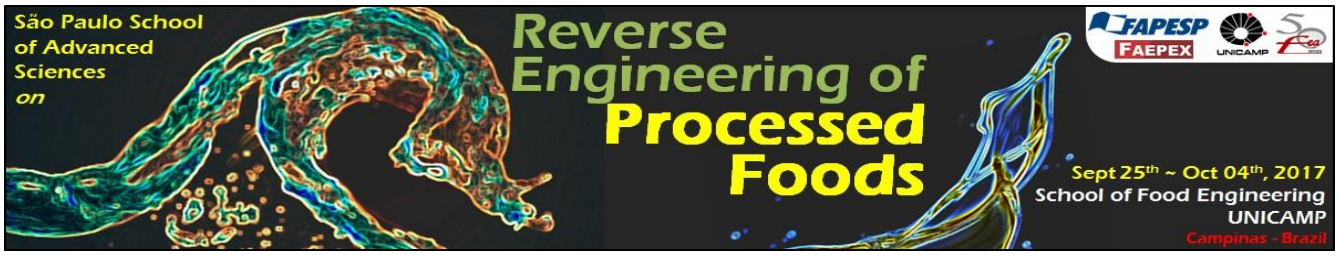

PHYSICO-CHEMICAL PROPERTIES OF ALGINATE-BASED FILMS: CROSSLINKING AND MANNURONIC/ GULURONIC RATIO EFFECT

MARIA J. COSTA1,ARLETE M. MARQUES1, SANNA SILLANKORVA1, JOSÉ A. TEIXEIRA1, MIGUEL A. CERQUEIRA2. 1Centre of Biological Engineering, Braga, Portugal; 2International Iberian Nanotechnology Laboratory, Braga, Portugal. *mariacosta@ceb.uminho.pt

Films can be produced by different edible materials such as: polysaccharides, protein, and lipids, with the possible addition of plasticizers and/or surfactants. Their performance is directly related with the material composition and the environmental conditions. Alginate films have been extensively studied, nevertheless their use in the production of edible films ask for the fully understanding of the effect of their main characteristics on the film's final properties. This work aims to characterize alginate-based films (10 g/L), with different ratios of mannuronic (M) and guluronic (G) acids and cross linking with different

concentrations of CaCl2 (0 to 15 g/L). Two commercial alginates, the CR 8223 (M/G ratio of 65/35 and a molecular weight of 300 kDa) and Manugel (M/G ratio of 30/70 and a molecular weight <200 kDa), were used. Mechanical properties (tensile strength and elongation-at-break), opacity, water sensitivity (moisture content, solubility, isothermic adsorption and contact angle) were evaluated for each type of alginate-based films. Chemical interactions were studied using Fourier Transform Infrared Spectroscopy (FTIR) to evaluate the possible changes in chemical structures of the different alginate-based films. Results showed that the crosslinking has a significant effect on alginate structure and properties, decreasing moisture content of films from 41.40 % and 37.29 %, in non cross-linked films, to 20.73 % and 21.78 % in films crosslinked with 1.5 % of CaCl2 for CR 8223 and Manugel, respectively. Another observed effect was in mechanical properties, where the crosslinking increased the films tensile strength, from 9.28 to 38.74 MPa for CR 8223 alginate and from 3.72 to 26.43 MPa for Manugel alginate. The crosslinking also allows a decrease of the films solubility and an increase of their swelling index. Results showed that the M/G ratio and molecular weight highly influenced the main properties of the films where the higher amount of mannuronic acid in relation to the guluronic acid leads to stronger and less soluble films. In conclusion, results showed that the use of alginates with different M/G ratio and their crosslinking with CaCl2 can be used to produce films with different properties and thus several applications can be foreseeing.

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