152-32

Biodegradable composite films based on -carrageenan/locust bean gum blends and clays: Physical and antimicrobial properties

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Biopolymer films offer a variety of advantages compared to synthetic films: biodegradability, use of renewable sources and potential edibility. Improvements in the functional properties of these films have been made by reinforcement of the polymer matrix with layered clay minerals such as montmorillonite.

The aims of this work were to evaluate the physical and antimicrobial properties of biodegradable films composed by mixtures of κ-carrageenan and locust bean gum when organically modified clay (Cloisite 30B) was dispersed in the biopolymer matrix.

Film forming solutions were prepared by adding Cloisite 30B (concentration ranging from 0 to 16 % w/w) into the κ-carrageenan/LBG solution (40/60 % w/w) with 0.3 % of glycerol. Barrier properties (water vapor permeability, *WVP*; CO_2 and O_2 permeabi-

mechanical properties (tensile strength, *TS* and elongation at break, *EB*) of the films were determined. The composite film structure was investigated by X-ray (XRD). Antimicrobial effects of these films against *Listeria monocytogenes*, *coli* and *Salmonella typhimurium* were also evaluated.

showed that an increase in the clay concentration caused a decrease of *WVP* $^{-11}$ to 3.19x10^{-11} g (m s Pa)$^{-1}$. O_2 permeability showed values ranging between and 4.80x10^{-14} g (m s Pa)$^{-1}$. The CO_2 permeability increased from 2.26x10^{-14} g (m s Pa)$^{-1}$ for films with 0 % and 16 % clay, respectively. Films with 16 % exhibited the highest *TS* (33.82 MPa) and *EB* (29.82 %). XRD patterns of the films that a degree of exfoliation is attained depending on clay concentration. an/LBG/clay composite films exhibited an inhibitory effect only against *L. es* due to the quaternary ammonium group of Cloisite 30B which disrupts e bacteria cell membranes.

geenan/LBG/clay composite films are a promising alternative to synthetic films improve the shelf stability of food products.