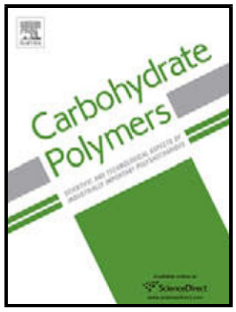

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Effect of the incorporation of antimicrobial/antioxidant proteins on the properties of potato starch films

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Highlights

Lactoferrin and lysozyme in potato starch films increased glass transition temperature.

Films with proteins were more brittle and less extensible, regardless moisture content.

Both proteins enhanced water vapour and oxygen barrier properties of starch films.

Films with the blend of both proteins showed antimicrobial activity against coliforms.

Both starch and protein-starch films resulted effective at reducing fat oxidation.

Abstract

Glycerol plasticized potato starch films containing bioactive proteins (lactoferrin (LF) and/or lysozyme (LZ), at 0.1 and 0.2 ratio with respect to starch) were obtained by casting method and characterised as to their microstructural, thermal and physical (water content, mechanical, water and oxygen barrier, optical) properties. The bioactive properties, named antioxidant and antimicrobial, of the proteins and the films were also characterized. The incorporation of proteins affected the structural and physical properties of potato starch films, while modifying their thermal behaviour and increasing the glass transition temperature. Both proteins showed a certain degree of compatibility with starch chains through the bond formations (increase in Tg), while a part is separated and migrates to the film surface. Their incorporation, especially that of lactoferrin, greatly increased the film's brittleness, regardless of the films water content, although they enhance the water vapour and oxygen barrier properties, whatever the age of the film. Protein also reduced the film's transparency and gloss, while lactoferrin induced colour changes. The thermal degradation of blend films and isolated proteins occurred at temperatures of over 250ºC, which means that blend starch films can be thermoprocessed, according to their thermoplastic properties and following the usual practices of the