

Accepted Manuscript

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PII: S0141-8130(17)34438-0
DOI: <https://doi.org/10.1016/j.ijbiomac.2017.11.073>
Reference: BIOMAC 8553



To appear in: *International Journal of Biological Macromolecules*

Received date: 8-8-2016
Revised date: 18-9-2017
Accepted date: 10-11-2017

Please cite this article as: Chengmei Shi, Furong Tao, Yuezhi Cui, New starch ester/gelatin based films: developed and physicochemical characterization, *International Journal of Biological Macromolecules* <https://doi.org/10.1016/j.ijbiomac.2017.11.073>

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New starch ester/gelatin based films: developed and physicochemical characterization

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Abstract

A new starch-based ester Starch-EDTAD-NHS (SEN) was successfully prepared firstly and used to modify gelatin films by amidation. $^1\text{H-NMR}$, FTIR spectra, XRD curves, elemental analysis and Van Slyke method verified the synthesis and confirmed the crosslinking procedure. The properties of the composite SEN-Gel film, such as mechanical test, surface hydrophobicity, light barrier performance, water uptake studies, morphology and solubility behavior were studied. The results of water contact angle showed the hydrophobicity of the films, and the obtained transparency values indicated that the films were opaque. Finally, the modified films with better surface hydrophobicity, more flexible and pliable, improved light barrier performances and low solubility were obtained. All the results above illustrated that the composite films obtained in this work maybe have potential applications in many fields.

Key words composite film, gelatin, starch, crosslinking

1. Introduction

In recent years, along with the increase in population and the deterioration of the environment, green chemistry has attracted people's attention ^[1]. Biomass-derived carbohydrates represent a promising carbon-based alternative as an energy source and a sustainable chemical feedstock ^[2-3]. Gelatin, as an environmental-friendly biological material, is produced by partial hydrolysis or thermal degradation of collagen, and is mainly extracted from bones, and connective tissues of mammalian sources ^[4]. On account of the low cost, biodegradability, nontoxicity, sustainability and abundance, gelatin is considered to be used in various fields of the most promising candidates, such as biology, medicine, chemistry and other fields, particularly in terms of packaging materials

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