new interactions between polymers and tannic acid are present. Porosity decreases and density increases after the addition of tannic acid because the structure of composites was changed as a result of cross-linking process.

Conclusions

Tannic acid can be used as cross-linking agent where its addition modifies the properties of biopolymer material. It enhances the mechanical parameters, modifies porosity and density.

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References

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