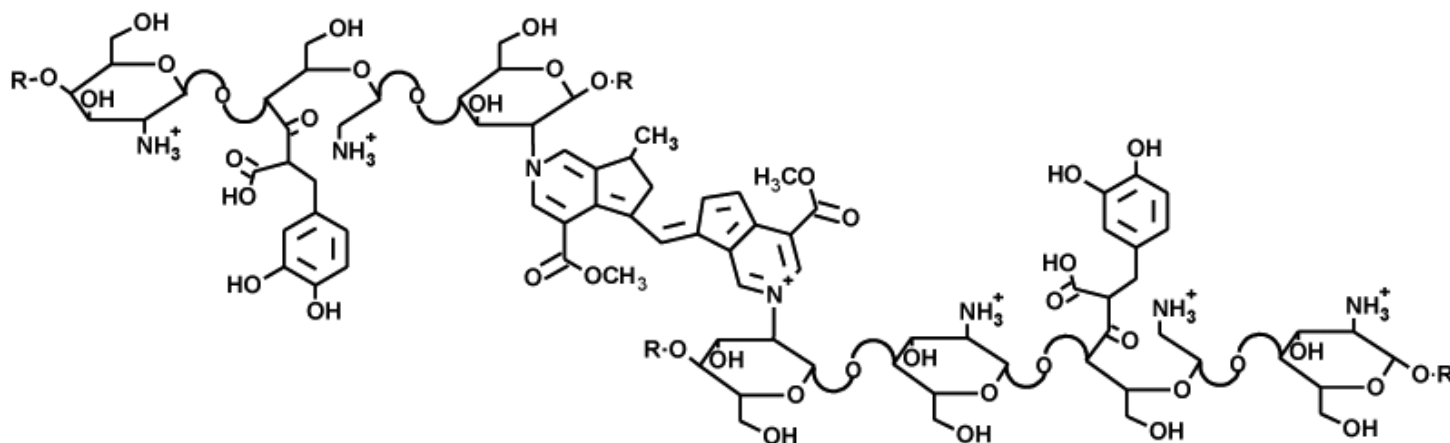


CHITOSAN-BASED FILMS WITH ENHANCED PROPERTIES FOR FOOD APPLICATIONS

C. Nunes, É. Maricato, Â. Cunha, J. A. Lopes da Silva and M. A. Coimbra



Department of Chemistry
& QOPNA, University of Aveiro

Chitosan films have an increasing interest in food industry to extend the shelf-life of foodstuffs because of their biocompatibility, non-toxicity, and antimicrobial properties. However, their use has been limited due to their solubility in aqueous acidic media. Cross-linking of chitosan to form a network is a strategy to prepare chitosan films stable in acidic media. Genipin is an iridoid, aglycone of geniposide obtained from *Gardenia*, which is an effective cross-linker for chitosan.

The chitosan-genipin films are suitable to replace the preservative action of sulfur dioxide during winemaking, which is an advantage due to the intolerance and/or allergic reactions attributed to sulfur dioxide. White wines can be produced according to the traditional method of vinification but, instead of the sulfur dioxide addition, the chitosan films are placed in contact with the wines. After one year of storage, the wines are microbiologically stable. The physico-chemical analyses showed that these wines had slightly lower content of phenolic compounds and lower colour intensity, with a greener tone (lower a^*) and less yellow (lower b^*). A sensorial trained panel revealed that the wines treated with chitosan films had a good global evaluation with respect to taste, aroma, and colour. These results show the efficiency on white wine preservation of the chitosan-genipin films, maintaining its sensorial characteristics.

dant activity than the pristine films. Furthermore, the surface wettability, mechanical properties, and thermal stability of the films were not significantly influenced. These films can be promising materials to be used as active polymers for food preservation and shelf-life extension.



FIGURE 1

Proposed structure of chitosan grafted with caffeic acid and cross-linked with genipin.

FIGURE 2

Film of chitosan grafted with phenolic compounds and cross-linked with genipin.

One approach to enhance chitosan functionality is to link phenolic compounds into the polysaccharide backbone increasing its antioxidant activity. A process for the preparation of a chitosan-based film was developed by grafting the red wine phenolic compounds to the chitosan glucosamine residues by a radical mechanism and also by cross-linking with genipin. This methodology allowed producing films insoluble aqueous acidic media with 100% higher antioxi-