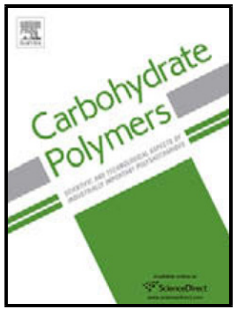

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Influence of starch oxidation on the functionality of starch-gelatin based active films.

Olga Moreno*, Julián Cárdenas, Lorena Atarés, Amparo Chiralt

Departamento de Tecnología de Alimentos – Instituto de Ingeniería de Alimentos para el Desarrollo. Universitat Politècnica de València, Camino de Vera s/n 46022 Valencia.

HIGHLIGHTS

- Interactions of starch carbonyl-gelatin amino groups resulted in polymer crosslinking.
- Crosslinking promoted the films' strength and improved their barrier capacity.
- Ethyl lauroyl arginate (LAE) addition interfered in the network crosslinking.
- Maillard compounds formation confer browning and antimicrobial activity to the films.
- Browning reactions and crosslinking progressed throughout film storage time.

Abstract

Biodegradable active films were prepared by casting, using corn starch, with differing oxidation degree, bovine gelatin, glycerol, as a plasticizer, and ethyl lauroyl arginate (LAE) as antimicrobial compound. The films were characterised as to their microstructure, physical properties and water affinity. Starch oxidation with sodium periodate (SP) greatly improved polymer compatibility and crosslinking, especially at 1:1 glucose:SP molar ratio, which promoted the films' strength (40-92 %) and barrier capacity (33 and 40 % reduction in water vapour and oxygen permeability, respectively in LAE-free films), while Maillard reactions promoted the film browning. LAE, with amino and carbonyl groups, participated in the condensation reactions, interfering in the network crosslinking. All films with LAE showed bactericidal effect against *Listeria innocua* and *Escherichia coli* and LAE free films with oxidized starch inhibited the growth of both bacteria by 1-2 log CFU, due to the antimicrobial properties of Maillard compounds. Blend films with the most oxidized starch and gelatin containing LAE are promising materials for food packaging applications.

Keywords: Biodegradable active films, oxidized corn starch, bovine gelatin, Ethyl lauroyl arginate (LAE), crosslinking.

*corresponding author: Olga Moreno. Fax: 0034 96 387 73 69 e-mail: olmomar1@upvnet.upv.es